



Faculty of Economic Sciences, Communication and IT

G. Wicander, M. Hatakka and E. Kromidha (eds.)

Proceedings of IPID Postgraduate Strand at ICTD 2010

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Foreword

It is our profound pleasure to introduce this conference proceeding with contributions from the postgraduate strand at ICTD2010. The event took place on the first day of the conference and was co-hosted by IPID (The International Network for Post Graduate Students in the Area of ICT4D, <http://www.ipid.se>) and postgraduates in the ICT4D Collective (<http://www.ict4d.org.uk/>). The purpose of the post-graduate strand was for post-graduates and other young researchers to share their experiences in the ICT4D field in order to gain more knowledge on how ICT use for development can be improved. The day consisted of three paper sessions with presentations and discussions and an interactive panel session focusing on mobile technology.

Authors were invited to share their research about, and experiences from, the entire field of ICT4D. The contributions covered a wide field of ICT and the papers encompassed several aspects from ICT development; both empirical research and conceptual papers. These examples of the rich diversity of papers bear witness to the promises and importance of ICT for development.

The ICTD2010 conference was the latest in the series of highly successful international ICTD conferences held in Doha (2009), Bangalore (2007) and Berkeley (2006). They provide a forum for researchers, practitioners and all those with interests in the use of information and communication technologies in development practice to meet and discuss the latest research advances in the field (more information can be found at <http://www.ictd2010.org/>). The ICTD 2010 - Post Conference Report can be found at <http://www.gg.rhul.ac.uk/ict4d/ictd2010/ictd2010Report.pdf>

We also want to acknowledge the important contribution of the reviewers for this conference and proceedings.

A special thanks to Hannu Larsson, Sirajul M Islam, and Endrit Kromidha for chairing the sessions and to Christopher Foster, Johan Hellström and Vivian Ogochukwu Nwaocha for participating in the panel. We especially thank Professor Åke Grönlund for accepting our invitation and for participating in the panel.

We would like to take this opportunity to thank the ICTD2010 Chairs Tim Unwin, Dorothea Kleine, Kentaro Toyama and the Programme Committee Chairs for their efforts and determination in making this event happen.

On the behalf of the organizing committee we would like to express our sincere thanks to all the paper presenters, who in this volume share their works and ideas with all of us and we would also like to take this opportunity to announce the ICTD2012 in Atlanta (more information can be found at <http://www.ictd2012.org/>).

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Theories of Change and Evaluation of Malaysian Rural Internet Centers

Nor A. Alias, H. Jamaludin, S. Hashim, I. S. Ismail, N. Suhaili

Abstract—The paper describes the findings from the early phase of a research conducted to evaluate the impact of utilization of Malaysian Rural Internet Centers (RICs) on user's sense of social connectedness and empowerment. It employs a theory of change approach to study the outcomes brought about by the RICs. Initial findings however, suggest that the RICs have evolved individually and are unique from each other, thus requiring a revised evaluation framework based on each RIC's role and functions. Interviews, observations and document analysis conducted at six RICs imply three main models: (1) The Cyber-café model, (2) The community service center model and (3) The entrepreneurial center model. Three theories of change are subsequently proposed to address each model and further aid the evaluation of the RICs in each category.

Index Terms—ICT development, Evaluation, Rural Internet Centers, Theory of Change.

I. INTRODUCTION

Malaysia is a developing country with a population of 28.0 million spread over thirteen states. The ICT agenda was spurred by the formation of the National Information Technology Council and the Multimedia Super Corridor in 1995. In 2008, there were more than 15 million internet users and 25 million mobile subscribers in Malaysia [1]. The 9th Malaysia Plan (2006-2010) targeted the setting up of 70 district internet centers and 100 sub-district centers. The services offered at those already established are cyber café like (e-mail and internet access); word processing; desktop publishing; access to e-government services,

education and training, printing and scanning. Projects such as *Pusat Internet Desa* or Rural Internet Centre (RIC) are carried out by the Malaysian government to provide ready access to ICT. As of 2010, forty one Rural Internet Centers (RICs) each with its own website and network of members are in full operation in Malaysia. The telecentre project initiated in April 2000 stands as one of the government's initiatives to bridge the rural-urban digital divide through free community-shared ICT facilities and internet access. Rural communities need to stay abreast not only of technological advances but of the country's development and the government plans. However, a study done by [2] to look at the level of preparedness, the suitability as well as the ICT needs of the people in the rural areas found a clear gap between the urban areas and the rural areas.

II. RESEARCH CONCERNS

ICT paves the way for the efficient transfer of information, e-services, social networking and knowledge sharing. In addition, communication through ICT can create a sense of connectedness [3] through exchanges that allow people to be aware of each other and to maintain social relationships. This is further emphasized by [4] who state that people not only socialize online, but they also incorporate the internet into seeking information, exchanging advice, and making decisions.

E-government initiatives have also moved from impersonal, one way information dissemination and limited accessible data to Government 2.0 initiatives that include integration of tools such as wikis, social networking sites and the use of blogs to exchange information and connect with the people [5], [6] including those in the rural areas. The question is whether the available RICs and access to the internet are actually impacting these communities. Connectivity is not an issue but connectedness may be a concern. Do rural users utilize the RICs to connect with family, friends and acquaintances? Do they connect with those external to their social circle? Do they connect with the government? Do they perceive a heightened sense of connectedness?

Another related aspect of ICT usage is that of empowerment, defined by [7] as a multi-dimensional social process that helps people gain control over their own lives. It gives people the capacity to implement and act at different levels including personal, interpersonal, group and citizenship level [8]. In Malaysia, e-government initiatives include provision of Internet access to rural folks. Does this measure give them the information, knowledge, technical action and

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opportunities including the capacity to conduct citizen-government transactions without leaving their village? Does ICT access through RIC empower the rural people?

The utilization of ICT made available at the Malaysian RICs is earlier anticipated to enhance the ICT skills and to foster capacity building of rural folks. Ten years after the RICs come into being, a revised theory of change and further evaluation of the RIC is due. The researcher employs a theory of change approach to propose a framework of evaluation of existing Rural Internet Centers (RICs) in Malaysia. The actual evaluation of the RICs will not be within the scope of the paper.

This paper reports a research in progress. It describes the early findings of a research on RIC utilization and proposes a theory of change that is anticipated through public access to ICT. It combines ICT skill enhancement, capacity building and networking into two constructs which are (1) sense of social connectedness and (2) empowerment. It starts with profiling the users and exploring the views of RIC managers in several states in Malaysia. The selection of RICs is done by scrutinizing each RIC's reported activities, available on each RIC website. RIC users on randomly selected days are the informants of this phase of the study.

III. BRIEF REVIEW OF LITERATURE

The impact of public access to ICT has not been definitive [9]. There is also a huge gap in the area of measurement of the magnitude of impact with most research in this area being case-based and qualitative. It is the aim of the research to provide both quantitative and qualitative evaluation of the impact of public access to ICT by going beyond studying government ICT provision in enhancing the people's access to information and knowledge. It will also look into a social psychological aspect of ICT, namely its capability to enhance the people's sense of social connectedness and empowerment

A. Sense of Connectedness and Social Connectedness

Of late, researchers have deliberated on the capability of technology to provide a sense of connectedness which is a sense of belonging, sharing and a feeling of being touch [10], [3], [11]. Ijsselstein et al [12] further express connectedness as keeping up-to-date with other people's lives. Social connectedness basically refers to the relationship people have with others. It illustrates the connection between people, both within their immediate social groups and within the wider community. Access to the internet thus provides higher level of social connectedness as people are able to access information resulting in opportunities to participate in society. A study by [13] indicates two types of ties that are fostered through community technology centers. These are bonding ties within communities that are horizontal (peer to peer) and bridging ties to individuals who are not aligned in social status or geographic location. The first tie thus enhances supportive relationships and opportunities to belong while the second tie provides the chance to connect to a world different from one's own. Boase et al [4] in turn describe the ties as core ties and significant ties.

Hemmingway Measure of Adolescent Connectedness as suggested by [14] postulates three separate elements to a sense of connectedness namely participation and support, sense of belonging and sense of relatedness. In this study, these elements are considered alongside those derived from the work of the researchers mentioned to develop a framework for sense of social connectedness. The elements as shown in Figure 1, are access and participation informal networks and a sense of relatedness that emerges out of it.

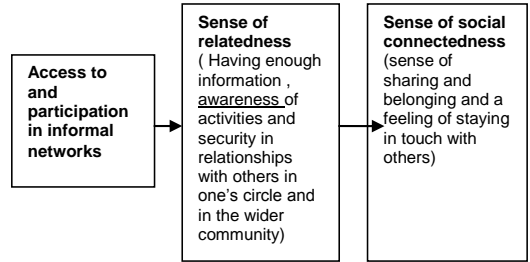


Fig. 1. . A framework of sense of social connectedness

B. Empowerment

Empowerment is about power and the capacity to do things. This study investigates empowerment as an impact of access to ICT via public sites that supports "an opportunity structure that allows people to make new choices through raised consciousness, better information, and expanded entitlements" [15]. As a social process, Page and Szuba's [7] definition of empowerment (see page 1) implies that the individual and community are fundamentally connected. This is supported by [16] who states that the foundation of community empowerment is based on the individual empowerment. She further suggests that the empowerment of the individual's begins with the belief that what he or she is trying to accomplish is possible.

Empowerment through ICT which is the mainstay of this study is studied by various researchers including [17] and [18]. Amichai-Hamburger et al [8] proposes a four-level model to explain E-empowerment ranging from (a) the personal, (b) the interpersonal, (c) group and (d) citizenship empowerment. In this study, empowerment is limited to increase skills and citizen accessibility to information and services. All other aspects of empowerment via ICT will not be investigated due to constraint of time and resources. In short, the research will study how public access sites, in this case the Malaysian Rural Internet Centers impact the sense of social connectedness and empowerment of its users through their internet usage. It will also look at these two aspects through constructs such as those listed below.

Sense of social connectedness

- a) Relatedness
- b) Access to informal direct networks
- c) Participation in informal direct networks
- d) Access to informal wider community networks
- e) Participation in informal wider community networks

Sense of empowerment

- a) Increased personal ICT-related skills

- b) Access to government information and tools
- c) Ability to conduct citizen-government transactions

Malaysian Rural Internet Centers (RICs) have however, evolved and carved a niche of their own. It is crucial to allocate the early stage of the research to investigate each RIC and how the two constructs can be achieved and measured.

C. A Theory of Change for Malaysian Rural Internet Centers (RICs)

A theory of change as espoused by [19] refers to “how practitioners believe individual, inter-group and social/systemic change happens and how, specifically, their actions will produce positive results”. With regard to the ICT related outcomes brought about by the availability of Rural Internet Centers, a proposed theory of change simply aids the identification of the impact of RICs. Though normally developed at the onset of the program or at the inception of RIC, a theory of change is also pertinent in the continuous process of developing a RIC’s direction. This is even more essential after individual and community characteristics have been duly studied and recognized. This is the main objective of this paper – to propose a theory of change that will aid in deducing outcomes based on the current RIC roles and functions. Figure 2 explicates the general framework of change proposed at the beginning of the study

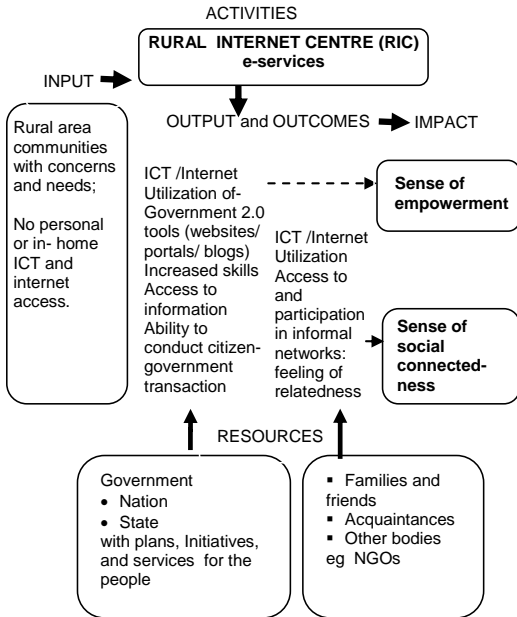


Fig. 2. The general framework of change

Though there are differences in a theory of change and a logic model [20], this report blends the two approaches to program evaluation, hence, a theory of change logic model is developed. It is however, pertinent to evaluate existing

practices and the usefulness of the abovementioned theory. Assumptions made may be imprecise and postulations need to be validated. Hence, the early stage of the research focuses on theories of change that bring about the RIC outcomes.

IV. METHODOLOGY

Visits were made to six rural internet centers (RICs) in three different Malaysian states during the early stage of the study. Data were collected through observations, document analysis and structured interviews using an 8-section venue survey. The researchers were given access to logbooks and reports on the RIC yearly activities and achievements. The managers of each RIC and several users were requested to answer questions on RIC infrastructure, staff, services, user access and utilization, changes and their perceived impact of the RIC on the community. The RIC managers were very cooperative and provided useful information to the researchers. They enthusiastically described unique cases of empowerment and social connectedness that stemmed from the users frequenting the RIC. Observations were also made to gauge the interaction between the users and the manager.

V. FINDINGS

All the RICs visited were found to offer basic ICT services such as computer use, internet use, printing, typing services, scanning, photocopying, faxing and phone services. Certain RICs provide laminating services, e-ticket travel services and preparation of documents such as resume and accounting report. Some prohibit downloading and chatting. The RICs also provide ICT training to the rural users.

Findings from this stage suggest varying practices among each RIC, contrary to the researcher’s preliminary beliefs. It was found that

1. Malaysian RICs tend to evolve differently depending on its location, users and the management. Hence, it is not quite right to generalize the findings in one RIC to all the Malaysian RICs. Each RIC is thus, treated as a unique case. However, similar characteristics persist among certain RICs, thus making it possible to categorize them accordingly.
2. Local context, culture, politics and community support are strong determinants of RIC activities and outcomes.
3. Location influences the functionality of the RIC. Those situated in locales with other public access centers such as cyber cafes and broadband centers tend to cater to mature users and older adults who are less comfortable with the younger group who frequent the other mentioned centers.
4. Most RIC managers respond to the local clientele, thus providing services and developing activities that fit the needs and characteristics of the users.
5. Community users influence RIC manager’s personal development
 - a. Managers who hail from the same community tend to be socially connected to the community of users
 - b. Managers develop their skills and ICT expertise according to the local needs.

The initial findings suggest that Malaysian RICs may be categorized into three main models:

1. The Cyber-café model
2. The community service center model
3. The entrepreneurial hub model

The above points also provide the basis for the development of three models or theories of change that underlie each category of Malaysian RICs. Adapting a theory of change logic model template developed by the Kellogg Foundation [21], the change in three categories of Malaysian RIC is illustrated in Figs. 3, 4 and 5.

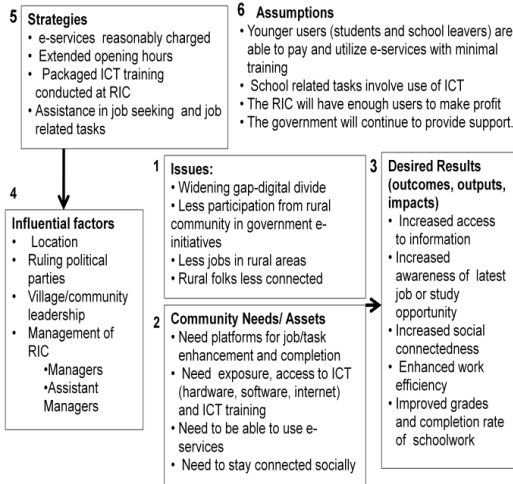


Fig. 3. The theory of change logic model for Cyber Café Model

The first RIC model is akin to a cyber café where younger users come in to utilize IT tools and the internet. Students, school leavers and job seekers form the target group of such RIC. They use the facility for communication, school work and job related activities. The manager is less socially involved with the members of the community and runs the center as a business entity. RIC utilization is anticipated to impact the user's sense of empowerment in terms of increased ICT skills that aid their schoolwork and job related tasks. Users are also expected to be more connected to friends

The second type of RIC as depicted in Fig. 4 functions as a community center where folks come in to meet others. The manager normally hails from the community and is very much involved with the people. The users are basically retired government servants, senior citizens and home makers who utilize the RIC to stay connected with family members and conduct simple home business tasks. The RICs are normally situated in locations where there are other public access centers such as cyber café and broadband centers.

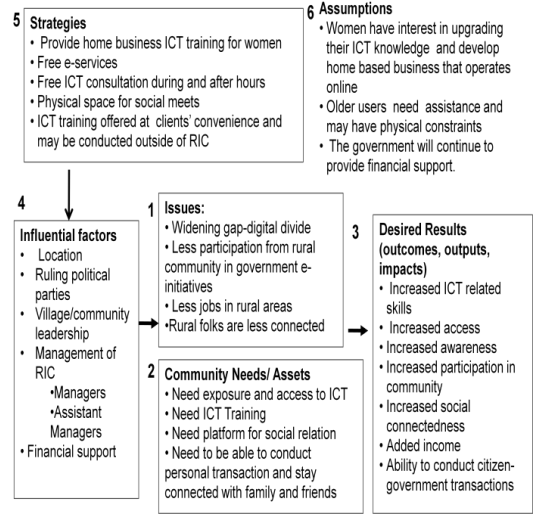


Fig. 4. The theory of change logic model for Community Service Center Model

The Entrepreneurial center model (Fig. 5) is gaining its ground in many Malaysian states. RICs are seen as training and service centers for small and medium business owners. The manager has the tasks of organizing sessions with relevant government such as Companies Commission of Malaysia/SSM for matters on company registration and tendering.

VI. DISCUSSION

The three abovementioned theory of change logic models are developed following the interviews and observations with RIC managers and users. Due to the varying context and needs of each community, the researchers contend that a generalization of the research findings is not possible. Each RIC has to be treated as a case on its own due to the differences in the way they operate, the profile of users and the support they receive from the community. The prevailing political party in the prospective areas also plays a role in assuring the smooth operation of the RIC and success of its activities.

The three models also suggest varying measure of empowerment and social connectedness which is due to the dominant age group, services provided at the RIC and the manager's initiatives. A rural internet center may not have many users who are empowered in terms of their schoolwork and academic tasks; instead it may harbor senior citizens who can now get a letter typed or email their grandchildren who live far away. Preliminary data shows that connectedness to the government is not apparent in the first two models but it is slightly evident in the third model. How the two constructs prevails in each RIC model will be further investigated in the second part of the research.

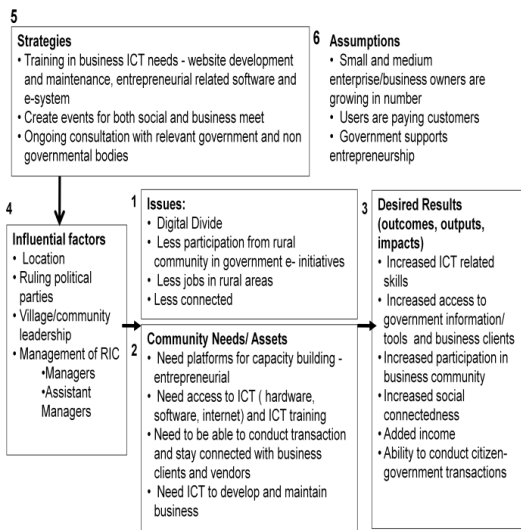


Fig. 5. The theory of change logic model for Entrepreneurial Center Model

VII. CONCLUSION

The early stage of the research generates three different theories of change for three categories of Rural Internet Centers (RICs) in Malaysia. The cyber café model, the community service center model and the entrepreneurial center models come into being via years of local community needs and influence. The uniqueness of each model will be further studied and the theory of change assigned to it will aid the researcher to evaluate the outcomes of RICs in the category. It is imperative that connectedness and empowerment are redefined according to each theory of change.

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REFERENCES

- [1] R. Fuchs. (2009, October 2009). Media statement at IDRC-PAN All Partners' Conference, Penang, Malaysia, June 11, 2009. [online]. Available: http://idrc.org.sg/.../12460090631Rich_Fuchs_Media_Statement.pdf
- [2] H. Azman, "Rural social transformation for The 21st century: Impact of E-community centers on the development of E-Literacy among youth in rural areas in Malaysia" in *Jurnal Pembangunan Belia Malaysia*, vol. 1 pp. 83 – 98, 2008.
- [3] R. Rettie. (2003, November 10). Connectedness, awareness and social presence, 6th International Presence Workshop, Aalborg. [online]. Available:

- <http://www.kingston.ac.uk/~ku03468/includes/docs/Connectedness,%20Awareness%20and%20Social%20Presence.pdf>
- [4] J. Boase, J. B. Horrigan, B. Wellman and L. Rainie. *The strength of internet ties*. Washington D. C.: Pew Internet and American Life Project. 2006
- [5] G. G. Curtin, "Global E-Government/E-Participation models, measurement and methodology: A framework for moving forward" presented at the 2006 Workshop on E-Participation and E-Government: Understanding the Present and Creating the Future, Budapest, Hungary
- [6] D. Hinchcliffe (2009, September 25). Building a vision for Government 2.0 [online]. Available: <http://www.zdnet.com/blog/hinchcliffe/building-a-vision-for-government-20/467>
- [7] N. Page and C. E. Szuba, "Empowerment: What Is It?" in *Journal of Extension* vol. 37, no. 5, 1999.
- [8] Y. Amichai-Hamburger, Y.A. Katelyn Y.A., B. C. McKenna and Samuel-Azran Tal, "E-empowerment: Empowerment by the Internet" in *Computers in Human Behavior*, vol 24 , pp. 1776–1789. 2008
- [9] A. Sey and M. Fellows, " Literature Review on the Impact of Public Access to Information and Communication Technologie" in *CIS Working Paper No. 6*, Center for Information & Society (CIS), University of Washington. 2009.
- [10] A. Haans and W. Ijsselstein, "Mediated Social Touch: A Review of Current Research and Future Directions" in *Virtual Reality* vol. 9. No 2-3, pp. 149-159. 2006.
- [11] T. Yukawa, K. Kawano, Y. Suzuki, T. Suriyon, and Y. Fukumura, Y. (2008, October 27). Implementing a Sense of Connectedness in e-learning. In J. Luca & E. Weippl (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 1198-1207). Chesapeake, VA: AACE. [Online]. Available : <http://www.edlib.org/p/28538>.
- [12] W. Ijsselstein, J. Van Baren, and F. Van Lanen, "Staying in touch: Social presence and connectedness through synchronous and asynchronous communication media" . In: C. Stephanidis and J. Jacko (eds.), *Human-Computer Interaction: Theory and Practice (Part II)*, vol. 2, pp. 924-928. 2003.
- [13] R. A. London, M. Pastor, L. Servon, R. Rosner and A. Wallace, *The role of community technology centers in youth skill-building and empowerment*. Center for Justice, Tolerance, and Community Working Paper, University of California, Santa Cruz 2006
- [14] M. Karcher, "The Hemingway: Measure of Adolescent Connectedness Validation Studies", presented at the 2001 Annual Conference of the American Psychological Association , San Francisco, CA.
- [15] S. Brook and J. Holland (2009, January 23).A mixed-method approach to measuring empowerment in the context of social policy monitoring in Jamaica, The World Bank Poverty Reduction Group [Online] Available: http://siteresources.worldbank.org/INTEMPowerment/Resources/Jamaica_Measuring_Empowerment.pdf (pp. 10)
- [16] E. Sadan (2004, August 10). Empowerment and community planning. [Online]. Available: http://www.mpow.org/elisheva_sadan_empowerment_spreads.pdf
- [17] B. C. Stahl, "Empowerment through ICT: A critical discourse analysis of the Egyptian ICT policy" in *Social Dimensions Of Information And Communication Technology Policy*. Boston: Springer , 2008, pp 161-190.
- [18] S. Jain. (2007, June 25). ICTS and women empowerment: Some case studies from India [Online] Available: <http://www.ifuw.org/seminars/2007/jain.pdf>
- [19] L. Shapiro (2006). Extending the framework of inquiry: Theories of change in conflict interventions [Online]. Available: http://www.berghof-handbook.net/documents/publications/dialogue5_shapiro_comm.pdf
- [20] H. Clark and A. A. Anderson. (2004). Theories of change and logic models: Telling them apart. [Online] Available: http://www.evaluationtoolsforracialequity.org/.../TOCs_and_Logic_Models_forAEA.ppt
- [21] Kellogg Foundation (2000). Using logic models to bring together planning, evaluation and action, [Online] Available: <http://www.publichealth.arizona.edu/chwtoolkit/pdfs/Logicmod/logicmod.pdf>

ICT and Oral Language Development

A Case Study at Makerere University Business School

Les TIC et le Développement de l'expression Orale en Français

Sur Objectif Spécifique (Fos) dans le Contexte Ougandais

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Abstract—This study forms part of a larger research on the role of information and communication technology in triggering language development in the learners of French for Specific purpose at Makerere University Business School in Uganda. The study adopts action research that focuses on the role of technologies deployed in oral technical presentations such as the use of MSOffice to enhance French students' oral skills in French for Specific purpose. Three main assumptions underpin the study; the first one is that the use of multimedia tools such as technical PowerPoint presentation facilitates the acquisition of the oral competence. Secondly, language 2 acquisition is made easier if learning activities combine real-world, content –based, socially and culturally viable activities. This is because of the very nature of the human faculty of language and its intricate relationship with society, culture and human knowledge. The third assumption encompasses the view that language production is the result of a dual –processing system (rule-based and exemplar –based) where nativisation is perceived as a natural process which requires some form of mediation. This therefore implies that a learning environment that incorporates language use and language-learning as social activities, coupled with the use of technology could lead to improved oral skills. These are situations which encourage negotiation of meaning and learner collaboration with other learners.

Keywords—*Information and Communication Technology; Action Research; Second Language Acquisition; French for Specific Purposes*

Résumé—Notre étude relève du domaine de la didactique des langues et de l'usage du dispositif TIC. Elle se base sur une recherche –action qui va porter sur un exposé technique orale par les apprenants du Français sur Objectif Spécifique (FOS) à Makerere University Business School (MUBS) en Ouganda. Cette recherche action vise à améliorer l'expression orale à buts spécifiques en langue française des apprenants de l'université "MUBS". Il s'agit de répondre à la fois à un souci caractéristique de bon nombre d'apprenants de filières technique et à une demande institutionnelle Locale. Notre hypothèse est que cet outil pourrait déclencher une interaction entre les apprenants qui n'arrivent pas à s'approprier la compétence de la production orale. Pour mieux cerner l'influence d'un tel exposé technique

oral sur l'acquisition de L2, et plus particulièrement sur le développement de l'expression orale (output oral), des apprenants de FOS, nous analyserons premièrement les différentes tâches proposées pour l'exposé technique (les contenus techniques ne seront pas les mêmes pour tout le monde) en nous inscrivant dans l'approche sociolinguistique et socioculturelle et ensuite, dans les théories d'acquisitions. Nous considérerons également le fait que les travaux préparatifs de recueil de données, de transformation et d'enregistrement de l'exposé se feront à distance et que l'enregistrement sera envoyé au professeur via internet. Ensuite, en nous appuyant sur l'écrit (les articles pour faire l'exposé technique oral) et sur les critères d'évaluation proposés, nous évaluerons les effets qu'un INPUT authentique exclusivement écrit engendrera sur la production orale des apprenants de FOS ainsi que la nativisation spécifique qui va avec en Ouganda. Les résultats de notre thèse se donneront comme objectif de proposer des pistes pour que les enseignants de L2 puissent se construire un changement profitable dans leurs métiers.

Mots-clés—*Apprentissage du FOS, dispositif TIC, recherche –action*

1. INTRODUCTION AND BACKGROUND TO THE STUDY

The initial purpose of the ongoing research was to investigate the potential of information and communication technology (ICT) in improving and developing oral competence in learners of French for Specific Purpose (FSP). The aim was to establish whether or not the integration of (ICT) in the learning and teaching of FSP could trigger oral language development in the learners. Subsequently, this involved establishing whether the use of Power Point presentation (PPP) would engage learners of FSP in collective actions both in the classroom and in the real world activities. In addition, there was an attempt to establish if relevant web quest materials were likely to enhance oral language acquisition and prompt learners to take responsibility for their own learning. FSP is taught across several undergraduate programs at Makerere University Business School (MUBS). These programs include Bachelor of International Business (BIB) (second and third years) as an elective course, Bachelor of

Catering and Hotel Management (BCHM) (second year) as an audited course, Bachelor of Travel and Tourism Management (BTTM) (second and third years) as an elective course, Bachelor of Leisure and Hospitality Management (BLHM) (second and third years) as an elective course, and Bachelor of Office and Information Management (BOIM) (third year) as an elective course.

FSP is being taught at MUBS for several reasons, the major one being the need to interact with the French speaking community within Africa and at global level. FSP is a second language (SL) or a foreign language (FL) in the Ugandan context. SL in Uganda is acquired after learner's first language, which could be any of the more than 35 local languages spoken throughout the country. Therefore the FSP learners come from different linguistic backgrounds with English being their official language since colonial times, to date. Over the years, learners of these different programs have been taught using traditional methods. These methods were mainly teacher centered as opposed to learner centered, with strong focus on reception activities as opposed to production. These learners have had difficulties with spoken French over the years; they engaged less in oral communication yet majority performed well in written French examinations. Oral production is a key skill that learners of French and indeed of any other language require in today's global business world and in their future career.

The integrationist and/or social constructivist or cultural hypotheses posit that social interaction plays an important role in the learning process and propose the zone of proximal development (ZPD), where learners construct the new language through socially mediated interaction [1]. Reference [2] summarizes this position as follows:

"Collaborative learning, either among students or between students and a teacher, is essential for assisting each student in advancing through his or her own zone of proximal development, that is, the gap between what the learner could accomplish alone and what he or she could accomplish in cooperation with others who are more skilled or experienced."

Language use and language-learning are social activities. They occur best in situations which encourage negotiation of meaning and learner collaboration with other learners. Language learning necessarily involves active participation through taking risks, testing hypotheses, making plans and decisions, and making judgments about one's own progress [3]. When these approaches are implemented, students learn to help themselves learn; ask for help from each other and from the teacher; learn language by using it in real settings; explain what they are learning and how they are learning; and grade themselves as a way to measure their strengths and weaknesses [3]. Through collaboration on a project, students use and manipulate language in a natural language environment.

A study conducted by SLA researchers found out that through collaboration on a project, students use and manipulate language in a natural language environment. For instance, experiential learning in the English as a Second Language (SLA) classroom, builds on the principle that language-learning is facilitated when students are cooperatively involved in working on a project or task, and when the project includes the

phases of exposure, participation, internalization, and dissemination. Projects that are challenging, communicative, and meaningful, and that provide opportunities for student ownership and participation in their own language-learning, create an environment conducive to sustaining motivation to learn the target language [1], [4].

II. METHODOLOGY

This study was part of an action research project I undertook in order to help learners of FSP improve on their spoken competence.

Reference [5] noted: "Action research is an inquiry in which participants and researchers cogenerate knowledge through collaborative communicative processes in which all participants' contributions are taken seriously. The meanings constructed in the inquiry process lead to social action, or these reflections on action lead to the construction of new meaning."

Reference [5] added: "Action research is context centered; it aims to solve real-life problems in context."

The current action research project began in January 2009. It involved identifying and putting into place a learning system for learners of FSP who experienced several difficulties with their spoken French. It was conducted by a succession of stages. The researcher, who is at the same time the practitioner, identified an existing institutional and a classroom problem. She sort to develop an action plan that would rectify this challenge. She opted for action –research as a method for data collection which would offer a perfect solution to the existing problem. As Practitioner-researcher she took to identify the real problem, collect data, develop an action plan, implement the action plan, collect and analyze the data, interpret the results. These different stages from construction to reconstruction of professional practice to discourse on that practice, observation, reflection and action played and are still playing a major role in the researcher's involvement in the action part of the research.

This study also describes sociolinguistic, language policy and language culture in Uganda. It further describes the geographical situation of Uganda in relation to the importance of learning French in the country. Based on the perspective of Ugandan education language policy, French language forms part of the very many languages spoken in Uganda although its status is one of a FL. This calls for a critical inquiry into the impact of French language acquisition at the crossroads of multiple local and area languages. This work-in-progress provides an insight into the acquisition of French in a diglossia setting. Three experiments were carried out to evaluate oral language development and the level of nativisation in the learners of the three programs, namely, BCHM 2, BIB 3 and BLHM 2,3 respectively. Focus was placed on the BLHM 3 as it is here that oral competence is at its poorest. The work presented here draws from the last experiment with this group.

III. EXPERIMENT

I carried out the first and second experiments on second and third year learners of FSP, and conducted informal interviews on the application of PPP in teaching and learning of FSP, at the end of the first semester teaching. The criteria for participating was open to volunteers but they had to work on

the project in pairs. The reason being that for effective communication to take place, there must be at least two locutors. The volunteers were able to give their opinions about the project. It should be noted that at MUBS, FSP is taught from second year of university studies for programs such as BCHM, BLHM, BTTM, while BIB and BOIM study FSP in their third year. The researcher administered a short questionnaire on learners' attitude towards the PPP project.

IV. THE PRELIMINARY PROJECT

This preliminary experiment based on the use of ICT in FSP was conducted from January 2009 to November 2009. I established the preliminary phase of the project on PPP during the first year of my doctoral studies at Sorbonne University Paris III (2008/09) from January 2009 to May 2009 in order to assess its potential contribution to language development by learners of the FSP at MUBS. This familiarization experiment consisted of learners identifying specialized technical documents about existing hotel services, touristic products, in their country from the internet, downloading the document, synthesizing it to at least 8 slides, and presenting it to their peers in class who acted as fictitious francophone clients. Meanwhile the peers listen, try to understand the presentation and ask simple questions. It was interesting to note that working from an authentic written comprehensible input helps to identify the level of nativisation that goes with it and hence the role of mediation that is required. Tools such as overhead projector and laptops were used for presentations. The primary objective was to sensitize students to this fundamental aspect of spoken expression and its importance to their future career. To further strengthen the acquisition of this input during this phase (that I posited as fundamental in triggering or not oral language among learners of FSP), I decided that learners would try to simulate more technical type of situations. In this regard, it seemed appropriate to include the proposal by [6] which argues in favour of allowing students to experience practical principles with the view that:

"Another way of focusing on language in interesting texts is to have learners themselves highlight linguistic input that they see as relevant to their learning. Learners might, for example be assigned to find a text of interest on the Web, summarize the text for the class, and highlight and define the expressions that he or she did not know in the text. A series of such assignments might result in a portfolio of texts with personalized highlighted forms."

V. PRELIMINARY FINDINGS

This study findings became more strongly centered around three propositions.

The first proposition is that if there is transfer of learning strategies of know-how in English towards the know-how in French, there are high chances of a mini oral -production taking place. The assumption here is that the learners of French who come from different professional programs are well conversant with their area of specialization, be it fields of technical content knowledge or content-specific knowledge. The transfer of such an expertise into French language learning facilitates its acquisition, for instance a student of Leisure and Hospitality Management who has done Front Office Management in

his/her core course is capable of transferring the same skills / knowledge in French.

The second proposition is that the use of power point presentation empowers learners to take responsibility for their own learning. The pedagogical reasoning is that PPP prompts learners to engage, involve in the search, preparation and investments of their classroom work. This enhances to a certain extent, their attitude towards acquiring the oral aspects of the language. By documenting my initial experiments in teaching SLA, engaging in reciprocal interviews and then reviewing the data in terms of the pedagogical reasoning model proposed by [7], I found out that the model shed light on how my instructional approaches could develop and help me identify the triggers for the development of pedagogical content knowledge in second language acquisition. A clearer understanding of these issues will assist me in defining the areas in which acquisition of oral production may best be directed.

The third proposition is that the use of technology as a tool for adding value to learners and for encouraging ownership for learning was an indispensable tool in triggering language development. Learners become active participants in their learning process rather than passive actors. The tutor ceases to be the expert at the front and becomes the guide by the side.

The preliminary conclusions indicate that the use of ICT is likely to trigger oral competence in French for Specific Purposes. This is an on-going research, I therefore need further investigations to either validate or falsify the preliminary results.

REFERENCES

- [1] H. D. Brown, "TESOL at twenty five: what are the issues?", TESOL Quarterly, vol. 25, pp. 245-260, 1991.
- [2] M. Warschauer, "The modern Language Journal, vol. 81, no.4, Special Issue: interaction, Collaboration and Cooperation: Learning Language and Preparing Language Teachers." Winter 1997:471
- [3] K. H. Wilhelm, "Collaborative dos and don'ts", TESOL Journal, vol. 8, pp. 14-19 1999.
- [4] S. Hussein, M. Nooreiny, and J. V. D'Cruz, "Sustaining an interest in learning English and increasing motivation to learn English: An enrichment program", The Internet TESL Journal, vol. 7, no. 5, May 2001.
- [5] K. N. Denzin and S. Y. Lincoln, The landscape of qualitative research: theories and issues, 2nd ed., Thousand Oaks, CA: Sage, 2003.
- [6] C. Chapelle, "English Language Learning and Technology :Lectures on applied linguistics in the age of information and communication technology", Language Learning and Language Teaching, 2003.
- [7] J. P. Narcy-Combes, Didactique des langues et TIC: vers une recherche-action, Paris: Ophrys, 2005.

APPENDIX 1

EXPERIMENT 1

BUSINESS PRESENTATION

Aim: To give a presentation on "provision of touristic information to tourists from Francophone countries"

Level: Advanced

Interaction: Students working in pairs and interacting with the whole class

Technology: Microsoft Power Point Presentation and data projector

Rationale: For business people, giving presentations is a real-world task. Using a program such as Power Point and a data projector, this can be simulated quite closely, especially in front of an audience of their colleagues or peers and tutors

PROCEDURE

1. You work as the marketing officer for either Burundi tourist board or Senegal tourist board or DRC tourist board. In order to market the existing touristic services to the francophone tourists prepare and present an attractive touristic package about the existing touristic products or services, provide information about the possible events, the must see attractions ,the hotel services ,the possible tourist destinations and the costs involved, the mode of transport that can help tourists get to their destinations, etc..
2. Choose one Country from the following website
 - a) <http://voyageafrique.blogtact.com/2009/06/27/visites-au-burundi/>
 - b) <http://www.globeholidays.net/Africa/Burundi/Bujumbura/Index2.htm/>
 - c) <http://www.congonline.com/Tourisme/tourisme.htm/>
 - d) http://www.tripadvisor.fr/Tourism-g294186-Democratic_Republic_of_the_Congo-u/
3. Download the required information from the selected website above. Each presentation should be between eight to ten minutes, questions and responses for 5 minutes and make use of the presentation phrases the class has covered. Be ready to field questions at the end. The choice of the country is up to you, although your preparation should be something that you would expect to present as part of your job or related to your work in some way.
4. You are going to use Power Point (or similar presentation program) to create the slides for your presentation. Ultimately, I will be assessing you on the basis of the appropriacy of the language you use, so you should spend the majority of your preparation time thinking about what you are going to say and keep the presentation slides minimal.
5. This preparation could be homework or done within a self-study period in the day.
6. Each learner gives their presentation using a computer and data projector to provide the visual support. The presentation can be recorded or videoed to create a permanent record time to prepare. Other members of the class should be encouraged to ask questions.
7. I will provide written feedback on the language used by each presenter. I will also provide feedback on the language used on the presentation slides

Design of a Sustainability Action Plan for EHAS-Napo project: a rural e-Health initiative

Inés Bebea González Leopoldo Liñán Benítez Carlos Rey Moreno

Abstract—ICT projects in rural areas of developing countries have an extremely low success ratio in terms of sustainability, especially in the field of Public Health. How to achieve sustainability in ongoing ICT interventions and prevent failure is an open issue. This work suggests a methodology for needs assessment regarding sustainability and for the design of a Sustainability Action Plan to be applied to EHAS-Napo project, an e-Health initiative in the Peruvian Amazon. The Sustainable ICT Framework has been applied in order to improve the project sustainability expectations in the medium term.

Index Terms—ICT, e-Health, sustainability, maintenance, developing countries, rural

I. INTRODUCTION

Rural areas of developing countries are the living context of 3 billion people. Access to the information society is extremely difficult in such environments, characterized by a lack of infrastructure for communications as well as for roads and electricity, scarcity of qualified staff able to handle technology and scattered low-income population. This makes it difficult to both launch and maintain Information and Communication Technologies (ICTs) over time, which leads to sustainability.

Despite ICTs being proposed as a cross-cutting and multi-sectoral approach to promote social priorities for achieving the Millennium Development Goals (MDGs) and millions of US-dollars being invested in this area, initiatives in developing countries have shown extremely low success ratios in terms of sustainability. Some studies claim high failure rates [1-5] up to 80% [6]. After literature review of success and failure of development ICT interventions, we found difficulties related to the lack of reported project evaluation, the lack of specialized literature where case studies abound, and disparate stakeholders interests and evaluation moments. Following Heeks [6] definitions, we consider *sustainability failure* as a successful initiative that achieves its expected results and therefore manages to reach its explicit objective, but fails to contribute to the overall objective of the development intervention because the project is abandoned in the medium term.



Fig. 1. Napo project in Peruvian Amazon communicates rural health facilities with city hospital.

By this definition, an ICT project is sustainable if it maintains and extends its benefits over the medium to long term [7]. The main difficulty in achieving this sustainability arises from the fact that sustainability needs to be simultaneously achieved in several categories: economical, financial, institutional, technological, educational, and also social and cultural challenges [8]. In the particular case of ICTs applied to Public Health, sustainability additionally encounters the challenge to support and facilitate organizational change of Health Institutions [9],[10]. Failure is also prevalent in this effort [11], [12].

Fundación EHAS is an international NGO promoting telemedicine in rural isolated areas in developing countries, being the Amazon region a well-known environment [13], [14], [15]. EHAS-Napo project seems to be a successful initiative while the NGO is still working on the field. However, some factors have been identified that indicate that the mid-term risk of sustainability failure is high. In this work, I analyze and propose a solution for the sustainability problem of EHAS-Napo project. This initiative started in 2007 and serves a broadband wireless network for the National Health System in the rural Amazonian region of Loreto, Peru. This project brings autonomous communication to 18 isolated health facilities along Napo river (covering a distance larger than 500 km) from Iquitos Regional Hospital to Cabo Pantoja in the frontier to Ecuador (see Figure 1). Connectivity is achieved using WiLD (WiFi IEEE 802.11 for Long Distance) technologies, and also some services are provided on top of the network, such as VoIP telephony, videoconferencing, reporting, chat and Internet access among others.

In 2009, Napo project seemed prepared for transfer process

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to public institutions, as the initiative counted with strong support and motivation from rural health staff and municipalities. However, low availability of e-Health services and local technicians dependence on NGO engineers, pointed to a maintenance weakness. However, a broader analysis conducted to study the problem of sustainability as a whole.

The aim of this work is both to identify risks related to sustainability and relevant criteria in the design of an action plan that improves the present situation with a view to definitive ICT project delivery.

II. METHODOLOGY

To identify and analyze problems related to maintenance and all related activities, I conducted a case study qualitative research methodology that included the following: a revision of maintenance documentation materials (technical and audit reports, manuals), statistics of IT services availability and use; participant observation in Napo network; in-depth interviews to engineers, doctors responsible for rural health networks, doctors at reference hospital, local and regional authorities assistants; as well as inquiries to rural health and maintenance staff [16].

For the analytic study of compiled information, detected factors have been classified following the Sustainable ICT Framework [17]. Logical Framework Approach (LFA) has been used to analyze trees of partial problems and solutions in the design of the Sustainability Action Plan (SAP): objectives, expected results, activities and stakeholders involved. SAP is detailed in Master Thesis [16] but only briefly presented here. The plan is design with 3 subplans facing different categories of sustainability and focus stakeholders.

III. ANALYSIS OF SUSTAINABILITY FACTORS IN NAPO PROJECT

Considering the five categories of sustainability [18], [17], the following is a brief explanation of problems detected:

- *Technological.-* Involves electric, ICT and road infrastructure. Technology must be robust, low-maintenance and low-cost, while maintenance is highly dependant on equipment availability and road infrastructure. Although ICTs based on WiLD technologies and autonomous solar electrification provided by Napo project are robust, availability statistics dropped to 70% in connectivity and therefore to 60% in data and telemedicine services. Maintenance difficulties also cited by Surana [19] lead to high MTTR (Mean Time to Recovery) due to extremely high cost of river transport, insufficient budget for spare equipment and dependence on experts for fault diagnosis.
- *Financial.-* Refers to economic mechanisms to support initial investment, operational (software, licenses, management) and maintenance costs (replacing equipment included) taking into account Total Cost of Ownership [20]. The main financial

problem identified in EHAS-Napo project is that no permanent budget for ICT operation and maintenance guaranteed by public institutions.

- *Social.-* Includes social and institutional arrangements to preserve ICT use for its intended social benefits. Project legal and political framework includes telecom market and radio-electric spectrum regulations and information policies that the project must assess in order to be independent of future political decisions or institutional changes. Social environment includes local mobilisation, identifying needs, ownership, participation and fulfillment of explicit objectives. In the particular case of e-Health projects, this entails commitment of health staff to institutionalization and organizational change, which is also crucial in Napo project. There, the formal political and legal framework was not fully stable as a consequence of the ongoing decentralization process of the National Health System.
- *Human.-* Refers to individuals knowledge and previous personal experiences, learning skills and cultural endowment. In Napo project, use of ICTs is estimated below its potential, due to high staff rotation and deficiencies in the limited learning and education skills cited above. Identified difficulties in capacity building include low frequency in-person courses given to users and technicians, courses focusing in computing and office applications, deficient attendance to courses because of incompatibilities with other functions (i.e. leaving a rural facility unattended) and high costs of in-person courses due to high transport and expenses costs.
- *Content.-* Refers to the information communicated through ICTs [18]: externally produced (i.e. Internet), externally or locally adapted, and locally produced (i.e. epidemiological surveillance reports mailing from rural health facilities). Content is useful once it fulfills language requirements, is understandable in the specific literacy and cultural context and answers real user needs. This involves also project software and documentation. In the project, the Health Information System has been partially adapted at the lower statements, where some information has been generated locally. However, production of locally relevant information in the form of on-line seminars or multicast discussions on clinic cases, is still a challenge in Napo project.

IV. DESIGN OF A SUSTAINABILITY ACTION PLAN

SAP is conceived with the aim of improving the sustainability of Napo project. For clearer objective-activity design, three subplans are proposed (see Figure 2): an Operative Maintenance Plan (OMP) fighting technological factors focusing in ICT professionals; an Institutional and Financial Plan (IFP) facing social-institutional difficulties also related to financing in the case of Public Health Institutions; and a Continuous Learning Plan (CLP) improving human and

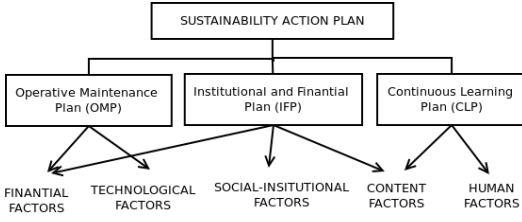


Fig. 2. Sustainability Action Plan improving sustainability at each category.

content-related factors affecting sustainability with a focus in training resources.

A. Operational Maintenance Plan

The main goal for the Operative Maintenance Plan is to reduce MTTR, thus improving ICT availability to 90% and 80% for connectivity and telemedicine services respectively. Proposed protocol for maintenance is shown in Figure 3, with a central core which is the 'Historical Knowledge of Network Status' (HKNS). This core is the basis for accurate, registered and up-to-date information that allows fast response, experience-based fault diagnosis and technology adaptation to dynamic user needs. The protocol consists of the following items:

- **Monitoring** collects accurate information from network devices and services running. This information includes connectivity status, signal strength received at wireless routers, network traffic, delay and data rate, CPU consumption, via a Network Management System (NMS). Contextual information is collected from user polling, thus checking non-managed service performance and human perception. The system proposed here is open-source Centreon-Nagios [21],[22].
- **Incident Management** records anomalous events and failures occurring during ICTs operation, including detection (user case or automated alerts generated by NMS), diagnosis decisions and maintenance actions taken -all items crucial in maintenance response and recovery time. A Ticketing System is proposed for this purpose: Request Tracker [23], due to its easy connection for listening NMS alerts.
- **Predictive Maintenance** studies statistical behavior of relevant parameters over time in order to anticipate faults and keep technological surveillance and adaptation through R&D.
- **Preventive Maintenance** plans 6-month maintenance interventions for general ICT infrastructure, hardware and software. The aim of these actions is to correct minor faults, prevent service interruptions and avoid costly corrective actions.
- **Corrective Maintenance** consists of ad hoc remote or in-person repairs once faults occur. Major costs here come from non-programmed

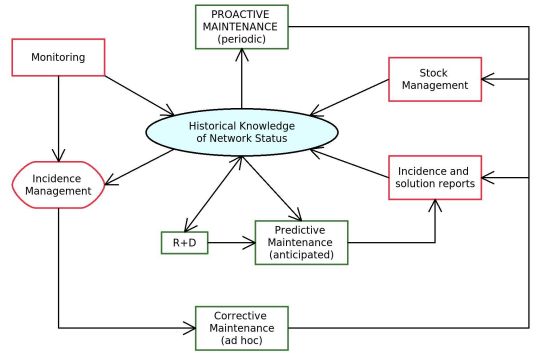


Fig. 3. Operational Maintenance Executive Core.

transportation to remote nodes.

- **Stock Management** includes control of spare equipment and toolbox, that must be ready for use in maintenance. Stock input-output recording, and purchase and shipment of equipment is also ticketed within Incident Management.
- **Reports** of all cited actions contribute to HKNS archive.
- **R&D** allows long-term surveillance on technology and user changing needs over time.

This subplan also specifies four maintenance levels for technical staff according to their (increasing) ICT education and expertise and to their (decreasing) proximity to network nodes. Layers are listed below:

L1: half-time local technicians (non ICT professionals, staff at rural health facilities)

L2: full-time operative engineering (ICT professionals, regional institutions staff at Telecom and Telemedicine Offices)

L3: ad-hoc support engineering (ICT professionals, NGO staff from remote)

L4: asynchronous R&D (ICT researches, NGO staff from remote)

Users are considered at the top of the pyramid, so their capacity to understand and describe failures is crucial in this process (see Continuous Learning Plan). Annual maintenance for Napo project costs 7% of the initial investment in project implementation.

B. Continuous Learning Plan

Taking into account particularities of rural health staff[24], CLP defines a learning methodology based in andragogic model and competence building [25], in-person and (open-source) distance learning modules, and training of trainers at Training Unit at the regional health division. Proposed contents are divided into four main modules. Each module may count with in-person and distance parts.

M1.- Computing, following International Computer Driving

License (ICDL) [26], for users and technicians (2 levels).

M2.- Use and administration of distance-learning tool for learners and trainers (2 levels).

M3.- ICT and Telemedicine operation.

M4.- ICT maintenance for users and technicians (2 levels).

Resources needed to implement this subplan are estimated budget 3% of initial Napo project investment per year. Restrictions taken in this calculation include: learning tools (didactic examples, teaching guides and support material), infrastructure (Moodle server installation and maintenance, edition and publication costs, computer rooms, projector and blackboard rentals), and human resources (one trainer each 10 learners and one trainer each 40 online learners).

C. Institutional and Financial Plan

Local authorities in Napo project consist of municipalities of three districts involved and two rural healthcare networks. There also exist major authorities including regional government and regional health division, which have the maximum administrative and health competencies in the decentralized national system. These regional institutional bodies need to provide funds for the initiative in the long term. Then the principal objective in this Plan is to manage institutional change from three fronts:

- Redistribute responsibilities and roles related to ICT project by passing them from the NGO to competent regional institutions.
- Regularize formal legal, political and administrative

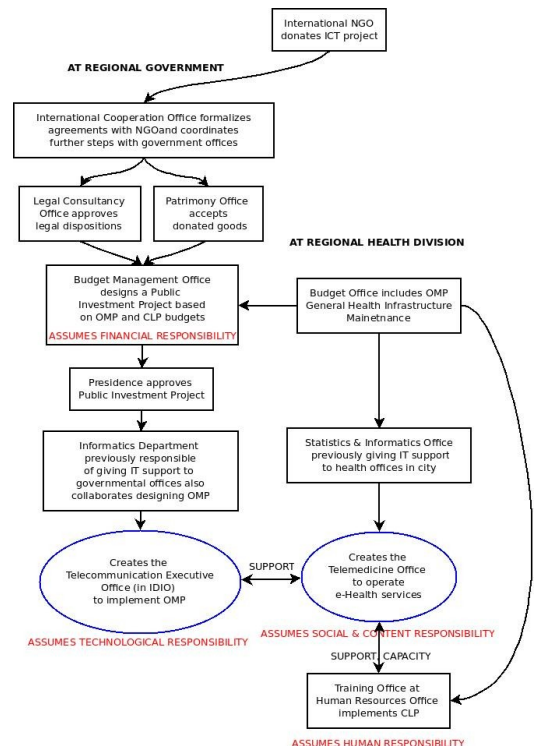


Fig. 4. Process for Institutional Change Management in Napo project.

framework of the project, which should be adapted to the new decentralized model.

- Build dispositions to guarantee a permanent budget in order to meet operational and maintenance costs (SAP costs are known now as annual 10% of investment) under a regional-local self-management proposal.

Institutions at a regional level can be huge, and organizational changes need presidential approval and 2-year procedure. Also necessary functions for implementing SAP are non-existent in the organigrams of regional institutions, so new offices are proposed to fill this gap. Figure 4 shows the strategy proposed to boost institutional change in the ICT project.

V. DISCUSSION ON RESULTS AND FUTURE WORK

Results achieved are hard to extrapolate even to similar initiatives due to the idiosyncrasy of e-health projects. However, the methodology proposed for this case could be adapted to address other e-Health and ICT projects: a deep assessments of factors characterizing sustainability and a global vision of a plan (much detailed but not included here) to improve sustainability assessment at any time of ICT project's life cycle.

During 2010 SAP has been partially implemented up to 25% of programmed activities. Some results have been collected that show partial solutions achieved and that we are reducing factors threatening the sustainability of this initiative. For a precise evaluation of SAP impact on sustainability, current work is focused on the design of a Validation Framework consisting of qualitative and quantitative indicators at each category in order to compare previous and later situations.

REFERENCES

- [1] C. Avgerou, "Information systems in developing countries: a critical research review," *Journal of Information Technology*, vol. 23, pp. 133–146, Sep. 2008.
- [2] K. L. Kraemer, J. Dedrick, and P. Sharma, "One laptop per child: vision vs. reality," *Commun. ACM*, vol. 52, no. 6, pp. 66–73, 2009.
- [3] R. Rajagopalan and R. Sarkar, "Digital networks and sustainability: Do we need the government?" *International Conference on the Digital Society*, vol. 0, pp. 49–54, 2008.
- [4] A. Chib, "Sustainability of ict interventions: Lessons from rural projects in china and india," *Communicating for Social Impact: Engaging Communication Theory, Research, and Pedagogy*, 2009.
- [5] F. Salem, "Failed revolution? exploring e-government barriers in the arab states," *Proceedings of the 4th International Conference on e- Government*, pp. 363–370, 2008.
- [6] R. B. Heeks, "Information systems and developing countries: Failure, success and local improvisations," *Inf. Soc.*, vol. 18, no. 2, 2002.
- [7] Batchelor, S. and Norrish, P., "Framework for the assessment of ICT pilot projects: Beyond monitoring and evaluation to applied research," *infoDev, World Bank Information and Development Program*, 2009. [Online]. Available: <http://www.infodev.org/en/Publication.4.htm>
- [8] C. I. Pade, "An exploration of the categories associated with ict project sustainability in rural areas of developing countries: a case study of the dwesa project," *Proceedings of SAICSIT*, pp. 100–106, 2006. E. L.
- [9] Mosse, "Understanding the introduction of computer-based health information systems in developing countries: counter networks, communication practices and social identity. a case study from mozambique," 2004.

- [10] H. C. Kimaro, "Decentralization and sustainability of ict based health information systems in developing countries: A case study from tanza- nia," 2006.
- [11] R. B. Heeks, "Health information systems: Failure, success and local improvisations," *International Journal of Medical Informatics*, vol. 75, p. 125137, 2006.
- [12] R. Hebert, "Health informatics - where to start? national e-health options for developing countries," *Information Technology in Developing Countries*, IFIP WG 9.4, vol. 18, no. 1, 2008.
- [13] A. Martinez, V. Villarroel, J. Seoane, and F. del Pozo, "Rural telemedicine for primary healthcare in developing countries," *IEEE transactions on Information Technology in Biomedicine*, Vol. 9, 66-72,, 2004.
- [14] A. Rendon, A. Martinez, D. Lopez, and M. D. ", "Rural telemedicine infrastructure and services in the department of cauca, colombia," *Telemedicine Journal and e-Health*, Vol. 11, n. 4, 451-459, 2005.
- [15] A. Martinez, V. Villarroel, J. Seoane, and F. del Pozo, "An economic analysis of the ehas telemedicine system in alto amazonas," *Journal of Telemedicine and Telecare*, Vol. 13(1), 7-14, 2007.
- [16] I. Bebea González, "Diseño de un plan de sostenibilidad para redes de comunicaciones rurales: estudio del caso Napo," 2010.
- [17] S. Sunden, "Information and communication technology applied for developing countries in a rural context. towards a framework for analysing factors influencing sustainable use," 2006.
- [18] Batchelor, S. and Norrish, P., "Sustainable information and communication technology (ict)," Gamos Ltd., 2003. [Online]. Available: <http://www.sustainableicts.org/sustainability1.htm>
- [19] S. Surana, "Beyond pilots: keeping rural wireless networks alive," 5th USENIX Symposium on Networked Systems Design and Implementation, 2008.
- [20] S. Cisler, "Planning for sustainability: How to keep your ict proyect running (schools online)," <http://www2.ctcnet.org/ctc/Cisler/sustain.doc>, 2002.
- [21] "Centreon, network, systems and application monitoring based upon the open source monitoring engine nagios," <http://www.centreon.com>, 2009.
- [22] E. Galstad, "Nagios 3.x documentation," <http://www.nagios.org>, 2008.
- [23] J. Vincent, *RT Essentials*. O'Reilly, 2005.
- [24] A. Martinez, "Evaluación de impacto del uso de tecnologías apropiadas de comunicación para el personal sanitario rural de paises en desarrollo," 2003.
- [25] D. Fidishun, "Andragogy and technology: Integrating adult learning theory as we teach with technology," *Proceedings of the 2000 Mid- South Instructional Technology Conference*, 2000.
- [26] "International computer driving license syllabus version 5.0," <http://www.ecdl.com>, 2007.

ICTs and its Social Meanings: Women in the Margins of Thailand

Mary Luz Menguita-Feranil

Abstract— This paper seeks to surface the social implications of Information and Communications Technologies (ICTs) for marginalized women in Thailand-Burma border as brought about by globalization and technological change. Many of the debates surrounding ICTs have been centered on technologies as drivers of growth and transformation of economies as information economy and knowledge society. While it has helped the economies of most developed countries, the urban-rural divide in sharing the benefits derived from ICTs in most developing countries such as Thailand persist. A notable implication is ICTs' influence in the lives of marginalized women migrant workers and refugees in Thailand in the context of community empowerment from a repressive military regime of Burma. The enabling environment of ICTs in the border created significant difference in their survival as freedom of information, communication and mobility had been largely repressed inside their own country. This paper argues that opportunities for women to access and use ICTs may be seen along several perspectives ranging from binding family ties, social networking and expanding relations to a broader perspective as learning arena, venue for advocacy and amplifying women's voices and sites for cultural expression and entertainment. However, while use of ICTs allow for processes of information and communication that were previously impossible to attain to a group of women, a large number of women is still excluded in the process.

Index Terms— Communications technology, Globalization, Social implications, Technology

I. INTRODUCTION

Globally, the rapid evolution of ICTs¹ over the past decade has resulted in the further improvement of economic opportunities through information sharing. This situation is

evident in most of the developed countries in the North while leaving behind the developing countries such as in the global South with the exception of Singapore, Korea, and Japan². A prevailing concern in the access of ICTs also emerged that has widened digital divide within and across countries specifically in the Asia-Pacific Region. Consequently, the gap has become more alarming in the context of marginalization of rural communities coupled with the widening information opportunity gaps between rural and urban communities. Rural communities particularly women there, face the risks of socioeconomic development.

Women use ICTs less than men, access the internet less and spend less time, and do not have the same levels of access at work (Nsibriano, 2009; Kennedy et al, 2003; Hongladarom, 2003). Most of the digital divide studies had focused on documenting statistical differences in access and use while little has been accorded in looking at the causes of the divide with focus on marginalized women in developing countries like Thailand. While Thailand's National ICT Policy (IT2010) is anchored in promoting knowledge-based society and economy, and posits that development does not focus on "technology" *per se*, but rather, on the good uses of ICT that would drive overall national economic and social development³, there is quite limited evidence on how such has taken shape among vulnerable sectors and groups like women. The influx of migrant workers and refugees to the Tak Province in Thailand from Myanmar⁴ provides an interesting case for examining how and to what extent ICTs have reshaped and influenced the lives of marginalized women⁵.

This paper aims to surface and understand the role of ICTs in influencing the lives of marginalized women in Thailand-Burma border. It focuses in answering the question: how do ICTs facilitate social empowerment among women? In getting the responses of women, a combination of qualitative research methodologies were utilized: 27 long interviews with individual women of different ethnic groups, 5 focused group discussions, participant observation and 8 key informant interviews mostly with individuals in community-based

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¹ Refers to the use of internet and mobile phones in this paper

² Global IT Report 2009-2010.

³ National ICT Policy of Thailand

⁴ Also referred to as Burma in this paper

⁵ Marginalized women in this study refers to the women migrant workers and refugees who had left Burma due to military upheavals and are now staying in the Thai-Burma border area in Tak Province. The Thai Government considers them displaced people.

organizations.

The concept of empowerment⁶ and agency⁷ is useful in looking at the ways women migrants and refugees utilize ICTs. These concepts tend to play significant role in illustrating the dynamics and relationships in women's lived experiences in their access and use of ICTs. The recent work of Koggel in the field of ICTs is found to be relevant in looking at social relations of women under study. Koggel (Forthcoming, 2007:2-3) demonstrates that:

Conceiving empowerment as a process suggests that agency approaches need to be contextual, relational, and responsive to changing conditions and circumstances. Where people are located, what opportunities and resources are available, what roles and functions are performed and by whom, and whether local conditions are impacted by national and global factors and actors are issues relevant to the analysis of empowerment.

Given this, the social meanings in women's associational life at the household and community in their access and use of ICTs is looked into. This paper takes on the variations created in specific context where women as actors operate.

II. HISTORICAL CONTEXT

Migrant workers and refugees living in Tak Province have a long history of struggle from Burma's repressive military junta. For over 50 years, people of different ethnic groups⁸ have been resisting economic, cultural, social and political suppression by the Burmese military regime. These groups are at risk and caught in conflict between the military and rebel groups. The chaotic situation pushed the people especially women and their children to flee across the Thai border and now living in several camps such as in study areas Umpiem Mai⁹, Mae La¹⁰ and in Mae Sot¹¹ in Tak Province (Fig. 1).

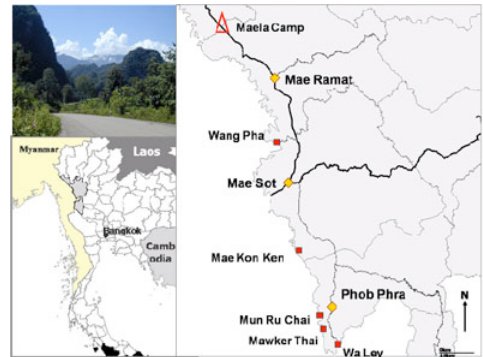


Fig. 1. Mae Sot in Tak Province, Thailand

The combined population of refugees in the all the 10 camps in Thailand is close to 150,000 and around 80,000 is staying in the camps in Tak Province¹². The Karen comprise 61 percent of the refugees in the camps. In the same period, the United Nations High Commissioner for Refugees (UNHCR) recorded 102,418 registered refugees, half of which are staying in the three camps and had an almost equal number for women (26,382) and men (26,520). Many are still left and cannot get across the borders have become internally displaced persons (IDPs) inside Burma¹³.

In Thailand, the ethnic groups can be classified into two: *refugees*¹⁴ and *migrant workers*¹⁵. The Thai government¹⁶ limits the movement and opportunities for refugees. The UNHCR has resettled around 30,000¹⁷ refugees to third countries, but the continuous arrival of new entrants from Burma has merely replaced this number. Migrant workers make up a sizable population¹⁸ and are predominantly illegal workers because they do not have work permits and most belong to the lower income group.

⁶ Adopts Moser's definition as *the ability to determine choices in life and to influence the direction of change, through the ability to take control over crucial material and non-material resources*. (Moser, 1993: 74-5)

⁷ Agency includes the meanings, motivations and purposes that individuals adopt to achieve their goals. (Kabeer, 1999:3)

⁸ Karen, Karenni, Shan, Mon, Chin, Kachin, and others

⁹ Located in Pho Phra District, Tak Province in northwestern Thailand. It has the highest elevation among the camps along the border with over 1,100 meters altitude; 10 km from the border and 87 km from Mae Sot. www.tbhc.org/mst/htm

¹⁰ Mae La is in Tha Song Yang District, Tak Province; 8 km from the border and 57 km from Mae Sot. www.tbhc.org/mst/htm

¹¹ Mae Sot is a town in western Thailand sharing a border with Burma (Myanmar) to the west; land area is 1,9861 sq km; trade hub in Tak Province; gateway to Burma.

http://en.wikipedia.org/wiki/Mae_Sot

¹² Thailand-Burma Border Consortium report as of June 30, 2010. It includes people eligible for rations.

<http://www.tbhc.org/camps/2010-06-jun-map-tbhc-unhcr.pdf>

¹³ <http://news.bbc.co.uk/2/hi/asia-pacific/6397243.stm>

¹⁴ The refugees are not allowed to work or have livelihood activities. Instead, they are given food ration and clothing by humanitarian agencies and assistance from non-government organizations (NGOs).

¹⁵ Migrant workers have more mobility and employment opportunities in the border towns but do not have the chance to be resettled and migrate to developed countries unlike the refugees. The migrants cross the Thai border primarily for employment.

¹⁶ It did not sign the 1951 convention on the rights of the refugees and does not call them refugees but displaced people

¹⁷ <http://www0.un.org/apps/news/story.asp?NewsID=27158>

¹⁸ Migrant workers in border provinces are more than 500 thousand. There are 40 thousand migrant workers in *tambon* (sub-district) Mae Sod, which is one of the closest towns to the Thai-Burma border and has one of the highest migrant populations. See http://www.irrawaddy.org/article.php?art_id=15194

III. VOICES FROM THE MARGINS

A. Users of ICTs

In this paper, the users of ICTs, particularly the Internet, are usually women migrant workers based in Mae Sot. Some women refugees in Umpiem Mai and Mae La camps only had access to mobile phones. The use of ICTs was relatively dependent on its accessibility, affordability, and availability apart from the capability and ability. Internet shops are usually located in the urban center of Mae Sot and are relatively distant from women's workplace and residence. The presence of Internet shop in the rural village is seldom. In the case of Myiek¹⁹ women migrants, they prefer to use Internet in a shop within their village due to its availability and accessibility. Most migrant women workers interviewed used the Internet in their workplace²⁰ as it provides more comfort, readily available at no cost.

I have never tried going to Internet shops in Mae Sot since I arrived in 2006. Internet is readily available in our workplace. I can check email anytime and staff had the privilege for free wifi access. (Zar Zar, 33 BWU).

Migrant women interviewed learned how to use the Internet from co-workers, friends, computer training provided by NGOs and migrant schools. The study reveals that constant and daily use of computers and Internet in their work (i.e., as migrant school teachers, librarian, IGP coordinator, and as volunteers in education, and health programs, etc.) had provided impetus for further learning and gaining self-confidence in accomplishing workload. The use of Internet is perceived as an integral part of women's work.

I gained knowledge of Internet from a senior staff of Karen Women's Organization (KWO). She taught me how to check email, attach photos, and browse websites. Some friends also taught me. Constant use and self-study also helped me a lot in my work especially health issues (Naw Eh Sew, 26 KWO).

However, the use of mobile phone is relatively easier than Internet to both women migrant workers and refugees as it is user-friendly with its simple features and does not require much skill to operate. Immediate kin and friends are often contacted and consulted when difficulties are met. Mobile phones are used often to contact immediate kin, relatives and co-workers and during emergencies particularly in the case of women refugees in the 2 camps.

My mobile phone is second hand, no camera and Internet connection. I just want to use it

¹⁹ Myeik is one of the ethnic groups in Burma.

²⁰ Case of Karen and Burmese women migrant workers working with Karen Women's Organization and Burmese Women's Union based in Mae Sot, Thailand.

for calls to contact my mother and son in the camp to check on their situation and to inform them of my monthly remittance. (Cho Thae, 27 BWU).

B. Social Meanings on the Use of ICTs in Women's Daily Lives

The access and use of ICTs particularly internet and to some extent mobile phones have created significant social meanings to women migrant workers in Mae Sot in several ways:

Binding family ties. Internet and mobile phone were instrumental tools in bringing and maintaining closer family ties (immediate kin and relatives) together despite their distance. Many Karen, Burmans, Lahu and Miyek women interviewed have families left in Burma while some had already resettled to "third countries" such as USA, Canada, Australia, and Norway;

Mobile phone is useful in our daily lives. My husband and I can respond to the calls of our 4 children and grandchildren who are all in the US (Auntie Rolly, 47 Umpiem Camp).

G-talk helps me reconnect with Karen/Burmese friends in the US, Canada, Australia and Norway and get to know their situation there. (Cho Thae, 27 BWU)

Social networking and expanding relations. It paves the way for a shift in communicating beyond household such as reconnecting to old friends, colleagues; making new friends from outside of Burma and Thailand; expanding relations to other organizations²¹ at the local and international level; and expanding actual and potential markets for handicrafts through website promotion and online marketing;

In between work, I can also chat to some friends in Australia, India, and Canada. Most of them are men who had stayed in the camp but now resettled in third countries during the past two years. (Zar Zar, 33 BWU Librarians).

Learning arena. Educational information relevant to work and for self-education such as issues on human rights, women's rights, democracy, educational music, English language, news updates, are mostly accessed and downloaded by women migrant workers from websites.

²¹ Community-based organizations (CBOs) such as women's groups and church groups, local and international nongovernmental organizations, donor agencies and government agencies

It's easy for me to check news via Kwekalu and BBC websites to update me about the situation in Burma and share the news to people in the community who do not have access to Internet. I also utilize the information in the class. (Si Si Hwe, 27, teacher).

Venue for advocacy and amplifying women's voices. The use of email and chat serves as venues in amplifying women's issues, statements, positions for advocacy in the form of lobby and campaign within and among women's networks²², donor partners, and government agencies.

My organization can easily send statement of support by email to Thai government regarding women's issues in the camps that we assist. (Naw Dah Mu, 27, KWO IGP Coordinator).

Arena of cultural expression and entertainment. Youtube, Kwekalu and related websites were most sought by women migrants where they can listen and download Karen/Burmese music. Preferences of music vary by age. Older women often listen to folk and nation songs while younger women likes' hip-hop and upbeat music. Some women refugees in the camps use Karen music as their ring tones.

If I miss my mother who lives in Burma, I just listen to Mother's Love music "Mu Ta Ehl". I reflect my life in Burma through Karen songs. (July Paw, 21 KWO Volunteer).

C. Non-Users of ICTs

Non-users of ICTs refer to women who live in refugee camps with ages ranging from 23 to 50. These are women who relatively have limitations in opportunity and space to information and communication especially in terms of literacy, mobility, accessibility, and affordability. Most of the non-users were not able to finish primary and secondary education due to the military repression in their home country.

Since some of us cannot read nor write, training is done in the form of discussion. We learn something about health, children's and women's rights and also livelihood. (Soe, 34, Umpiem Mai)

Our movement in the camp is very restricted. Every time we go out, we need to inform the Station Commander of our whereabouts and we can only stay up to four days outside. Otherwise, the Thai police will already look for us (Pa Nah, 45, Umpiem Mai)

Refugee women and the rest of their family members communicate with their loved ones through writing letters and which are sent mostly through friends or relatives who had the chance to go out of the camp. Though reply from kin takes a longer period,²³ women, especially mothers feel happy knowing that their son or daughter in Mae Sot is safe and healthy. In the FGDs conducted, women expressed their desire to have mobile phones but could not afford to buy yet as it is not a priority in the household's subsistence budget. Instead, they have opted to borrow from close friends or neighbors in case of emergency to contact their kin.

Though women tend to see entrenched barriers to their social empowerment in not using ICTs, they are actively coping in some ways with the help of CBOs²⁴ in the Camps. They are able to gain awareness on issues affecting them, earn income through weaving, and the freedom to borrow phones when needed.

IV. CONCLUSION

This initial study illustrates that access and use of ICTs tends to create differentiated influence on women in various ways. Institutions such as household and community seem to influence changes in social relations with ICTs.

For most women migrant workers, ICTs opened up their gates for interesting social opportunities ranging from binding family ties, social networking and expanding relations to a broader perspective as learning arena, venue for advocacy and amplifying women's voices and sites for cultural expression and entertainment. While use of ICTs allow for processes of information and communication that were previously impossible to attain to a group of women, a large number of women is still excluded in the process.

²³ Two weeks to a month

²⁴ Examples of CBOs helping women in the Camps are Women's Education for Advancement and Empowerment (WEAVE) and KWO and others who provide information sharing about human rights, women's and children's rights, livelihood, and health at least twice or thrice a year.

²² The community-based women's organizations, to which the individual women respondents belong, are part of the larger women's umbrella network called Women's League of Burma (WLB). It is where common issues and positions (in relation to institutions of democracy in Burma and women's human rights) of 13 members are discussed and come up with unified agenda for lobby and advocacy to government/s and other concerned agencies.

References

- [1] T. Chadamas and T. Koanantakool, "Global ICT report 2010," in *Promoting Co-operation in Information and Communications Technologies Development*, Kuala Lumpur and Penang, Malaysia, 25-29 March 2002.
- [2] S. Hongladarom, "Cultural politics of the digital divide in Thailand" in *3rd International Convention of Asia Scholars, Singapore*, Aug. 19-22, 2003.
- [3] N. Kabeer, "Resources, agency and achievements: reflections on the measurement of women's empowerment," *Development and Change*, vol. 30, pp. 435-464, 1999.
- [4] T. Kennedy and B. Wellman, C. Clement, "Gendering the digital divide," *IT&Society*, vol. 1, no. 5, pp. 72-96, 2003.
- [5] C. Koggel, "Agency and empowerment: embodied realities in a globalized world," in *Agency and Embodiment*, edited by S. Campbell, S. Sherwin and L. Maynell, Eds. to be published.
- [6] C. Moser, *Gender Planning and Development. Theory, Practice and Training*. London, New York, Routledge, 1993.
- [7] R. Nsibriano, "Him and her"- gender differentials in ICT uptake. a critical literature review and research agenda," *International Journal of Education and Development using ICTs*, vol. 5, no. 5, 2009.

Analysing ICT Micro-Enterprises using Activity Theory: The Case of Mobile Regulation in India

Christopher Foster

Abstract— There is an increasing presence of informal micro-enterprises in developing countries which use information and communications technology (ICTs) at the centre of their operations.

Analysis of such enterprises has so far focussed on the local practices of individual entrepreneurs which whilst significant, does not provide a complete understanding of how such enterprises evolve, underplaying wider contextual issues, such as entrepreneur interconnection, institutional environments and supply chain relations.

This paper illustrates an example of using Activity Theory to analyse ICT micro-enterprise. Activity Theory allows a dynamic understanding of evolving technology use, but with consideration to connected and heterogeneous ICT micro-entrepreneurs.

Index Terms—ICT micro-enterprise, entrepreneurship, technology appropriation, developing countries, policy

I. INTRODUCTION

INCREASINGLY in developing countries, micro-enterprises¹ are emerging locally which centre around using ICTs and/or digital products in areas such as mobile provision, internet cafes and video-film [2-4]. Typically, such enterprises contain elements of informality² which challenge conventional 'business school' understandings of enterprise and entrepreneurship.

For informal ICT micro-enterprises, the literature is mainly ethnographic, focussing on the ingenuity of ICT micro-entrepreneurs in modifying technologies and their local practices. However, there is little in the way of wider theorization and a weakness in linking between local practice and wider contextual issues, notably entrepreneur interconnection, understanding institutional environments and supply chain relations (e.g [2], [4]).

With the lack of wider understanding of informal ICT micro-enterprise, we have little knowledge of how ICT micro-

enterprises evolve and adapt over time, and how this relates to their uses of ICTs. In wider policy terms, this connects with a lack of guidance or policy understanding of such informal ICT micro-enterprises.

Activity Theory provides a potential framework to fill this gap. It provides a coherent way to analyse the *dynamics* of ICT micro-enterprises, focusing on local technology practices but within a wider social environment. In this paper Activity Theory is outlined and an application of Activity Theory is illustrated by way of worked examples from informal mobile micro-enterprise.

II. ACTIVITY THEORY MODELS

At its core, Activity Theory seeks to examine how wider change is closely connected into daily practice and actions. The main features are outlined below [6]:

- 1) Activity theory places *activity* at the centre of analysis, arguing that humans and tools can only be understood by examining their interaction and change within activity.
- 2) The basic unit of activity is an *action* which can be broken down into a triad of components; A *subject* (an individual) acting upon an *object*, done by way of a *mediating object* (a 'tool') (e.g. me (*subj*) using a hammer (*tool*) to hit a nail (*obj*)).
- 3) Actions can be considered from a *socio-historical position* as shown in Figure 1. Forms of tools and established practices are theorized to have emerged from longstanding forms of activity. Equally the present forms of tool and action will in turn shape future activity. Thus, historic action at time ($t-1$) shapes the forms of each of the respective components of the action triad (subject, object, mediating object) at the time (t), and will be further refined at time ($t+1$) through action at time (t).

Engeström's models of Activity Theory is adopted in this paper, which can be used to understand more complex interactions, where a number of different actions and actors undertake interrelated activities. In this work, the triad of action outlined is increasingly subsumed into a wider *activity system* [7]

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¹Micro-enterprises can be defined as enterprises with 10 or less employees (the large majority of which are single owner-operator businesses), where products are sold into the market [1]

²Informality refers to elements of micro-enterprise that for reasons of tax, licence, location, products or processes lie outside legal norms and/or how micro-enterprises are "not recognised, regulated, or protected by existing legal or regulatory frameworks" [5]

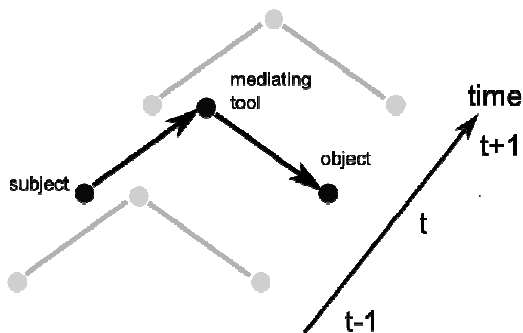


Fig. 1. Socio-historical view of actions. History of actions results in a change to the subject, object, mediating tool

In an Activity System, multiple *individuals* work to 'achieve shared objects'³, where individuals are part of a *community* (see Figure 2(b)). In more established activity systems, rules, divisions of labour and instruments and objects are crucial, and can be said to be mediators (see Figure(b)):

- **Instruments** - The multiple mediating tools, objects and mental processes (internalised tools) which mediate between the individuals and objects of activity
- **Rules** - The way that individuals negotiate their roles within a community
- **Division of labour** - The way that activity in the community is divided to achieve an object

Such mediation is again theorized as emerging to reflect historical modes of activity and interaction.

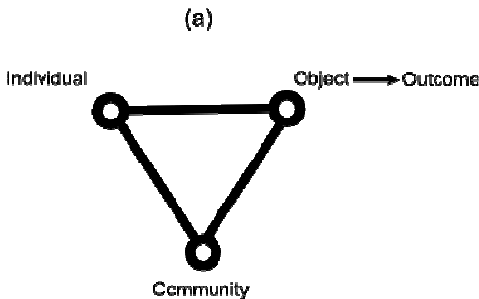


Fig. 2(a). Engeströms[7] model of an activity system. The previous model of actions is increasingly subsumed into a wider activity system model. Individuals are part of communities who work towards achieving 'shared objects'

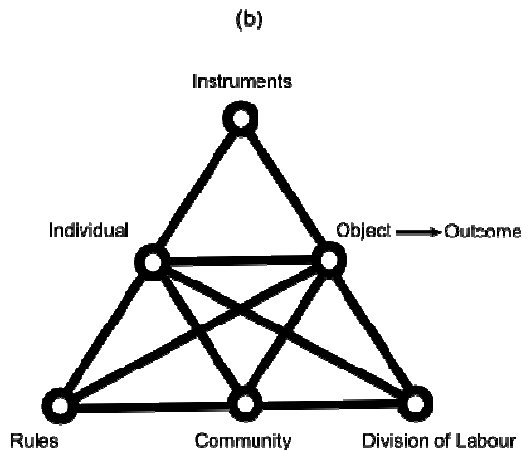


Fig. 2(b). Mediation in Engeströms[7] model; instruments, rules and division of labour act as mediators and are integral to shape the forms of activity within the system

Activity systems are not always stable and aligned. Engeström uses the notion of contradictions - tensions and collisions in an activity system that emerge over time – to understand the role of change. Contradictions emerge in and between components of activity system as shown in Figure 3. Contradictions are the basis for “new qualitative stages and forms of activity [which] emerge as solutions to the contradictions of the preceding stage of form” [7]. Thus, by analysing the emergence of contradictions, it is possible to build a more coherent understand the dynamic characteristics of an activity system and changes over time.

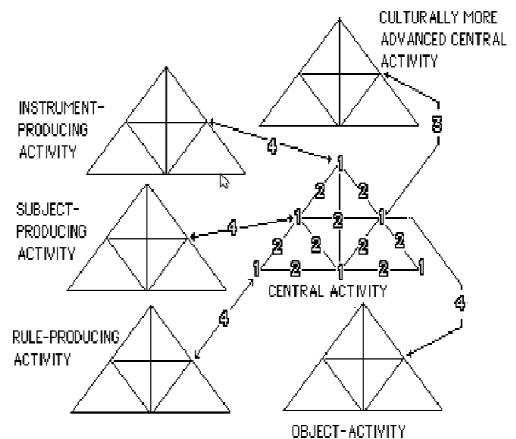


Fig. 3. Contradictions can be seen in multiple senses[7]:
 1) Within single elements of activity (i.e. competing objects of activities)
 2) Between elements of activity; (i.e. between rules and individuals)
 3) As activity systems evolve, between more advanced and older activities
 4) Between 'neighbouring' activity systems; (i.e. activity systems elsewhere which create instruments which are then transferred)

³ Which can be either physical items or mental states

III. USING ACTIVITY THEORY TO ANALYSE MOBILE MICRO-ENTERPRISE

A. Understanding Informal Mobile Micro-enterprise Forms

Activity Theory is used to outline typical dynamics of informal mobile micro-enterprises in developing countries, connected to serving base-of-the-pyramid (BoP) customers - lower income citizens, who mobile has reached as consumers [8].

In all sectors, BoP customers are commonly served through informal micro-enterprises. Figure 4(a) shows the makeup of a typical micro-enterprise which focuses towards BoP customers, using the components of an Activity system that were laid out previously. Micro-entrepreneurs through their close social connection to customers are able to understand local BoP needs, and informal micro-enterprises survive in all sectors by providing niche products for locals (such as by breaking products down to fit with small incomes etc.) [8]. Beyond this informal strategic approach, informal micro-enterprises are often aligned by the relational interconnections, between micro-enterprises, and the consequent informal norms created by interconnected and networked micro-enterprises [9].

As shown in Figure 4(b), there is a disconnect between these general norms of BoP provision, and models of formal mobile 'vendors'. By comparing the parallel components of

these two activity systems, we can see that there are a number of contradictions between them. There are contradictions in the *object* of activity - formal outlets do not necessarily succeed in providing appropriated mobile products for BoP customer needs. However, it is unlikely that a typical informal micro-entrepreneur, who better understand BoP needs, could integrate into formal mobile structures and contracts. This is connected to the contradictions between *rules* and the local informal networks of trust in the markets, bazaars and streets where trading occurs, against the more formal requirements of being a formal mobile vendor [10].

These contradictions between the two systems can be seen to be resolved through a hybrid - informal mobile micro-enterprises which are found in many developing countries. As outlined in Figure 4(c) such micro-enterprises should not be seen as passive 'vendors', but in line with BoP entrepreneurs in other fields, informal mobile micro-entrepreneurs actively create inventive niches which differentiates them from the wider market for BoP customers [11]. Such niches are achieved through socio-technical appropriations, small adaptations of technology or connected arrangements [4]. In terms of the relational aspects, evidence suggests that mobile micro-enterprises are often closely interconnected, becoming part of 'ecosystems', where micro-enterprises feed into one another and enterprises gain through clustering [12].

In sum, the Activity Theory model of mobile micro-enterprise in Figure 4(c) provides a clear model of mobile

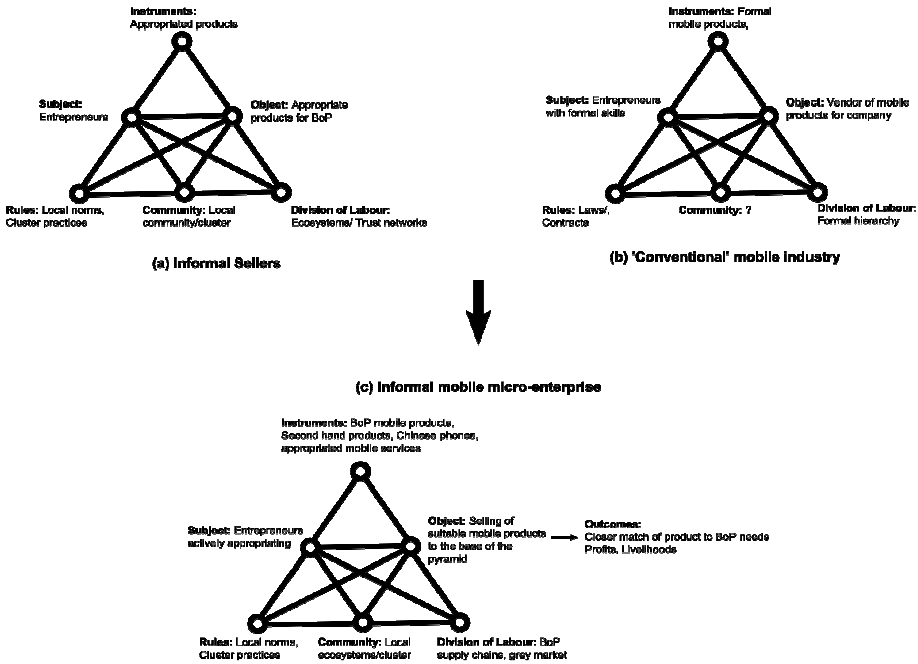


Fig 4: Understanding forms of informal mobile micro-enterprise using an Activity system model. Informal mobile micro-enterprises are considered as a hybrid emerging from the contradictions between two previous activity systems

micro-enterprises and its wider context. Such micro-entrepreneurs are not solely a contractor in the formal mobile supply chain. They are more autonomous and interconnected with their own rules and norms, adaptively pulling together multiple networks and technologies whether this is the supply chains of BoP products, or more informal chains of 'unbranded' Chinese phones and second hand items.

B. Sudden Contradictions: Mobile Handset Regulation in India

1) The Case

On 1st December 2009, mobile operators in India began enforcing a new regulation. Operators were required to operate an Equipment Identity Register (EIR), which would reject network access to mobiles which did not have an International Mobile Equipment Identity (IMEI) number⁴ [13], [14]. This seemingly minor regulation, turned out to be a massively disruptive moment both for mobile micro-entrepreneurs in India and BoP customers.

There are no definitive statistics on the extent of disruption, but there are reports of anywhere up to 30 million BoP phone users in India experienced problems, unable to use their mobiles on any network [15-17]. The disruption was focussed on the cheaper generic brand phones, typically imported through grey markets from China⁵ and distributed through informal mobile micro-enterprises. Such phones often avoid registration fees and regulation by not assigning a unique IMEI code to phones, and this was the cause of the December 1st disruption.

The regulation in India can be seen as specifically targeting imported Chinese phones. Such regulation was first suggested in 2004, within wider security consultation⁶ [20]. Operators slowed the impetus of regulation, fearful of potential disruption, "low end and marginal subscribers, could well have grey market handsets with duplicate IMEIs and would be adversely affected by stringent action" [21].

It was only after terrorist incidents in India⁷ that changes again started to move forwards⁸. To placate the operators, the

government worked in hand with MSAI (Mobile Standards Association of India) to open 1600, 'Genuine IMEI Implant Program' (GII) outlets in India [25], whose role was to fix Chinese phones "for the benefit of genuine innocent mobile customers who have unwittingly bought such handsets" [26].

However, as suggested by the scale and chaos of the fallout, it is debatable whether such a scheme made more than small dent in the problems. For example, there is suggestion of a lack of provision in GII centres [15], [17]; in the cost, which was likely prohibitive for the poorest (R199 (~\$4.25)); and stated doubts of mobile micro-entrepreneurs as to the long-term viability of such IMEI 'implanting' (see discussions at [27]).

In sum, a seemingly small policy change had significant effects, in this case potentially jeopardizing the key products and reputations of many informal mobile phone entrepreneurs, who many argue have been central to enabling mobile to reach BoP customers in developing countries [28]. In addition the way the policy changes have occurred has put a significant number of marginal livelihoods at risk.

2) Using Activity Theory to Analyse Change

An activity theory model theorizes a wider significance of technology, beyond simply being an object. In this Indian case, Chinese phones are not simply a technology, they are deeply entwined into the connected micro-entrepreneurs, and their form influences the practices of the mobile micro-enterprise activity system. With their sudden removal, contradictions emerge within activity systems which point to increasing instability of mobile micro-enterprise due to these regulatory changes.

As shown in Figure 5, in terms of contradiction in *instruments*, many technology products will no longer be viable for micro-entrepreneurs, and this will have knock on effects in terms of supplying niche products to BoP customers. In addition, from an activity theory view such changes threaten long established forms of appropriation and repair amongst mobile micro-entrepreneurs. Examining the contradictions related to the *division of labour*, mobile supply chains have been documented as a source of knowledge, learning, credit and social capital [4], thus sudden disruption of supply chain could have spillover effects on the viability of the complete activity system. Other contradictions are also brought into focus by the regulation change, the local *rules* and norms of entrepreneurs are being questioned with the enforcement of law, and this might affect the way that micro-entrepreneurs articulate themselves in the long term. Equally BoP customers are likely less willing to interact with micro-entrepreneurs.

⁴ All GSM mobile phones have this unique IMEI number, which is transmitted during calls. The EIR is operator equipment which can accept or reject calls, based upon a white or blacklist of IMEIs.

⁵ Discussion on such Chinese phones is fraught with ambiguities, on one hand seen as a legitimate competitor to Western BoP firms in developing markets [18]. On the other hand, they are accused of cutting corners and infringing on intellectual property [19].

⁶ In the 2004 proposal, operators would implement EIR with blacklisting of all stolen phones in their network, each EIR would share blacklists through a national (and likely international) Central Equipment Identity Register (CEIR), allowing trans-operator and trans-national synchronisation of blacklists

⁷ For example, one of the main sources of evidence that the Mumbai bombers were Pakistani, was alleged to be connected to the IMEI of their mobiles (which embeds details of the country of distribution) [22]

⁸ Whereas wider consultations in 2004 had been around blocking all stolen phones and non-unique IMEIs, the newer approach was specifically targeted at Chinese phones [23], ignoring international security standards of CEIR/EIR blacklists [24], which makes the genuine effectiveness of the scheme debatable.

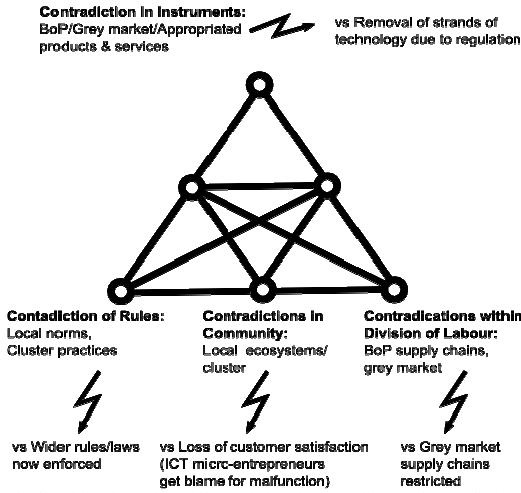


Fig 5: Sudden change in mobile regulations leads to widespread contradictions and instability in the informal micro-entrepreneurs' activity system

In an activity system theorisation, contradictions are likely to be resolved through change in the activity system. There are a number of potential transformation paths, as illustrated in Figure 6. For the original policy makers, the top-most transformation shown is likely the intended outcome - technological change leads to entrepreneurs opting toward other more acceptable handsets. But is this realistic? As the Figure 6 shows, other transformations seem more likely. This is attested to by reports from India, where mobile micro-entrepreneurs have been documented as further appropriating technology, offering informal IMEI implanting and software flashing to work around the law [29], [25]. This is not a surprise, given long standing and stable local practices and relations, such modifications of technology are more viable than deeper changes, to which the regulator aspire.

Nevertheless, considering the importance of loyalty in the relationship between mobile micro-entrepreneurs and BoP customers [11], [2] there will inevitably be some loss of customers (and potentially a loss of confidence in ICTs for BoP customers). There is evidence of this in strategies of Chinese manufacturers now looking to buy stakes in Indian mobile phone production, keenly aware of a loss of reputation of both Chinese mobile products and mobile micro-entrepreneurs [30].

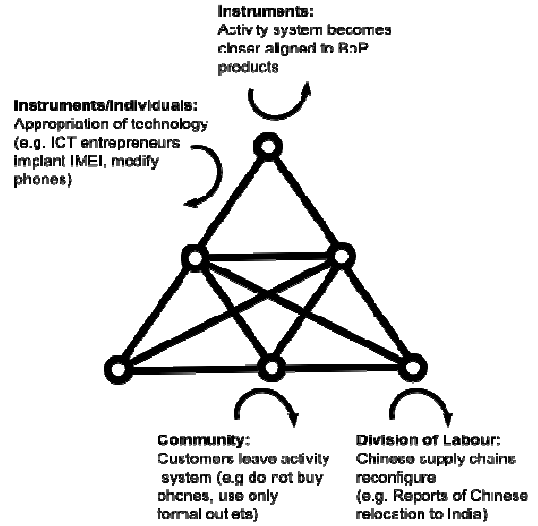


Fig 6: Possible transformations connected to contradictions

In sum, whilst there was some inkling of the impact that regulation would bring, there seems to have been very little analysis of the potential of the knock-on effects on ICT micro-enterprise or amongst BoP customers. As the activity theory models suggest, given appropriate instruments, it is possible that the mode and outcomes of such regulation could have implemented in a more coherent and far less damaging way.

IV. SUMMARY

This paper has deliberately taken a wide sub-sector of ICT micro-enterprise and a strongly disjunctive moment to illustrate the use of activity theory. However, the framework can also be applicable and insightful when trying to understand more subtle links between local practices and technologies [31].

Activity Theory offers a theoretical contribution to studying ICT micro-enterprise in several ways. By analysing practice, within the constraints of wider activity systems, Activity Theory is able to offer a coherent and dynamic analysis of actions, and connecting them into wider flows and structures. The notion of socio-history is crucial in that the focus is on ongoing dynamic change and how this shapes future interactions.

As vividly illustrated in this case, in addition to evolutionary growth of enterprise, there are often sudden disjunctive moments in ICT micro-enterprise. Activity Theory provides room to analyse both the evolutionary paths and

sudden disjunctive moments and how entrepreneurs respond to these changes.

More generally, researchers might also consider Activity Theory as a good fit to analyse complex technologically-led 'grassroots innovation' and 'per-poor interventions' in developing countries that are increasing emerging within the ICTD and ICT4D literature [32], [33], helping to connect between increasingly heterogeneous socio-technical practices and wider contexts.

Activity Theory also critiques the prevailing notion in ICT4D of ICT as simply a tool or of theorisations where ICT is present in name only [34], [35]. In Activity Theory technology objects are theorised in a more expansive way, seen as actively changing, and a meaning maker within technology-led actions.

REFERENCES

- [1] C. Liedholm and D. C. Mead, *Small Enterprises and Economic Development: The Dynamics of Micro and Small Enterprises*. London: Routledge, 1999.
- [2] H. Ilahiane and J. Sherry, "Joutia: Street Vendor Entrepreneurship and the Informal Economy of Information and Communication Technologies in Morocco," *Journal of North African Studies*, vol. 13, no. 2, pp. 243–255, 2008.
- [3] B. Larkin, "Degraded Images, Distorted Sounds: Nigerian Video and the Infrastructure of Piracy," *Public Culture*, vol. 16, no. 2, pp. 289–314, 2004.
- [4] N. Rangaswamy, "ICT for Mesh-Economy: Case-Study of an Urban Slum," presented at the IFIP 2009, Dubai, 2009.
- [5] M. Chen et al., *Women and Men in the Informal Economy: A Statistical Picture*. Vienna: International Labour Organisation, 2002.
- [6] V. Kapteelinin and B. A. Nardi, *Acting with Technology: Activity Theory and Interaction Design*. Boston, MA: MIT Press, 2006.
- [7] Y. Engeström, *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Helsinki: Orienta-Konsultit, 1987.
- [8] C. K. Prahalad, *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits*, 5th ed. Philadelphia, PA: Wharton School Publishing, 2009.
- [9] A. Brown, *Contested Space: Street Trading, Public Space, and Livelihoods in Developing Cities*. Rugby, UK: Intermediate Technology Development Group (ITDG), 2006.
- [10] T. Molony, "I Don't Trust the Phone; It Always Lies: Trust and Information and Communication Technologies in Tanzanian Micro- and Small Enterprises," *Information Technologies and International Development*, vol. 3, no. 4, pp. 67–83, 2007.
- [11] J. Chipchase, *Mobile Phone Practices & The Design of Mobile Money Services for Emerging Markets*. 2009.
- [12] J. Lugo and T. Sampson, "E-Informality in Venezuela: The 'Other Path' of Technology," *Bulletin of Latin American Research*, vol. 27, no. 1, pp. 102–118, 2008.
- [13] BBC, "India Blocks Millions of Mobiles," *BBC Online*, 01-Dec-2009.
- [14] B. L. Panwar, "Directions to Meet the Requirements of National Security," 06-Dec-2008.
- [15] Deccan Chronicle, "Mad Rush to Validate 'smuggled' Handsets," *Deccan Chronicle*, 02-Dec-2009.
- [16] KPMG, *An Inconvenient Reality - The Unaccounted Consequences of Non-Genuine Software Usage*. India: KPMG Group, 2009.
- [17] D. Madhavan, "Buyers Throng Outlets in the City to Implant IMEI," *The Times of India*, 01-Dec-2009.
- [18] K. Ma, E. Tse, and Y. Huang, *Shan Zhai: A Chinese Phenomenon*. China: booz&co, 2009.
- [19] A. Zimmerman and P. E. Chaudhry, "Protecting Intellectual Property Rights: The Special Case of China," *Journal of Asia-Pacific Business*, vol. 10, no. 4, pp. 308–325, 2009.
- [20] TRAI, *TRAI Preliminary Consultation Paper on Mobile Phone Theft*. New Delhi, India: Telecom Regulatory Authority of India, 2004.
- [21] COAI, *COAI Response to TRAI Preliminary Consultation PaperNo. 2/2004*. New Delhi, India: Cellular Operators Association of India, 2004.
- [22] Rediff, "The Mumbai Police's Technical Evidence," *Rediff Online*, 26-Feb-2009.
- [23] MSAI, "Mobile Standards Association of India - Welcome Letter to GSP Program," 2009.
- [24] ETSI, *Etsi Ts 122 016 - Digital Cellular Telecommunications System (phase 2+)*. Sophia Antipolis, France: European Telecommunications Standards Institute, 2010.
- [25] MSAI, *Press Brief-GII (Genuine IMEI Implant) Program*. New Delhi, India: Mobile Standards Alliance of India, 2009.
- [26] COAI, *Operationalization of Genuine IMEI Implant (GII) Program by GSM Industry*. New Delhi, India: Cellular Operators Association of India, 2009.
- [27] GSM-Forum, "GSM-Forum," [Online]. Available: <http://forum.gsmhosting.com>. [Accessed: 18-Jul-2010].
- [28] J. Mujica, *Local Strategies for Mobile Telephony Access. Functions and Structures of the Informal Market in a Low Income Community*. Peru: DIRSI, 2007.
- [29] S. Bafna, "COAI Warns Mobile Users against IMEI Implant by Unauthorized Players," *Telecom Talk*, 15-Dec-2009. [Online]. Available: <http://telecomtalk.info/coai-warns-mobile-users-against-imei-implant-by-unauthorized-players/14691/>. [Accessed: 17-Jul-2010].
- [30] H. Jinglei, "Shenzhen Handset Makers to Set up Factories in India," *Telecoms, Media & Technology China*, 08-Jan-2010. [Online]. Available: <http://tmt.interfaxchina.com/news/2534>. [Accessed: 17-Jul-2010].
- [31] A. Mursu, I. Minkinen, and M. Korpela, "Activity Theory in Information Systems Research and Practice-Theoretical Underpinnings for an ISD Method," *Information Research: an international electronic journal*, vol. 12, 2007.
- [32] R. Heeks, "Development 2.0: The IT-Enabled Transformation of International Development," *Communications of the ACM*, vol. 53, no. 4, pp. 22–24, 2010.
- [33] R. Heeks, "ICT4D 2.0: The Next Phase of Applying ICT for International Development," *Computer*, vol. 41, no. 6, pp. 26–33, 2008.
- [34] C. Aygerou, "Information Systems in Developing Countries: A Critical Research Review," *Journal of information Technology*, vol. 23, no. 3, pp. 133–146, 2008.
- [35] W. J. Orlikowski and C. S. Iacono, "Research Commentary: Desperately Seeking the 'IT' in IT Research-A Call to Theorizing the IT Artifact," *Information Systems Research*, vol. 12, no. 2, pp. 121–134, 2001.

Conceptual and Methodological Problems in the Study of ICT Appropriation Process by Low-income Urban Youth in Argentina.

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Marina Calamari, Jimena Ponce de León, Miguel Gaztañaga

Abstract— In this work we discuss the theoretical framework and the methodology to approach the relationship between public access to ICT, poor urban youth groups and socio-economic changes in their daily lives. For this purpose we analyze the concepts of appropriation and contribution versus those of impact and attribution, considering the theoretical and methodological implications of this difference. This is followed by an analysis of the selected methodological strategy and the logical model used in this research. Finally, the article analyses the practical implications of these concepts and the selected methodological strategy for the efficiency in the design of public policies.

Index Terms— Appropriation, Contribution, ICT, Poor Youth

I. INTRODUCTION

THIS paper discusses the theoretical and methodological implications of a major research titled “The impact of public access to ICT in Argentine low- income urban youth”. Our research proposal focuses on how the young urban poor in Buenos Aires appropriate ICT through public and shared Internet access venues. We are interested in the everyday life uses and meanings attached to these different types of venues by these social groups. For this purpose, the study approaches the impact promoted by a shared Internet access in the following dimensions: education, employability, civic participation and sociability. The objective is to compare the

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appropriation experience in three different projects situated in the most densely populated municipality of Buenos Aires (La Matanza): 1) a private and commercial venue (cybercafé), 2) a non-profit communitarian space sustained by the Unemployed Workers Movement and 3) a telecentre sustained by the local council and the national state.

This work focuses on the framework and methodological aspects of the above-mentioned research project. In this sense, the aim of the paper is to discuss several concepts and categories and to clear methodological issues in order to render them applicable for this context. In the first place, we address the relationship between technology and society and we discuss the notions of appropriation, impact, contribution and attribution. Afterwards, we develop the questions and the logical model that will guide our research. Finally, as a conclusion, we provide some considerations in terms of the contributions that our research can give to policy makers dedicated to digital and social inclusion and youth.

II. THEORETICAL FRAMEWORK AND IMPLICATIONS FOR THE RESEARCH

Our research incorporates a constructivist view of technology [1] and the pragmatic sociology of Latour [2] – [3] to situate the work under what Feenberg categorizes as a critical theory of technology [4]. This epistemological approach does not admit a priori definitions of the meaning of technology. Quite the opposite, it posits that its meaning is constructed through the social and historic practices of people with objects. Thus, technology is not value-free but embedded in social relations and contextually situated. In this way, interpretations vary according to the historical moment, socio-cultural contexts and variables such as class, age, gender, ethnicity, etc. which are varied and multiple and in consequence do not necessarily coincide with the codes of technology and its devices.

Taking into account the relevant aspects of this critical conception of technology, we also consider the social theory of media of J.B. Thompson [5]. We relate subjective experiences of individual appropriation of the Internet in

public shared access centers with broader social dimensions of their context, which enables us to supersede the dispute between methodological individualism versus systemic approaches. In order to address the relations between youth and ICT as practices and values we use the term appropriation, understood as the material and symbolic interpretation of sense-making of certain cultural and technical artifacts by a social group, privileging it over the concept of consumption. While this last category implies that the chances of action are predetermined and closed in a technology, the concept of appropriation emphasizes the capacity of subjects to make it significant for their own purposes. For this reason the notion of impact is also questioned, as it implies that technology has a particular agency, veiling the capacity of subjects to interpret and reinterpret technical objects. Although our consideration is that impact studies are necessary and valuable, they should also be understood for what they can provide. Appropriation and impact hold a different epistemological status. Firstly, there is an interrelation between subject and object, which implies a signification process. Only after we understand this process we are able to study the ways in which the incorporation of this technology transforms the daily life of people. What should not be lost is that these transformations are always the result of a previous interaction with technologies; they are not incorporated or consumed in a vacuum without a history of experiences, as if individuals could be molded like clay by these technical objects. That process of signification is not achieved from scratch. Individuals always have assumptions and expectations with respect to technologies and the media with a social and cultural origin [6]. This implies shared assumptions by a group with similar trajectories. Interpretation is thus a hermeneutical relational process which implies socialization with others [5, p. 62].

Another relevant theoretical issue is related with the capacity of attribution of causal relations between public shared access to ICT and changes in everyday life of low income urban youth. From the conception of technology as a process of appropriation between subject and object, where numerous types of mediations operate [7], we believe we can appreciate the contribution of public access in the daily life of low income urban youth. Given that the emergence of these venues and their appropriation shape a complex system [8] y [9] where multiple variables operate, we will seek to determine in which way public shared Internet access contributes to improve certain social, cultural and economic features of these groups, rather than establishing certain attribution effects in each of these spaces. "A theory of change is compatible with the notion of a paradigm or worldview in that it encompasses a set of assumptions (...) The key word in this theory of change is contribution, as opposed to attribution. Contribution suggests that ICTs will be part of strategies where the broadband services and applications may enhance, enable, and provide options that were not there before. The term suggests an assumption that the intervention has good

odds of contributing to the goals but that efforts to prove causality will not be a priority. Moreover, it embraces the socio-technical interaction between people and technology as a source of innovation, often leading to unexpected outcomes (...) What is added here is an explicit acknowledgment that the gap between outcome and purpose (or results or impact) will be addressed through a contribution theory of change." [7, pp. 90-91].

III. METHODOLOGICAL CONSIDERATIONS

Following previous statements, our research questions analyze mechanisms of appropriation. We want to question the practices and technological representations of the youth in order to understand the ways in which ICT, particularly the Internet, are incorporated into their daily lives in the different shared access venues stated previously. The research is centred around the practices undertaken by low-income youth groups in these venues, analyzing their perceptions on the computer and the Internet and the effects of the relationship with these technologies in terms of their own capacity building to access and stay in the educational system, employability, sociability and engagement with public life. Lastly the research addresses what would happen if these Internet venues would disappear.

Given that appropriation processes are, by definition, extremely complex, a specific methodological approach is needed to address this issue. Following the conceptual framework developed previously for this research, an impact assessment is rendered as an inconvenient approach. The study is not centered in measuring quantitative data (employability indexes, scholarly qualifications, technological capability indexes, amount of new contacts, etc.) which could be attributed to the presence of Internet shared access venues. On the contrary, the epistemological and methodological strategy which is aligned with this research's objectives and theoretical underpinnings aims at determining the intermediate results achieved by these youth groups in Public Access Venues (PAC). These intermediate outcomes are primarily of a qualitative nature, as they intend to comprehend the impact that public access to ICT promotes in the capabilities and imaginaries of these youth. In this way, literature that links flow and web usage [10] – [11] – [12] – [13] could help us to think the possible intermediate outcomes related to poor youth flow experience, which is defined by Csikszentmihalyi [14] as an integration of the constructs of a clear goal, feedback, challenges matching skills, concentration, focus, control, loss of selfconsciousness, transformation of time, and the autotelic nature of an activity. Moreover, we aim at determining the impact of the modes of appropriation of public access to ICT in terms of the accumulation of social capital [15] – [16] of young, urban poor. This capital is essential, according to the literature, to counteract the so-called "discouraging effect": where they can feel trained enough to search for a job [17], where they value the permanence in an educational system as

the driving motor of social promotion [18], where they use their social networks as a strategy for social inclusion and where they feel that public participation can be effective [19]. In other words, we hope to disseminate the ways in which the appropriation of ICT in PAC contributes towards the construction of positive evaluations with

outreach of public policy goals would be very difficult to attain.

The Chart N° 1 depicts this analytical model. It shows the tentative / hypothetical relations amongst variables which we expect to validate with the research. This model establishes a

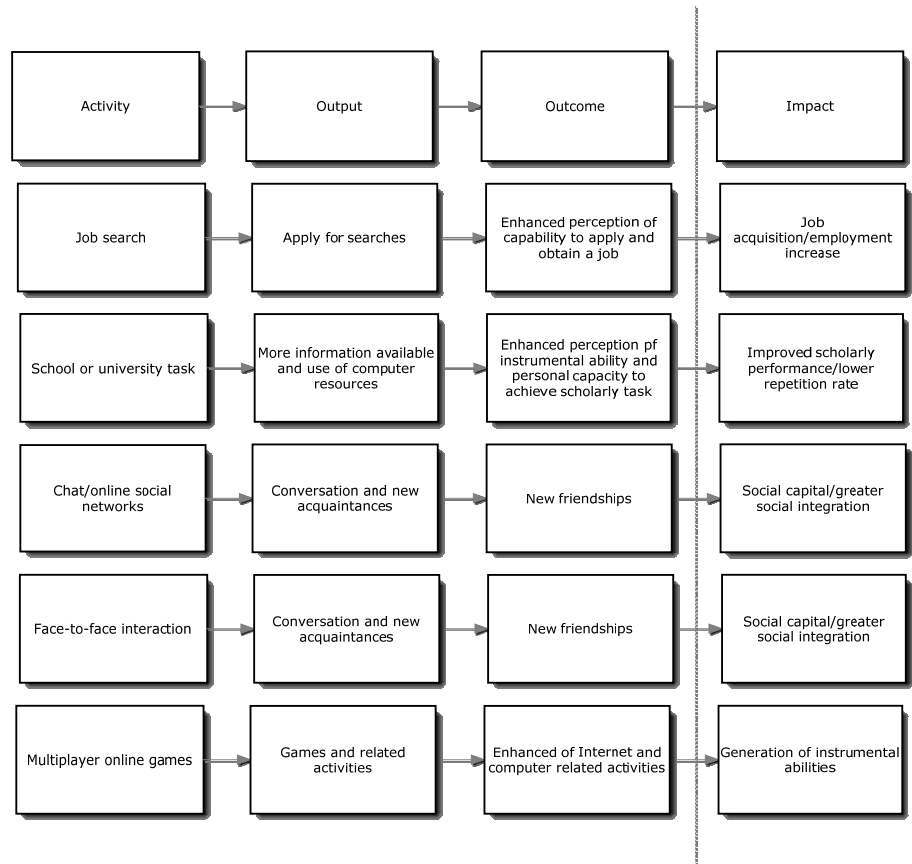


Chart N° 1. Logic Model for assessing the appropriation of ICT in public access venues

regards to their own capacities, social ties, the benefits of education and of collective action. Without these it is quite unthinkable to achieve final outcomes such as the improvement of their work performance, the permanence in an educational setting, the strengthening of social ties and the increase in civic participation and public engagement. Given the specific objectives of this research, we do not aim to measure the degree of compliance or achievement of these final outcomes but rather to show how the different shared access venues can contribute towards the generation of those intermediate outcomes, without whom the final impact and the

complex system between inputs, activities, intermediate results and final impact, as they are all inevitably mediated by social, economic and cultural conditions. The dotted line between the intermediate outcomes and the final ones (final impact) shows the contribution between both parts. The line also frames the explanatory potential of this research. Our research aims at understanding the complex tie established between the first three dimensions (columns), which is nothing other than the process of appropriation. It is essential to understand then this relationship between: inputs (access, devices and services offered at the venues); the socio-cultural conditions of these actors and their practices and social representations by analyzing how they appropriate ICT and potentially strengthen their opportunities in terms of

education, work, sociability and participation in public life. The third column explains with examples how the appropriation of ICT in shared venues could contribute to strengthen each of these capacities.

Given our interest to capture the interrelation between practices and technological representations and the degree of complexity of our analytical model, the methodological approach of this project incorporates qualitative and quantitative techniques.

Also, given that there are no finished theoretical findings regarding our object of study, that is the relationship between public access to ICT by low-income urban youth sectors, descriptive tools will be used to process and analyze the data (for eg: the “most significant change” technique). We will also proceed in the construction of complex typologies, crossing the modes of appropriation of ICT with social class, relevant socio-cultural variables, as well as gender and age. Through these methods we will develop grounded theories based on facts [20], [21].

Methodological sequence is crucial in order to respond to each of our research questions. Thus, the fieldwork is organized in three stages. The first stage is focused on a literature review of publications, research and sources. The second stage is a qualitative and exploratory fieldwork technique, including semi-structured interviews to users and non-users, non-participatory observation techniques in the shared Internet access centers and structured interviews with the managers and coordinators of each venue. This stage also includes focus groups with users from each venue, allowing us to compare them. The third stage will work on the findings from the interviews to build a questionnaire that will help us explore the validity of these data through a survey on ICT uses, activities and intermediate outcomes.

IV. CONCLUSION.

As a conclusion we would like to reflect on the practical utility of concepts such as appropriation and contribution. More than a contribution to the academic debate, as we have done up to now, we are sure of the importance of this perspective for decision making and design of public policies concerned with bridging the digital and social divide and the application of ICT for development.

As was mentioned before, we expect that the concept of appropriation and the approach it entails will help to question, revise and propose new categories to reflect the relationship between the urban poor and ICT, enriching the concepts of “digital divide” and “digital poverty”. We expect the results of this study will allow us to generate original knowledge and indicators for the monitoring and evaluation of digital inclusion programs in Argentina. Because despite the advances in diagnosing and implementing policies to address

the digital divide, there is a lack of studies which incorporate users’ appropriation experience. This omission evidences an epistemological limitation expressed in the construction of indicators which do not contemplate actors’ perspective for the evaluation of these programs [18]. Taking into account these considerations we will devise a communications plan in order to disseminate these results to policy-makers.

For this purpose, it is essential to understand the interrelationship between low-income youth groups and ICT though the study of the contributions of the different PAC and the subject-object technical mediation which operates in them. That is, the work seeks to understand what these youngsters do in these spaces, how they interact personally in these settings and with others (via the Internet) through the appropriation of the potentials that ICT offer in each of these different shared access venues.

The knowledge of the qualitative changes that have occurred through this mediation offers a new and indispensable perspective when providing strategic guidelines for public programs. This research’s final objective aims at providing policy recommendations to the State with regards to the types of shared ICT access initiatives that, if supported and financed, would generate an improvement in the social and economic indexes of these groups. Which public access model should be financed? Should games and playful uses be allowed in these venues, or should they be banished? Which training strategies should be proposed? In which ways could education and shared ICT access be articulated? This research expects to provide scientific evidence which will allow decision-makers to answer these questions when designing and evaluating digital inclusion policies amongst the most vulnerable social groups.

REFERENCES

- [1] T. Pinch, y W. Bijker, “The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other”, *Social Studies of Science*, vol. 14, No. 3, pp. 399-441, 1984.
- [2] B. Latour, “Where are the missing masses? The sociology of a few mundane artefacts”, in Bijker and Law (Eds.) *Shaping technology/building society: studies in sociotechnical change*. Cambridge: MIT Press, 1992.
- [3] B. Latour, *Politics of Nature: How to Bring the Sciences Into Democracy*. Harvard: Harvard University Press, 2004.
- [4] A. Feenberg, “From essentialism to constructivism: philosophy of technology at the crossroads”, 2005. Available: www.sfu.ca
- [5] J. Thompson, *Los media y la modernidad*. Barcelona: Paidós, 1998
- [6] D. Morley, *Medios, modernidad y tecnología. Hacia una teoría interdisciplinaria de la cultura*. Barcelona: Gedisa, 2008.
- [7] R. Ramírez, “Appreciating the contribution of broadband ICT with rural and remote communities: stepping stones toward an alternative paradigm”, *The Information Society*, vol. 23(2), pp. 85 – 94, 2007.
- [8] P. Rogers, “Using Programme Theory to Evaluate Complicated and Complex Aspects of Interventions”, *Evaluation*, vol. 14, pp. 29-48, 2009
- [9] R. Heeks, R. and A. Molla “Compendium on Impact Assessment of ICT-for-Development Projects”, 2009. Available: <http://ict4dblog.files.wordpress.com/2009/06/idrc-ia-for-ict4d-compendium1.doc>
- [10] D. L. Hoffman & T. P. Novak, “Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations,” *Journal of Marketing*, Vol. 60, pp. 50-68, July, 1996

- [11] D. L. Hoffman, & T. P. Novak, "Flow Online: Lessons Learned and Future Prospects", California: University of California, 2008
- [12] Mannell et al. "Internet/Computer Use and Adolescent Leisure Behavior, Flow Experiences And Psychological Well-Being: The Displacement Hypothesis" Paper Presented at the Eleventh Canadian Congress on Leisure Research, May 17 – 20, 2005.
- [13] S. Pace, "A Grounded Theory of the Flow Experiences of Web Users," *International Journal of Human-Computer Studies*, Vol. 60, pp. 327-363, 2003
- [14] Csikszentmihalyi, M. (1997) *Finding Flow: The Psychology of Engagement with Everyday Life*, Basic Books, New York.
- [15] M. Warschauer, "Social capital and access." *Universal access in the Information Society*, Vol. 2(4). Pp. 15-31, 2003.
- [16] P. Bourdieu, *La distinción*, Madrid: Taurus, 1988.
- [17] S. Benítez Larghi, "La lucha desigual por la apropiación de las TIC en las Organizaciones de Trabajadores Desocupados. Doctoral Dissertation in Social Sciences, FSOC, UBA, Buenos Aires, 2009.
- [18] R. Winocur, "Nuevas tecnologías y usuarios. La apropiación de las TIC en la vida cotidiana". *TELOS*, Vol. 73, Madrid, Pp. 109-117, octubre – diciembre, 2007
- [19] M. Castells, Manuel *La era de la información. Economía, sociedad y cultura*, Madrid: Alianza, 1998.
- [20] B. Glaser & A. Strauss, *The discovery of grounded theory*, Chicago: Aldine, 1967.
- [21] A. Strauss & J. Corbin, *Bases de la investigación cualitativa. Técnicas y procedimientos para desarrollar la teoría fundamentada*, Antioquia: Ed. Universitaria de Antioquia, 2002.

E-readiness Assessment Among the Farmers in Five Top Rice-producing Provinces in the Philippines (September 2010)

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Abstract— E-readiness is an important issue in using information and communication technologies for development or ICT4D. Critics have raised their concerns that e-readiness measures available focus much on the environment discounting the users' perception on ICT. Hence, a good measure of e-readiness is one that considers the environment and the users. This study surveyed 1,097 farmers from Nueva Ecija, Isabela, Iloilo, North Cotabato, and Maguindanao. The study queried on both the environment (access and ICT trainings) and users (computer literacy and usage and information-seeking behaviour) issues from the farmers' end. It was found that 82% of the farmers surveyed did not know how to use the computer. They preferred lectures and printed publications as modes of delivery for the latest rice production technologies. Seventy-two percent of the farmers surveyed did not have access to the Internet. This study recommends tapping farmers' children in bringing ICT to farmers, putting up of Internet kiosks in the community with a competent intermediary, and optimizing use of mixed media in extension education as ICT can be a location-specific intervention for now.

Index Terms— e-readiness, ICT4D, ICT in agriculture in the Philippines

I. INTRODUCTION

E-READINESS "is the degree to which a community is ready to participate in a digital economy" [1]. In this paper information and communication technology (ICT) will be limited to the use of the Internet. E-readiness is oftentimes seen in the context of the environment or ICT infrastructure available such as the number of computers and telephone lines [2]. Critics argue that aside from the environment, the users'

perspectives on ICT are equally important [3]. Hence, a holistic way of seeing e-readiness is to consider both the environment and the users' perspectives [3].

This research was guided by the overarching research question: What is the level of e-readiness in the five top rice-producing provinces of the Philippines? The main goal of this research was to provide inputs for policies concerning ICT promotion to Filipino farmers.

In this paper, both the environment (access and ICT training) and the users' perspectives (computer literacy and usage and information-seeking behaviour) were considered in looking at e-readiness. Said areas are important considerations in formulating policies on how to bring the benefits of the Internet to the Filipino rice farmers.

It will be argued in this paper that ICT promotion to the Filipino farmers should be geared towards complementing, but never to supplant, the existing traditional modes of information delivery. Considering the multifarious issues that should be addressed such as the digital divide and the socio-demographic constraints, full-blown ICT promotion can be a location-specific intervention for now.

II. LITERATURE REVIEW

A. Uses of the Internet in the agriculture sector

The Open Academy for Philippine Agriculture (OpAPA) has many innovative ways of bringing the benefits of the Internet to the Filipino farmers. One of them is the *Pinoy Rice Knowledge Bank*, a website on modern crop management practices, which has versions in English, Filipino, Iluko and in Cebuano [4]. OpAPA likewise conducts online communication campaign where experts based in the Central Experiment Station based in Nueva Ecija in the Northern part of the country interact with farmers in other places such as in Mindanao, which is in the Southern part of the Philippines [5]. While there are a myriad of initiatives in promoting use of ICT in agriculture in the Philippines, most of them are on a project basis, still on the pilot-testing stage and can hardly get into the mainstream of Philippine agriculture.

B. Bottlenecks to adoption

Age [6], [7], education [6], [7] and quality of life [6] are determining factors in ICT adoption. There is a negative

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correlation between old age and the interest to learn how to use the computer [7]. In addition, old people usually have ICT anxiety or feeling of discomfort when facing the computer [8]. However, there had been a few instances when farmers despite their old age still showed interest in browsing the Internet. In an ICT literacy training by OpAPA, farmers enjoyed exploring the Internet, as they could use it to communicate with their loved ones abroad [9].

Meanwhile, education can play crucial role in computer literacy. Computers penetrated the Philippines only in the 1980s, and they did not get into public schools until the 1990s. Hence, this would explain why most farmers, who are 40 years old and above, do not know how to use the computer.

The third bottleneck to adoption is the absence of ICT infrastructure [10]. ICT infrastructure phase is the first phase in building an e-ready community [11]. In Turkey, there were a myriad of infrastructure in urban areas that were hardly available in the rural areas [12]. The authors likewise highlighted that few investors wanted to put up ICT infrastructure in rural areas as huge investments would be required for such an endeavour.

Another main concern is the hectic daily schedules of famers such that they could no longer accommodate new tasks except on lean months, when they are just waiting for harvest [13].

C. Use of intermediary in bringing the Internet to farmers

There seems a consensus on the importance of intermediaries in bringing the benefits of the Internet to farmers. The intermediaries must preferably be an agriculture graduate with competent computing skills [7], [14].

Zhao *et al.* (2006) [15] document the computer trainer in a computer access point in China helped computer illiterate farmers access information from the Internet. There were instances when farmers brought some specimen to the computer access point and asked for assistance to search for information from the Internet on how to manage the disease of their crops. During the pilot-testing of the online communication campaign in the Philippines, the site coordinators, who served as intermediaries, made the farmers comfortable by attending to the technical aspects of videoconferencing [5]. They were the ones who set up the computers and made sure the webcam, speakers and other gadgets were operational. Hence, all the farmers needed to do was to communicate with the experts, which resulted in fruitful discussions between them and the rice experts. In a separate study, it was noted farmers learn and appreciate computer and the Internet more if they are in groups [16].

III. METHODOLOGY

The study used the quantitative approach. Quantitative research “emphasises quantification in the collection and analysis of data” (p.22) [17]. Consistently, as regards research philosophy, positivism was employed. “Positivism is an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond” (p. 13) [17].

Survey research design was employed in this study where 1,097 farmers from the five top rice-producing provinces of

Nueva Ecija, Isabela, Iloilo, Maguindanao and North Cotabato in the Philippines served as respondents. Wiseman and Aron (1970) [18] note survey research is a method for collecting and analysing social, economic, psychological, technical, cultural, and other types of data via structured questionnaires in order to obtain information from respondents presumed to be representative of a specific population” (p. 37). Specifically, the study can be classified as a descriptive survey research as the main interest was to give a broad description of the level of e-readiness in the said provinces.

Convenience sampling was employed in this study. Wimmer and Dominick (2003) as cited by Liu (2010) [19] note convenience sampling is “a collection of readily accessible respondents for study” (p.46). Hence, the respondents for this study were the farmer-participants in the PalayCheck Field School (PFS) activity by the Philippine Rice Research Institute (PhilRice) implemented under the Rice Self-Sufficiency Program of the Philippine Government through the Department of Agriculture. In the PFS, farmer-participants meet weekly to participate in technology demonstrations and in lectures on new crop management technologies [20]. Thus, it was convenient for the researchers to access the farmers owing to the existing coordination between PhilRice and the field implementers.

As regards data collection process, letters were sent either to the Provincial (PA) or Municipal Agriculturists (MA) informing them about the study. PAs and MAs assigned Rice Sufficiency Officers (RSOs), who serve as the key facilitators of PFS, to accompany the researchers going to the PFS sites. The RSOs referred the sites for the conduct of the survey. A PFS site was composed of 30 farmers, on the average. Two enumerators were hired to help in the survey. They were briefed on the study and the questionnaire prior to data gathering. The researchers together with the enumerators administered the survey to the respondents. Survey returns were reviewed prior to encoding.

The questionnaire was divided into five parts: socio-demographic characteristics, computer literacy and usage, access, information-seeking behaviour and attendance to ICT training. Data gathered were coded and ran using SPSS. Frequency tables and diagrams were used in analysing the data. Frequency tables and diagrams are among the most common approaches used in doing univariate analysis [17].

Sixty-seven percent of the farmers surveyed were 41 years old and above. Fifty-eight percent of them had less than P 10,000 (USD 200) monthly income. Close to 25% of the farmers finished college in 1980 or earlier. Most of them (68%) were men and married (85%).

IV. RESULTS AND DISCUSSION

A. Literacy and usage

Eighty-two percent of the respondents reported they did not know how to use the computer. This can be explained by the fact that computers were introduced in the Philippines during mid-1980s and did not penetrate public schools until around late 1990s. In fact, even those who graduated from college in early 1990s reported they still had difficulty in using it. Many

farmers reported they had not seen a computer, while some were afraid to touch one. Nearly 18% reported they knew how to use the computer especially MS Word (49%). Most of these farmers used their computer in typing reports and for their children's projects, but seldom for their own research.

As regards computer ownership, only 12% of the respondents had computers at home while a few owned laptops aside from having desktops. In a separate study, it was found computer ownership is scarce in the farm households [21]. Of the more than 1,000 farmer-respondents in surveyed, 97% did not own computers [21].

B. Access

Seventy-two percent of the respondents did not have access to the Internet. In addition, 75% of the respondents were far from Internet cafes. Those who were near reported they had not entered those cafes as they did not have any business there, no time, or the rates were expensive. Some farmers who found themselves inside Internet cafes reported they just accompanied their children, or fetched a son after playing computer games.

These results reinforce the need for more investment on ICT infrastructure. In Maguindanao alone, farmers reported electricity had not been reinstalled for more than 2 months after a war between the rebels and the military broke out. The infrastructure phase is the first phase in building an e-ready community [11]. One way to increase Internet access is to put up more Internet kiosks located in areas that can easily be reached by farmers, and must have competent staff or "infomediary" assigned. Moreover, local officials must be tapped in putting up the Internet kiosks. In Banay-Banay Cybercommunity in Davao del Sur under OpAPA, support of local officials resulted in active involvement of the farmers in the activity of the cybercommunities [5].

Moreover, there might be some wisdom in tapping indirect sources to bring the benefits of ICT to the farmers. In this study, 25% reported they wanted their children to work with them, while 40% trusted computer operators or anyone who knows. Tapping the youth will solve the access problem, as they oftentimes go to computer shops. In addition, training for these kids will be shorter, as it will just be more on rice appreciation, nothing more on basic computer operations especially if they are exposed to computers in their schools. The question now, and perhaps a good research topic, is the willingness of the farmers' children to access information for their parents.

C. Information-seeking behaviour

The agricultural technologists (ATs) were the primary sources of agricultural information of the farmers. Radio, TV, and printed materials ranked second. Farmers emphasized they learned much from the seminars given by the Department of Agriculture (DA) and private companies.

Meanwhile, seminars were the most preferred mode of information delivery, as they could ask questions right away and see how technology works through technology demonstrations. The print medium was second, as farmers could always go back to it whenever they miss out on something.

Eighty-five percent of the farmers surveyed did not access rice information online, as they were computer illiterates (47%), no Internet connection (14%) and unaware that they can get information from the Internet (5%).

In a separate study, it was noted "only those who are convinced of the benefits that can be derived from ICT are most likely to spend time learning it" [6], [22]. In addition, ICT adoption may be slow as farmers are not convinced of the advantages computer literacy can give to them [22].

From these results, it might be good to look at how to effectively promote ICT. Meera *et al.* (2004) [7] note promoting ICT must start with making people aware that they can get information from the Internet. Farmers should be informed on how the Internet can help them.

On the other hand, rethinking ICT's relevance in rural areas is also in the right direction, as ICT can be a location-specific intervention for now. Perhaps, in some areas where access is not a problem such as in key cities, ICT-based strategies may take off. Otherwise, traditional modalities should be intensified. Hence, if ICT should be promoted, it should complement traditional modes of information delivery.

D. ICT Training

Ninety percent of the farmers surveyed were unable to attend ICT training in the past 5 years, as there was no opportunity (85%) or they were unaware if ever there had been any training on it. Meanwhile, those who were able to attend ICT training reported they learned basic computer operations. Some were able to apply them in their work, while some were not.

Eighty-six percent of the respondents reported they wanted to attend ICT training in the future, as they wanted to learn how to use the computer (57%). However, many of them reported their attendance would depend on the proximity of the training venue, availability, and on monetary costs involved, that is, the training must be for free. On the other hand, there were many who reported they would have a hard time learning how to use the computer because of their old age.

V. CONCLUSION

It seems cogent from the results of this study that innumerable issues must be addressed if the farmers are to benefit from ICT. Given the nagging issue on digital divide side by side with the socio-demographic constraints of farmers such as old age and computer illiteracy, full-blown ICT promotion can be a location-specific intervention for now. In the context of farmers in rural Philippines, it appears that they still prefer traditional modes of information delivery such as consulting with extension workers, reading printed materials and attending seminars. Depending on the available ICT infrastructure in place, ICT can be promoted to complement, but never to supplant, traditional forms of information delivery.

This study has provided inputs in coming up with policies on how to bring the benefits of the Internet to the Filipino farmers. Future studies can work on coming up with a model

on how ICT can be optimised in Philippine agriculture. There might also be some wisdom in integrating the research studies so far conducted on ICT for development in the Philippine context.

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REFERENCES

- [1] S. Bhatia, "e-ASEAN readiness assessment," presented to the The Internet in Southeast Asia workshop, Bangkok, Nov. 2001.
- [2] J. James, "Reconstructing digital divide from the perspective of a large, poor, developing country," *Journal of Information Technology*, vol. 19, pp. 172-177, 2004.
- [3] D. Dada, "E-Readiness for Developing Countries: Moving the Focus from The Environment to the Users," *The Electronic Journal of Information Systems in Developing Countries*, vol. 27, pp. 1-14, 2006.
- [4] Pinoy Rice Knowledge bank. (2010, June 4). *Pinoy RKB*. [Online]. Available: <<http://www.pinoyrkb.com/index.htm>>
- [5] J.A., IV, Manalo, M.G. Layaoen, and E.A. Parac, "Reflections on online communication campaign on rice production: Prospects and inputs for expansion," presented to the Philippine Extension Network Symposium, Manila, Oct. 2009.
- [6] N. Taragula and E. Gelb. (2010, July 31). "Information and communication technology adoption I horticulture: A comparison to the EFITA baseline," in *ICT in agriculture: Perspectives of agricultural innovation*, E. Gelb and A. Offer, Eds. [Online]. Available: <<http://departments.agri.huji.ac.il/economics/gelb-hort-14.pdf>>
- [7] S.N. Meera, A. Jhamtani A and D.U.M. Rao, "Information and communication technology in agricultural development: A comparative analysis of three projects from India," *Agriculture Research and Extension Network Network Paper No. 135*, pp. 1-15, 2004.
- [8] P.O. Jegede, O.O. Dibu-Ojerinde and M.O. Ilori, "Relationship between ICT competence and attitude among some Nigerian tertiary institution lecturers," *Educational Research and Review*, vol. 2, pp. 172-175, 2007.
- [9] J.A. IV Manalo. (2010, June 7). "We wish we had our own personal computers—Midsayap farmers," Available: <http://www.openacademy.ph/index.php?option=com_content&task=view&id=1104&Itemid=356>
- [10] C. Klimaszewski and J.M. Nyce, "Does universal access mean equitable access?: What an information infrastructure study of a rural Romanian community can tell us," *New Library World*, vol. 110, pp. 219-236, 2009.
- [11] A. Majit, and K. Ehrle, "Building a framework for ICT use in agricultural research and development: Is the North different from the South?," in *Proceedings of EFITA 2003 conference*, pp. 504-512.
- [12] H. Akca, M. Sayili and K. Esengun, "Challenge of rural people to reduce digital divide in the globalized world: Theory and practice," *Government Information Quarterly*, vol. 24, pp. 404-413, 2007.
- [13] R.B. Malasa, K.R.B. Loresca and M.A.M. Baltazar, Loresca, "Land owner and landless rice farmer households: lifestyle in focus," presented to the 19th Federation of Crop Science Societies of the Philippines Scientific Conference, Tagaytay City, Philippines, Jun. 2007.
- [14] V. Balaj, S.N. Meera and S. Dixit, "ICT-enabled knowledge sharing in support of extension: addressing the agrarian challenges of the developing world threatened by climate change," *SAT e-journal*, vol. 4, pp. 1-18, 2007.
- [15] J. Zhao, H. Xiaoming, I. Banerjee, "The diffusion of the Internet and rural development," *Convergence: The Journal of Research into New Media Technologies*, vol. 12, pp. 293-305, 2006.
- [16] K.R. Iddings and J. Apps. (2010, July 31). "What influences farmer's computer use?," in *ICT in agriculture: Perspectives of agricultural innovation*, E. Gelb and A. Offer, Eds. [Online]. Available: <<http://departments.agri.huji.ac.il/economics/gelb-what-13.pdf>>
- [17] A. Bryman, *Social research methods*. New York, United States: Oxford University Press Inc, 2008.
- [18] J.P. Wiseman and M.S. Aron, *Field projects for sociology students*. Cambridge, MA: Schenkman, 1970.
- [19] S. Liu, "Social surveys and the statistical analysis of data," in *An introduction to communication and social change*, T. Pradip and M. Bromley, Eds. Brisbane, Australia: UQ, 2010, pp.39-54.
- [20] PhilRice, *The Philippine Rice Masterplan 2009-2013: Enhancing Provincial Rice Self-Sufficiency*, Manila: PhilRice, 2009.
- [21] R. Malasa, M. Velayo and E.J. Quilang, "Rice-based farm household information technology status," unpublished.
- [22] E. Gelb, and G. Bonati. (2010, July 31). "Evaluating internet for extension in agriculture," in *ICT in agriculture: Perspectives of agricultural innovation*, E. Gelb and A. Offer, Eds. [Online]. Available: <<http://departments.agri.huji.ac.il/economics/gelb-sum-12.pdf>>

Public Access to ICT and Employment: Case of the Impact of Public Access to ICT Skills on Job Prospects in Rwanda

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Abstract — The modern Information and Communication Technology (ICT) is widely seen by countries as a major drive for their socio-economic development. This is demonstrated by huge investments put in ICT projects. Despite such investments, less is done to evaluate the impact of the access to ICT in specific sectors such as employment. This paper presents a study which intends to evaluate the impact of ICT skills acquired from public access ICT venues on job prospects in Rwanda. A mixed method approach is adopted to carry out the investigation. The study is in progress such that the paper does not present any findings, but the study is expected to contribute to the improvement of our understanding of the impact of public access to ICT and to have a potential public policy impact.

Index Terms— ICT, Impact, public access, skills

I. INTRODUCTION

In this 21st century, countries have vowed to exploit modern information and communication technologies to accelerate their socio-economic development. Rwanda is an example of such countries as described in its ICT-led socio-economic development plan [1]. One of the major efforts for the countries to achieve this objective is to equip the population with ICT skills. While some people acquire ICT skills through a formal education in schools, due to various constraints a part of the population acquire or supplement ICT skills from public access ICT venues such as cybercafés and professional ICT training centres. In Rwanda, this is demonstrated for example by the program undertaken by the department of Information Technology of the Rwanda Development Board (RDB) aimed at establishing community telecentres throughout the country [2].

The public access to ICT is reported to be very important in the employment sector. For instance, a research initiative that examines the impact of free access to computers and the Internet in public libraries in USA reported that activities

related to employment were observed as the third highest use for library computer users [3]. People without employment use computers in public access ICT venues during their search for job, and those who are employed use public access ICT venues to perform some tasks of their employment. A public access ICT venue is a place where Internet and other ICT infrastructure are available and accessible to the public either for fee or for free. Regarding the use of public access ICT venues by people who are not employed, research shows that telecentres increase employment opportunities as some people establish their own ICT centres after getting trained in telecenters [4] while other users have high hope of getting jobs after acquiring computers skills from those venues [5]. However, different types of ICT skills acquired from these public venues are not identified and tracked for their contribution to the improvement of users' job prospects. Furthermore, telecentres have been extensively studied such that evaluation guidelines [6] have been produced for them while other types of venues have received less importance.

Despite a lot of efforts put in the adoption of modern information and communication technologies, very less has been done to evaluate the output of such huge investments. This paper presents a study in progress which aims at evaluating the impact of public access to ICT skills on job prospects in Rwanda. After this short introduction, section II describes this study by presenting the main research issues addressed by the study and the hypotheses in the study. Section III presents the methodology being used in this research, and finally section IV presents the conclusion in terms of the importance of this research.

II. THE CURRENT STUDY

The study presented in this paper intends to evaluate the impact of public access to ICT skills on the job prospects of public access ICT venue users. As explained in [7], there is a strong relation between the skills acquisition and the prospect for employment. The study by Okutsu [7] shows that people who have acquired some skills are highly influenced by these skills on the issues of desired occupation and job search. This relation shows that we cannot investigate the impact of the skills acquisition without first identifying the skills that are acquired. In this respect, our study addresses the following

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major research issues:

- What ICT skills do users of public access ICT venues acquire from the venues?
- How does public access to ICT change the levels of users' computer skills?
- What impact do ICT skills acquired from public access ICT venues have on venue users' job prospects?

To answer the research questions derived from these major research issues, the study tests the following hypotheses:

1. ICT training and services provided at public access ICT venues further computer skills of venue users.
2. ICT skills acquired from public access ICT venues improve the job prospects of venue users: the ICT skills help users to get jobs or to set up their own ICT-based business.

III. METHODOLOGY

This study is a form of evaluating how an intervention produces particular results. In the context of this study the intervention is equipping people with ICT skills using public access ICT venues, and the expected results are the impact of these skills on their job prospects. The study adopts the Logic Model for its potential to perform such evaluation. In the logic model, key sequences in the flow from inputs through outputs to the expected outcomes are identified [8]. As shown in Fig. 1, the logic model of the Public access to ICT skills and job prospects includes as inputs the ICT infrastructure and the instructor. These inputs lead to activities of learning basic computer skills, communication and information search. The outputs from these activities include basic computer skills essential to get some kinds of jobs, skills for job search over the Internet, Internet-based communication that can help to get job opportunities information. These outputs in turn lead to outcomes such as searching and applying for a job, meeting ICT competences required for a job, doing ICT test required for a job, or planning own business as a result of ICT skills acquired. Finally, the analysis of the outcomes will reveal the impact of public access to ICT skills on job prospects; whether it leads to improved job prospects, with either people getting jobs or setting up their own ICT-based business.

A. Data collection strategy

A mixed method approach is adopted for data collection in this study. As our research questions are about identifying the skills acquired from public access ICT venues and their impact on job prospects, a case study where the skills acquisition and the job prospects are examined in real life context is very important. In this respect a qualitative data collection combined with a quantitative data collection

followed by a statistical analysis are potential to answer the research questions. Both quantitative and qualitative data will be used to benefit from the strength of each. For instance, quantitative data offer the certainty for generalisation while qualitative data help to confirm the relevancy of indicators to policy makers as explained by Becker et al [8].

Quantitative data collection

For evaluating the impact of public access to ICT skills on job prospects, two categories of people are targeted for field survey. The first category comprises people considered as public access ICT venue users; that is people who have acquired ICT skills from public access ICT venues and people who used public access ICT venues to supplement their ICT skills. The other category comprises people considered as non-users of public access ICT venues; that is people who did not acquire ICT skills from public access ICT venues and who are employed or created their own jobs. The last category includes people who got ICT skills from formal ICT education (in schools) and those who got ICT skills from informal practice outside of public access ICT venues.

Quantitative data will be collected using a questionnaire. We target 416 respondents for filling the questionnaire. This sample will comprise of people with age ranging between 18 and 65 years because we are pretending that most of users who benefited from ICT skills in the public venues are found in this category. During fieldwork, male and female will be given equal chance of being selected. Fieldwork will be conducted on one hand in public places where Internet and other ICT infrastructure are available and accessible to the public. Professional ICT training venues, Cybercafés, telecentres and public secretariats will be targeted organizations as the operators of these venues are likely to have acquired ICT skills from public access ICT venues. On the other hand, we will visit public and semi-public institutions as we are pretending that a significant number of people who benefited from ICT skills in public venues are employed in various institutions mostly occupying lower positions but which require using a computer. Such positions are for example receptionist, customer care officer and secretary. Target institutions are among others; ministries, public and semi-public companies, secondary schools, districts and provinces offices.

Purposive sampling¹ [9] will be used to select target people at the sampled places. The survey will only be guided by the purpose; people who acquired ICT skills. To make our sample representative and cover the whole country, target places and people are distributed as follows:

¹ The primary consideration in purposive sampling is the judgment of the researcher as to who can provide the best and required information to achieve the objectives of the study (Kumar 2005:179).

- All the existing 16 community telecentres distributed around the country will be surveyed and one person will be contacted at each telecentre.
- A sample of 10% of all secondary schools distributed around the country will be surveyed and one person at each school will be contacted. This will lead to 100 respondents. Schools will be sampled following a proportionate quota sampling with respect to districts.
- A sample of 100 cybercafés and public secretariats will be surveyed and one person at each venue will be contacted. 40% of the venues will be sampled from Kigali city while the other 60% will be selected from the other four provinces evenly. This distribution is due to a higher concentration of ICT-based activities in Kigali city compared to the other provinces.
- From public and semi-public institutions, 200 respondents will be sampled from 50 institutions. The selection of institutions will be such that all the districts and both urban and rural areas are covered. At each institution, four people including two public access ICT venue users and two non-users will be contacted.

Since we are using a purposive sampling, we will ensure that the questionnaire is filled by people who have acquired ICT skills and mainly those who acquired or supplemented ICT skills from public access ICT venues. Moreover, during qualitative data collection we will ask about the records of those trained in such venues and follow up on them. The data collection materials are designed such that they will capture the ICT skills acquired from public access ICT venues and their contribution to job prospects. This will allow us to compare the situations before and after the skills acquisition, and hence assess the impact against the right intervention.

Qualitative data collection

As emphasized by Yin [10], a case study investigates a phenomenon with its real life context. This study will use a case study approach by selecting some places and people for a deeper investigation. Some people in different categories including public access ICT venue users, instructors in public access ICT venues and policy makers will be selected and given an interview to find more data that will be analysed along with quantitative data.

In addition to the data collected through a field survey, secondary data sources will be used. Secondary data sources include policy documents and governments publications related to ICT diffusion and development in Rwanda, ICT training attendance records and publications on workforce and ICT skills development in Rwanda.

B. Data analysis

For measuring the impact of ICT skills on job prospects the

“After only” approach will be applied. According to [11], the “after only” approach consists of carrying out a research when a program or intervention has been introduced or finished in the study area. Our study falls in this case as the impact assessment will focus on people having already benefited ICT skills. The analysis will be performed on the three types of data: quantitative data collected through questionnaire, qualitative data collected through interview, and secondary data collected from documents. Some parts of interviews will be quoted and qualitatively interpreted. Content analysis method will be applied on data collected from secondary data sources. Tables and graphs will be used for presenting results and for correlation test between acquired ICT skills and job prospects. The data analysis will trace the following indicators from the data collected:

1. Number of people who have been informed about job opportunities via Internet
2. Number of people who have submitted their job applications via internet
3. People’s attitude on Internet-based communication while searching a job
4. Number of people who had ICT component in recruitment tests
5. Importance given to ICT component during recruitment tests
6. People’s attitude on ICT skills during recruitment test or job creation
7. Number of people who have created their own ICT based jobs as a result of having acquired ICT skills from public access ICT venues

The impact of public access to ICT skills is seen differently on different users based on other factors. Because of this, each of the aforementioned indicators will be tested and evaluated taking into account those factors of gender (female versus male) and social factors such as category of age, education level and origin of trainees (rural versus urban areas). The categories of age are determined based on our assumption on the influence of age on the type of skills sought and the type of employment most likely to be acquired. The categories of education level are determined based on our assumption on the ICT skill needs at different levels of education.

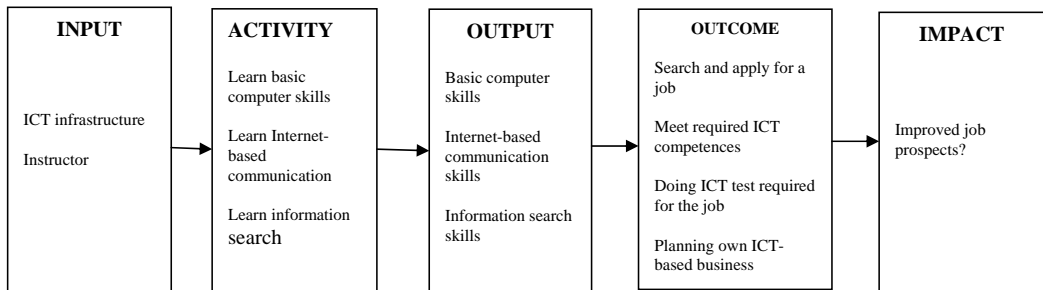


Fig. 1. The Logic Model for the public access to ICT skills and the job prospects

IV. CONCLUSION

This paper has presented a study in progress that aims at evaluating the impact of public access to ICT skills on job prospects in Rwanda. A mixed method approach has been adopted for this research: qualitative and quantitative methods are used to carry out the investigation. The study will contribute to our understanding of the impact of public access to ICTs and will have a potential public policy impact as it will show proven facts of how both positively and negatively the existing ICT policies and interventions are affecting ICT skills acquisition and the contribution of these skills to the improvement of job prospects. The chosen case-study based method has the potential to produce results that are convincing while communicating with policy makers for a potential public policy impact.

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REFERENCES

- [1] Government of Rwanda. *An Integrated ICT-led socio-economic development plan for Rwanda (2006-2010): The NICI-2010 Plan*. Kigali, Rwanda, 2006.
- [2] Rwanda Information Technology Authority. (2007). *Community Telecentres*. Available: <http://www.rita.gov.rw/spip.php?article21>.
- [3] S. Becker, M. D. Crandall, K. E. Fisher, B. Kinney, C. Landry, and A. Rocha, "Opportunity for All: How the American Public Benefits from

- [4] Internet Access at U.S. Libraries. (IMLS-2010-RES-01)", Institute of Museum and Library Services, Washington D.C., Final Rep., 2010.
- [5] United Nations Economic and Social commission for Western Asia. *Impact of ICT on Community Development in ESCWA member countries*. New York: United Nations Publications, 2009.
- [6] F. E. Etta and S. Parvyn-Wamahu (Eds), *Information and communication technologies for development in Africa, Volume 2: The experience with community telecentres*, IDRC and CODESRIA, 2003.
- [7] A. Whyte. (2000). *Assessing community telecentres: Guidelines for researchers*. Available: http://www.idrc.ca/acacia/ev-9415-201-1-DO_TOPIC.html#beginning.
- [8] M. Okutsu, "Vocational Training as Job Search Support: Role and Effect of Employment Realization Strategy", The Japan Institute for Labour Policy and Training, Rep. 46, Sep. 2005.
- [9] S. Becker, M. D. Crandall, and K. E. Fisher, "Communicating the Impact of Free Access to Computers and the Internet in Public Libraries: A Mixed Methods Approach to Developing Outcome Indicators", *Public Library Quarterly*, Vol.28, no. 2, pp. 109-119, 2009.
- [10] R. Kumar. *Research Methodology: A Step-by-Step Guide For Beginners*, Sage, 2005.
- [11] R. K. Yin. *Case study research: design and methods*. Newbury Park etc., Sage, 2003.
- [12] M. Myers. *Monitoring and Evaluating Information and Communication for development (ICD) programmes*. DFID, 2005.

Assessing the impacts of Rural Internet Center programs on quality of life in rural areas of Malaysia

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Abstract— This paper describes and discusses users' perceptions of Rural Internet Centers (RICs) in Malaysia. The Malaysian Government's Rural Internet Centre program has operated in regional and rural areas since 2003. An online survey was conducted as the main phase of this research to determine users' perceptions and level of satisfaction with the services provided by RICs and whether there is evidence of outcomes which could result in improved QoRL from RIC users through their usage and visits to the RIC centers. The results of statistical analysis of the quantitative survey data are presented and discussed. A number of interviews and focus groups were also conducted with other key stakeholders in the RIC program to gain a broader understanding of the program from the perspectives of government, program managers, RIC managers and non RIC users. The key findings of this study from perspectives of RIC end -users were the users are satisfied with the RIC programs and activities. The key findings of the key stakeholders were they are cooperative and plan for RIC sustainability. The main contributions of this research are evidence of the effectiveness and acceptability of community informatics programs in regional and rural Malaysia, which suggests there is potential for improvements in "QoRL". The main contributions of this research are evidence of the effectiveness and acceptability of community informatics programs in regional and rural Malaysia, which suggests there is potential for improvements in "QoRL".

Index Terms— community informatics, 'QoRL', Rural Internet Center (RIC), social capital

I. INTRODUCTION

THIS is an overview of research to evaluate the impact of Rural Internet Centers (RICs) popularly known as *Pusat Internet Desa*, introduced by the Malaysian government in 2000. The major goal of the program is to bridge the 'digital divide' between urban and rural areas and the RICs provide IT skills training and knowledge acquisition programs to rural communities, especially including women, the elderly, youngsters and children, which will then lead to an improvement in the Quality of Rural Life (QoRL) for target areas. This connection between community centers and

improved QoRL, especially in relation to income and employment has been proposed in academic and policy literature and this project will test that proposition using Malaysian case studies.

This paper contains a brief review of the theories and concepts and an outline of the methodology to be used in this research. The organizing framework for the overall research is the policy logic of the program, with the expected benefits identified from literature and then tested using quantitative and qualitative methods. Research data includes official demographic statistics, a survey and interviews, and direct site observations.

As a result, the contributions of this study will be evidence of the degree of effectiveness of community informatics programs, testing the concept of "QoRL", developing the empirical studies of building social capital and examining an application found for program improvement.

How do RICs affect the QoRL? This requires an examination of the ways in which the advent of the centers has impacted on the relevant factors; employment, income, education, and social capital levels in the study sites.

This paper focuses on the assessment of the user's/recipient's perspective of a Malaysian government program, currently under Ministry of Information, Communication & Culture (MICC) which provides access to ICT via 42 RIC telecentres (refer Table 1) in rural Malaysia. A RIC is a community centre that provides public access to computers and the internet. This is a pioneer telecentre program in Malaysia; where there are now more than 2,000 plus telecentres in total. The initiatives within the RIC programs aim at improving economic benefits and building social capital for residents in rural Malaysia. The target users of the RIC program are the youth and women. Therefore, the youth and women participation in this program is very important and relevant to this research.

Table 1: Characteristics of study sites

	Peninsular Malaysia				Borneo
	Northern Region	Eastern Region	Central Region	Southern Region	East Malaysia
RICs location by state	*Perlis	*Kelantan	*Selangor	*Johor	Sarawak
	*Kedah	*Terengganu	Negeri Sembilan		Sabah
	*Penang	*Pahang	Malacca		
	*Perak				
Geography	Rural	Remote	Rural area	Rural area	Remote

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cal	area	area			area
Major economic activities	Agriculture Industrial/manufacturing	Oil, gas & petrochemical Industrial/manufacturing	Industrial/manufacturing Tourism	Industrial/manufacturing	Palm oil Industrial/manufacturing Tourism
No. of responding centers (survey)	9	7	5	6	6
No. of responses (survey)	41	65	21	50	21

* RIC sites that have been visited and interviewed.

II. COMMUNITY INFORMATICS & RURAL DEVELOPMENT

A. Rural Development

Development is a cause and consequence of change and it may be considered to be an instrument which can be used to promote particular rural development (Singh 2006). The overall development of rural areas is with a view to improving the quality of rural life. This is the outcome of relationships between various physical, technological, economic, socio-cultural and institutional factors. The strategy is designed to improve economy and social well-being of a rural poor.

Information and Communication Technologies (ICT) have the potential to improve the quality of life of individuals by providing 'easy' access to information, goods and services (Huggins & Izushi 2002). This requires shifts in public policy to harness today's technological changes as tools for human development (UNDP 2001). Therefore, future rural development programs will be dependent on these changes in policy planning and it is for this reason that the potential role of ICT for rural development needs to be highlighted and discussed further.

B. Digital Divide

The evolution of ICT has brought significant changes to individuals and communities around the world. However, these technologies are not equally accessible to all and disparities in ICT access exist. In particular gaps exist between those who have high access and those who have little or no access. These gaps are commonly referred to as the digital divide. There are eight factors identified as contributing to the existence of the digital divide. The factors are: (1) income, (2) education, (3) age, (4) location, (5) disability, (6) opinion, (7) gender, and (8) culture (Black & Atkinson 2007). Disability is not considered in this study, as it is an area for specialized research.

C. Community Informatics (CI)

The Community Informatics (CI) is a technology strategy which links economic and social development efforts at the community level with emerging opportunities in such areas as Telecentres. Mason (2001) defines CI as the application of technology to enhance and support social structures. As such,

the application can be used to improve the quality of life of the users. CI is also a strategy to create new patterns of usage that are community based and which concentrate on improving life at the community level (refer to conceptual framework).

Studies in CI show a response to the challenge of achieving economic and social development through the use of ICTs. CI pays attention to physical communities and the design and implementation of technologies and applications, which enhance and promote their objectives, one of which can be overcoming 'digital divides' both within and among communities (Gurstein 2000).

D. Social Capital

As well as material circumstances, this study is also concerned with community development and well-being. Social capital refers to the networks and norms that enable collective action (World Bank 1999). It is developed through social networks and can be like physical capital and human capital, a 'stock' and in which society should 'invest'. Putnam defines social capital mainly in terms of trust and participation (Putnam 2000). Based on economic performance, cross-country comparisons also support that social capital has a positive association with economic growth (Knack et al. 1997).

There are two types of social capital; (1) bonding and (2) bridging. Bonding social capital is associated with strong ties within a limited group and bridging is associated with loose ties across communities (Leonard et al. 2003). The internet could contribute to bridging capital as it connects people to other communities and networks, while the actual community centre could contribute to the bonding capital, through the creation of another social space.

The overarching conceptual framework is based on the implied program logic of RICs, from program goals through to expected outcomes. The application of RIC services (inputs) should provide benefits (output) for the community, which in turn should increase the value of economic, human and social capital (intermediate outcome). This project is assessing participant perceptions of changes in those intermediate outcomes and QoRL. The anticipated improvement in QoRL is expected to be driven by increases in the quantity and quality of relevant information and the value of human, knowledge and social capital, as shown in Figure 1 (refer APPENDIX). Therefore, from the survey and interviews; it has been designed such that the RIC program goals are expected to bridge the digital divide. The methodology of the framework drives the program logic and the need to evaluate intermediate outcomes.

III. METHODOLOGY

The overall research was grounded on a meta-analysis of studies of RICs and similar programs and an outline of the methodology used in this research is provided in this section. As related to this study, Harris (2007) used quite similar methods to evaluate telecentres. The methods are: (1) interviews (2) focus group and (3) survey. For the part of the

research reported here, the Ministry involved, the private company and the managers at each RIC were contacted through emails and the RIC portal, to seek formal permission to conduct this study and assistance from the RICs managers to distribute the online questionnaire. The RIC managers encouraged RIC users to participate in the online survey questionnaire. Valid survey responses were received from 33 of the centers which is (about 79 percent of those involved) refers Table 2. The survey is the main data collection for this study, supplemented by interviews to explain in-depth findings and discussion.

Table 2: Summary of **survey** responses

Response Details	Number
Total responses received	229
Reliable/Promising responses (answered most of the questions)	210
Unreliable responses (answered some parts of the questions-later part was unanswered)	19
Average response per centre	<10
Range of responses per centre	1 to 24

The study also conducted interviews and site observations (refer Table 3). To deepen the understanding of the impacts of RICs, the researcher conducted in-depth interviews with senior RIC program officers, RIC managers/assistant managers, non-RIC users and RIC committee members. The researcher had also conducted direct observations in 11 selected sites and had accessed to workshop/training and classes so that the researcher can observe and analyze the interactions between individual RIC managers and participants.

Table 3: Summary of **interview** responses

Response Details	Total Number
Total response received-managers	11
-officers	2
-non-RIC users	7
-RIC committees	5

The table presented above explains the summary of responses applied in this study. Statistical analyses of data gathered from RIC usage records, survey responses and, official demographic data were used to categorize communities and to identify potential correlations. Statistical analyses, including tests for correlations may reveal whether or not RIC activity is associated with perceptions of better economic and social outcomes.

The purposes are to identify and, where possible quantify, perceived changes in social and human capital and increased employment and business activity that relate to the presence and usage of RICs. Then, the interviews and observations were used to further investigate whether such outcomes, if detected, are likely to be causal or just coincidental.

From the summary of interviews, the researcher will then find a theme from the data gathered. This will be based on the

conceptual framework suggested in the study. Figure 2 is the framework highlighted for each variable that has been tested according to the survey and interviews. Therefore, what is about to find out is the outcome of the study; whether the intermediate outcomes or ultimate outcome (QoRL).

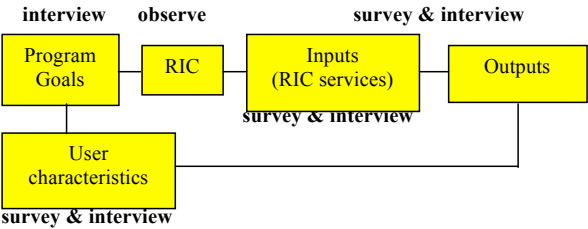


Figure 2: Model/framework highlighted

IV. SUMMARIZED RESULTS & DISCUSSION

The survey results show that communities use RIC services in their daily lives to satisfy their social and economic needs, such as to send and receive messages and seek information. They are satisfied both with the RIC community and the services they offer. The findings of this study show a high level of satisfaction with RICs. On overall satisfaction; the mean is 5.63 (refer Table 4).

Table 4: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Satisfaction mean	200	3	7	5.63	.880

From Table 5; the local communities view all the QoRL outcomes as benefits that they gain from using the RIC and all variables were statistically significant. Hence, they perceived that the social capital does exist pertaining to RIC impacts. Therefore, the benefits were not only social capital, but also on other economic factors. Nevertheless, they should not neglect the social capital as one of the main factors on QoRL, for their community development.

Table 5: Perceived outcomes - **Correlation Matrix^a**

RIC improves/Correlation:-	Income	Education attainment	Employment prospects	Bonding social capital
Education attainment	0.477**			
Employment prospects	0.621**	0.579**		
Bonding	0.544**	0.667**	0.562**	
Bridging	0.456**	0.579**	0.557**	0.860**

****.** Pearson Correlation is significant at the 0.01 level (2-tailed). N = 200

Table 6 explained the summary findings from interviews for different categories of interviewees for the interview questions. There were some differences perspectives between the 11 managers; even though the questions were designed similarly, but, not much different from the non-RIC users. Hence, a few differences from the RIC committees.

Table 6: Perceptions of the RIC Program

No . Of interviewees	Types of interviewees	Summary of interviews	Observations
7	Non-RIC users	The main reasons that they do not use the RIC; are: (1) They find it difficult to travel to the RIC-problem with no transportation. (2) Working on full-time basis-RIC operating only during office hours. (3) Time constraint-no time to visit the RIC.	The users have the interest in RIC. Some of them know what RIC is and the information flows from mouth-to-mouth (especially from friends/relatives that are RIC users).
11	RIC managers	Want more programs and activities. Continuous improvement of RICs. Need more resources/ government funding to upgrade RIC facilities and infrastructure from upcoming budget.	Appears to be a strong relationship between the attitude and personality of the RICs' managers and the success of the RICs.
5	RIC committees	RICs should be located in convenient sites. Government funding to realise RIC projects/programs. Working interrelated with the managers to develop and sustain the RIC programs.	Some of the leaders and committees are very supportive and willing to give time and energy to attend activities at the RIC and also very much involved in promoting the RIC by conducting events and meetings at the same place.

1	Officer from Warisan Global	The centre needs to be monitor and evaluate. The managers are trained on capacity building and social entrepreneurship.	A good training program for RICs.
1	Officer from ministry	RIC is a successful government project. Each RIC have its own uniqueness and ways on how it can be develop and sustain.	The ministries always change and so does the people involved within the project. Too many government agencies involved, project has become more complicated.

The RIC is at one and the same time an ICT service provider, a forum for training, a centre for hosting neighborhood micro-enterprises and individual entrepreneurs. The RIC is seen to have enhanced local job opportunities and the acquisition of new skills; according to the survey respondents. RIC also offers social and economic advantages, and the great enthusiasm for them is proof that they stand some chance of surviving and growing.

In addition, these users have positive attitudes towards RICs and they believe that they gained benefits from using the RIC. Therefore, the users have a sense of ownership and sustainability of the RIC is more likely. Razak (2009) recommended that “the community’s level of ICT literacy can be upgraded through several layers of training and awareness programs. The telecentres can become effective centers for social activities among local communities. There are evidences that some telecentres are moving towards social business model and network with other organizations as partners in training and economic activities” (Razak 2009). The key findings of this study support the findings of Razak (2009).

V. CONCLUSIONS

The RIC program seems a successful government project that has been sustained for almost ten years. Hence, the centre is fully operated by the manager and assistant manager recruited by the Ministry. They had to deliver day-to-day training courses for the rural communities. All of the activities and programs are designed and planned according to the needs of the community. Involvement from the local champions (local leaders, head of village, representatives) and the community is also important to build relationships, cooperation and trust between them. With involvement of multiple key stakeholders, the evidence from this research and previous work suggests that the implementation of the project can be run smoothly and successfully.

Therefore, the outcomes of this program to be realized it is necessary for the government, managers and the communities

involved in evaluating the implementation of the program. The success and failure of RIC depends heavily on the cooperation between these stakeholders.

As a conclusion, the relationship between community telecentres, their potential economic outcomes and the social capital of the community needs further research in order to understand the interactions and their impact on each other. This requires further investigation and testing of the relationship between the theory of CI and QoRL as outcomes.

A number of studies also suggest that there is a need for further research and evaluation of programs addressing the digital divide in rural areas, particularly focusing on the benefits and experiences of individuals ICT technologies and the identification of successful program models. As such, Rao (2003) mentions the need for program evaluation, so lessons can be earned for future programs and policy development.

APPENDIX

Conceptual Framework – Program Goals & Objectives

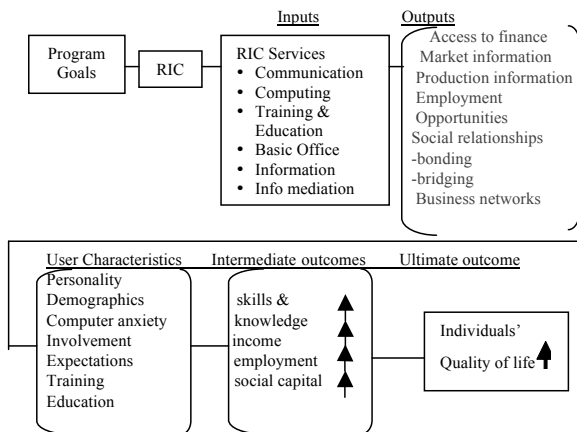


Figure 1: Rural Internet Centre (RIC) Program Objectives

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REFERENCES

- [1] Dunn, WN 2008, *Public Policy Analysis: An Introduction*. New Jersey. Pearson Education Inc.
- [2] Gurstein, M 2000, *Community Informatics: enabling communities with communication technologies*. Hershey, PA: Idea Group Publishing.
- [3] Lin, N 2001, *Social Capital: Theory and Research*. New York: Aldine De Gruyter.

- [4] Putnam, R 2000, *Bowling Alone: the collapse and revival of American Community*. Simon & Schuster, New York.
- [5] Sen, A & Nussbaum, M 1993, *The Quality of Life*. New York, US. Oxford University Press.
- [6] Singh, K 2006, *Rural Development: Principles, Policies and Management*, Second Edition, Sage Publications.
- [7] Mason, D 2001, *Book Review: Community Informatics: Enabling Communities with Information and Communications Technologies*. Hershey, PA: Idea Group Publishing.
- [8] Harris, RW & Tarawe, J 2002, *e-Bario: 'Participatory Community Development with Information and Communication Technologies'*. Roger Harris Associates, Hong Kong, Republic of China. Unpublished paper.
- [9] Huggins, R & Izushi, H 2002, 'The Digital Divide and ICT Learning in Rural Communities: Examples Good Practice Service Delivery', *Local Economy*, vol. 17, no.2, pp. 111-122.
- [10] Knack, S & Keefer, P 1997, 'Does social capital have an economic payoff: a cross country investigation', *The Quarterly Journal of Economics*, pp. 1251-85.
- [11] Leonard, R & Onyx, J 2003, 'Networking Through Loose and Strong Ties: An Australian Qualitative Study', *International Journal of Voluntary and Nonprofit Organizations*, vol. 14, no.2, June 2003.
- [12] Rao, S 2003, "Information Systems in Indian Rural Communities" in *The Journal of Computer Information Systems*, v.44, n.1, p.48.
- [13] Razak, N.A. 2009, "Empowering the rural communities via the telecentres," *European Journal of Social Sciences* (9: Number 3), pp 425-432.
- [14] Black, R & Atkinson, J 2007, 'Addressing the Digital Divide in Rural Australia' published to Southern Cross University-conference paper.
- [15] Harris, RW 2007, 'Telecentre Evaluation in the Malaysian Context', presented at the 5th International Conference on IT in Asia, 10-12 July, 2007, Hilton Hotel, Kuching, Sarawak, Malaysia.
- [16] Rao, PTPR 2004, 'ICT and e-Governance for Rural Development', paper presented to Governance in Development: Issues, Challenges and Strategies, Anand, Gujarat, India, December 2004.
- [17] Mohammad, M 1998, *The Seventh Malaysia Plan 1996-2000*, The Economic Planning Unit, Prime Minister's Department, Putrajaya, Malaysia.
- [18] UNDP 2001, *Human Development Report 2001. Making Technologies Work for Human Development*. Washington, D.C.
- [19] World Bank 1999, "Knowledge for Development," Oxford University Press, Oxford.
- [20] MCMC. Malaysian Communication & Multimedia Commission 2008, Statistical Brief, no.7, survey 2008, <<http://www.skmm.gov.my>>.
- [21] MEWC. Ministry of Energy, Water and Communications 1998, viewed 12 February 2009, <<http://www.ktak.gov.my>>.
- [22] MEWC. Ministry of Energy, Water and Communications 2006, viewed 12 February 2009, <<http://www.ktak.gov.my>>.
- [23] Telecentre Organisation 2006, viewed 10 March 2009, <www.telecentre.org>, <<http://telecentrecommunity.ning.com/notes/History>>.

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SMS-Based Mobile Learning System: A Veritable Tool for English Language Education in Rural Nigeria

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Abstract—In sub-Saharan Africa, particularly in rural Nigeria, students in high school face the challenge of lacking exposure to English Language. For the mainstream, the English language class is the only opportunity they have of learning English words. Consequently, their expression is very poor. On the other hand the use of mobile phones in Nigeria has continued to soar, with everyone having at least one mobile phone and Short Messaging Service (SMS) becoming the cheapest and regular mode of communication across different socio-economic spheres. Thus, there is a great potential for this technology to be used as an instructional tool. In this study, an SMS-based mobile learning system is employed in teaching high school students English Language. In order to determine if there were significant differences between students' success rate, pretests were administered to the experimental and control groups, after both received classroom instructions from the same Instructor. Subsequently, posttests were administered to both groups, after the experimental and control groups had received SMS-based instruction and extra classroom instructions respectively. A paired sampled t-test was carried out and the results clearly revealed that after receiving the SMS-based instruction, the experimental group performed better than their counterparts who had received additional classroom instructions.

Keywords—English language, mobile learning, mobile phones, phrases, Nigeria, short messaging service

I. INTRODUCTION

The rapid developments in information and communication technologies (ICT) have created new opportunities to enhance the reach and quality of education. Many higher education institutions (HEIs) are using ICT to develop course materials, deliver and share the course content, lectures and presentations; facilitate communication among lecturers and students; conduct research; and provide administrative and management services. However, information on how ICT has been, and can be, used to enhance the design, delivery and management of higher education programmes in Nigeria is not readily available.

Today, more than a billion and a half people around the world now own a mobile phone. Nigeria is not left out in this

mobile phone diffusion since the number of people that use this technological tool has continued to soar. The current estimate of mobile phone users lies at about 45.5 million as at August 2007, with most people having more than one cell phone (Wikipedia, 2010). The greater mobility, personal nature and lower cost of mobile phones compared to computers means that there are more people who can afford to make use of this technology. More than ever before, Short Messaging Service (SMS) has become the cheapest and most common means of communication in Nigeria. This is because SMS or "texting" cost less than voice calls and thus offers a mode of communication that is within the reach of almost everyone. The ubiquitous application of SMS across different socio-economic and gender lines implies that there is a great potential for this technology to be used as an instructional tool. Therefore, the application of SMS based mobile learning system in English Language education would be highly practical and convenient, especially for poor students studying in high schools located in rural Nigeria.

Mobile learning, or m-learning for short, is a fairly new concept. It is very closely related to e-learning and can be defined as a 'special type of e-learning, bound by a number of special properties and the capability of devices, bandwidth and other characteristics of the network technologies being used' (Stone, 2004). Milrad defined e-learning as 'learning supported by digital electronic tools and media', and m-learning as 'e-learning using mobile devices and wireless transmission' (Milrad, 2003). Mobile learning is often defined as learning that takes place with the help of portable electronic tools (Quinn, 2000). A portable device that supports learning may be freely moved, but the learner is mostly stationary, even though they are using a mobile device. Although the device is mobile, the learning as an event cannot be described as mobile (Ahonen et. al, 2004). Moreover, when people access information via different tools, there is still much usability, compatibility and accessibility related questions that hinder seamless mobility and m-learning.

A survey carried out in high schools situated in rural Nigeria revealed that only a very small percentage of students owned personal digital assistants (PDAs). In contrast, survey results indicated that every student owned and used at least one mobile phone. Consequently, the widespread use of this device amongst high school students in rural Nigeria, informed the choice of employing this technology in enhancing their

performance in English.

II. LITERATURE REVIEW

At the fourth phase in the evolution of educational technology are handheld computers (Pownell and Bailey, 2001). The first phase was dominated by large, expensive mainframes, which were used in education to make administration and managerial tasks easier. In the 1970s, the second phase began with the advent of personal computers (PCs), and schools introduced computer literacy. The third segment started in 1990s by the development of the Internet and the World Wide Web. The fourth and the current phase started around 2001 and involve the use of palmtop computers and mobile phones. Although many educational specialists have identified the great potential in the use of mobile devices in m-learning, there are currently very few successful implementations to consider as the best practice.

Mobile learning is typically implemented on palmtop computers or mobile phones. There are many reported usage of palmtop computers in schools. Shields and Potfak (2002) report that exchanging messages by beaming between palmtops has a direct effect on learning, especially for collaborative working and group working, and increases the amount of writing produced. The Docklands Learning Acceleration Project (McTaggart, 1997) aimed to increase the amount of children's reading and writing skills. The project was run by the National Literacy Association, and distributed 35 Acorn Pocket Book computers to 15 schools in the inner London Borough of Newham and Southward. McTaggart reported that an improvement in the children's literacy skills was observed because they could use the spell-check and the thesaurus while he could be free to work on the content of their work.

The literature review generally presents the application of palmtops in education. However, some problems are also reported. Jackson (2002) and Perry (2003) warn about the physical fragility of palmtops in the rough environment of schools and the likelihood of theft. The challenge of having to keep batteries recharged is also important, otherwise work could be lost (Perry, 2003). Mifsud (2003) suggests that the new types of mobile phones and PDAs offering extra functions, such as voice and image recording, can also act as a disruptive technology.

There have been a few applications in literature on the use of SMS text messaging in the sphere of education. Soloway et al (1996) describe a trial using SMS text messaging at the Kingston University (UK) to support undergraduates in terms of time management and in ensuring that essential core learning is not missed at an early stage. SMS is also used to complete exercises which facilitate learning and to complete assessed work (Stone, Briggs & Smith, 2002). However, practical studies to determine the efficacy and feasibility of actually delivering educational content through SMS are still lacking. The outcome of this study would provide relevant

information for understanding mobile learning via SMS messaging. It would equally contribute to knowledge and explore the viability of employing SMS as a supplement in teaching English Language phrases to high school students in rural Nigeria.

III. OBJECTIVES OF THE STUDY

This research seeks to determine:

- The opinions of the high school students about the SMS-based mobile learning system; and
- The effectiveness of using SMS-based mobile learning to support classroom teaching of English phrases to high school students in rural Nigeria.

IV. METHODOLOGY

A. Setting

This research was carried out in a high school located in the rural region of northern Nigeria, during the third term of the 2008/2009 academic session. In order to send the SMS text messages, a Windows-based Mobile Learning System was employed.

B. Subjects

Participants were students in the Senior Secondary School who were randomly selected and classified into two groups; the control and experimental groups. Before commencing the study, an interview was carried out during which it was confirmed that, all the participants had mobile phones which could receive and display SMS messages. The phone numbers of all the participants were equally recorded.

C. Instrument

The Activex control package Logic code GSM SMS Activex DLL (2007) was used to format the SMS text messages containing participants' phone numbers, before sending them to a mobile phone attached to the PC via the Bluetooth interface. The mobile phone received these messages and then sent them to the recipients (participants) at the times specified by the PC. The diagram below depicts the framework of the SMS-based mobile learning system.

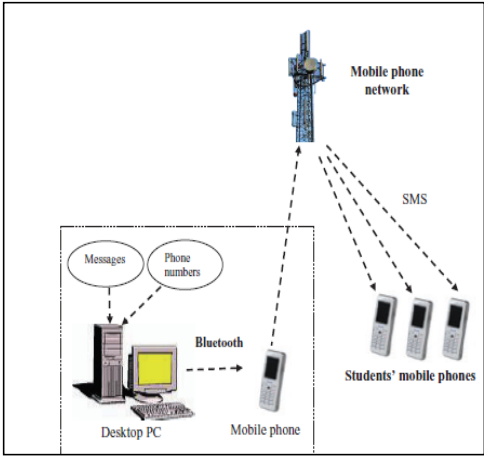


Figure 1: Framework of the SMS-based Mobile Learning System

D. Data Collection and Analysis

In order to determine the effectiveness of the novel system and the learning abilities of participants, pretests and posttests were carried out. Prior to the pretests, all the participants received classroom instructions from the same Instructor. Subsequently, posttests were administered to both groups, after the experimental and control groups had received SMS-based instruction and extra classroom instructions respectively. The experimental group received text messages containing the phrases and their corresponding descriptions, participants had the posttests. The test conditions (i.e. the duration of the test and the environment) were identical in both tests.

Questionnaires were administered to the participants to receive their feedback on the use of the mobile learning system. The students were asked to fill out the survey questionnaire during an English Language class. The questionnaire consisted of specific questions, and each question was worded to determine whether or not there was a positive response to the mobile learning system. The questionnaire was formed based on the 5-point Likert scale type questions, consisting of 15 items, with 5 being a response of strongly agree and 1 representing strongly disagree. Each question was worded so that strongly agree, represented a positive reaction to the system.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I found the mobile learning system enjoyable					
2	I think all my friends who used the system are happy with it					
3	I can easily remember the phrases that I received on my mobile phone					
4	The phrases I learned with this system have increased my vocabulary					
5	I would like a similar system to be used in all my other lessons					
6	With the help of the mobile learning system I learned new expressions easily					
7	The mobile learning system helped me correct the meanings of words I knew wrongly					
8	The current mobile learning system has motivated me					
9	Using a this novel teaching tool helps me maintain my enthusiasm					

10	Because I am usually occupied during class hours and it is more difficult to learn new expressions, I can learn and remember new words easier during my leisure time.					
11	It would be nice if the mobile learning system supported "searching" where I could search for a new expressions					
12	It would have been more effective if I could use two-way communication with the mobile learning system					
13	I preferred the messages to come as multimed in messages					
14	I would like to see the mobile learning system used in the next semester					
15	I found learning new phrases with the mobile learning system very effective					

Figure 2: Survey Questions

V. RESULTS

The results given in this section are based on students' grades obtained in the pretest and posttest. In order to determine whether or not there was any statistically significant difference between students' success rate in pretest and

posttest, a paired sampled t-test was carried out and the results are shown in Table 1. These results clearly indicate that before using the SMS-based mobile learning system (M = 24.68, SD = 12.44), the experimental group had lower success rates than after using the system (M = 71.83, SD = 4.36). A paired sampled t-test based on pretest and posttest results has indicated a significant difference between the two tests (t = 32.29, p < 0.05) in favour of the posttest. On the other hand, table 2 indicates that the success rate of the control group was minimal after the receiving additional classes (M = 32.00, SD = 7.31).

Table 1: The success rate of experimental group

	N	Mean	SD	T	P
Post-test	60	71.83	4.36	32.29	0.0
Pretest	60	21.33	6.23		

Table 2: The success rate of control group

	N	Mean	SD	T	P
Post-test	60	32.00	7.31	32.29	0.0
Pretest	60	21.33	6.23		

VI. CONCLUSION

The result of the survey is in favour of the SMS-based mobile learning system. All participants expressed their satisfaction with the new instructional device. Participants were able to give appropriate descriptions of phrases after the experiment as reflected in the higher marks they scored after the posttest. The average scores for the experimental group before and after the experiments were 21.33 and 71.83 respectively, which is a clear indication of the effectiveness of the SMS-based mobile learning system in promoting English education.

VII. RECOMMENDATIONS FOR FUTHER STUDIES

Although the teaching of new phrases using the mobile phones has been successful, the project can be improved in several ways:

In the experiment, only text-based SMS messages were used. Subsequent studies should employ pictures to illustrate the description of phrases rather than text messages that are several lines long. Sounds can also be used to teach the

pronunciation of new words. The mobile learning system can be applied in teaching other subjects at the tertiary level. The proposed research which is ICT-based will thus form a sound basis for implementing mobile learning and provide business opportunities for all stakeholders.

REFERENCES

- [1] Ahonen, M., Pehkonen, M., Syvanen, A. & Turunen, H. Mobile learning and evaluation. Interim report. Digital Learning 2 project. Working papers. University of Tampere: Hypermedia Laboratory. 2004.
- [2] Jackson, G. B. Handheld computing: educational saviour or fantasy? TechKnowLogia. 2002.
- [3] Logiccode GSM SMS Active X. DLL (V2.2) [Computer software] 2007.
- [4] McTaggart, M. Palms take root in East London. The Times Educational Supplement, 4225, 23. Jun. 1997.
- [5] Mifsud, L. Learning '2go': pedagogical challenges to mobile learning technology in education. In K. Nyiri (Ed.), Mobile learning: essays on philosophy, psychology and education. Vienna, Austria: Passagen Verlag. 2003.
- [6] Milrad, L. Mobile learning: challenges, perspectives, and reality. In K. Nyiri (Ed.), Mobile learning: essays on philosophy, psychology and education. Vienna, Austria: Passagen Verlag. pp. 151–164. 2003.
- [7] Perry, D. Handheld computers (PDAs) in schools. British Educational Communications and Technology Agency (Becta). Coventry, UK. 2003.
- [8] Pownell, D. & Bailey, G. Getting a handle on handhelds. Electronicsschool.com. 2001.
- [9] Quinn, C. mLearning: mobile, wireless, in-your-pocket learning. Linezine. 2000.
- [10] Shields, J. & Potfak, A. A report card on handheld computing. Technology and Learning, 22, 7, 25–36. 2002.
- [11] Soloway, E., Jackson, S. L., Klein, J., Quintana, C., Reed, J., Spitulnik, J. et al. Learning theory and practice: case studies of learner-centered design. CHI 96 Proceedings, ACM. 1996.
- [12] Stone, A. Designing scalable, effective mobile learning for multiple technologies. In J. Attwell & C. Savill-Smith (Eds), Learning with mobile devices. London: Learning and Skills development Agency. 2004.
- [13] Stone, A., Briggs, J. & Smith, C. SMS and interactivity—some results from the field and its implications on effective uses of mobile technologies in education. In Proceedings IEEE International Workshop on the Wireless and Mobile Technologies in Education, New Jersey, (pp. 147–151), ISBN: 0-7695-1706-4. 2002.
- [14] Wikipedia . http://en.wikipedia.org/wiki/Mobile_phone . 2010

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A methodological framework of information and communication technology (ICT) for development and e-business management implementation challenges

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Abstract: Information technology has supported the growth of various industries by reducing operational cost and increasing their ability to generate value for their customers. The rapid development of information and communication technology (ICT) has enable businesses to interact with customers with added value, to achieve competitive advantage. ICT is bringing numerous changes in the way businesses are run. Successful development of ICT to empower individuals and organisations to store and share information with others, irrespective of time and distance is on the rapid. The perceived benefits from ICT developments and e-business in helping organisation can not be over emphasised. The objective of this paper is to propose a methodological framework of ICT for development and e-business management implementation challenges. Unique in the developing world context, the study will provide a theoretical framework to help organisations and communities enhance their chances of successful ICT development and e-business implementation practice.

Index Terms: ICT for development, e-business, ICT and e-business framework, ICTD research, ICT and e-business implementation.

I. INTRODUCTION

To maximise the full benefit of ICT development and e-business, organisations need to successfully adopt

and implement the management of these processes. It becomes difficult, especially in the developing world where information about how best this can be done and implementation experience is still limited. With the success of information and communication technology come the challenges and failures associated with it [1].

Since information technology has brought enormous success to lives and businesses, how then can firms effectively adopt and implement ICT and e-business using available framework to achieve the maximum potential benefits in running the day-to-day processes? As ICT development continues to evolve, business organisations are transforming how they operate, conduct business, and utilise the new opportunities that are being created [2]. This is especially true as competition and growth among firms continues to increase at an unprecedented rate.

II. LITERATURE REVIEW

I. ICT and e-business for development

The awareness of companies toward the numerous potential benefits ICT provide is increasing on a large scale, with some of its benefits as improved public relation, cost effective business process and reduced cost of communication [3]. ICT for development has given rise to access to information for private and professional decision-making, and has expanded the

range of choices and opportunities by facilitating greater access to economic, educational and development-related information. Thus, countries, especially those in developing regions of the world are benefiting immensely. At the same time, many economists seem to agree that ICT backwardness is the major cause of much of the poverty observed around the world [4]. Hence, any long-term solution to the problem of ICT development must therefore address the issue of narrowing the large technological divide between poor and advanced nations as well as provide frameworks to enable the developing countries adopt and implement ICT for development.

Reference [5], define e-business as “the application of information and communication technologies (ICTs), in online and offline format to execute or facilitate the execution of organizational functions like financial management, marketing management, strategy leverage, production management, information systems, logistic management, and customer relationship management”. Thus, this could be understood, that for any meaningful development in the area of e-business, ICT as an enabler for development would first be adopted. In e-business, the old process of buying, selling, exchanging of products and services, information; generating of demand for such through marketing and advertising ; customer services, business collaboration; as well as electronic transactions within an organisation can now be done via computer networks and the Internet [3]. With the advent of the Internet as ICT tool, users are seen as achieving higher response rate due to ease of use as well as greater interactivity [6]. Together, ICT and e-business for development will provide a useful and planned view of strategic direction in increasing participation in economic and human development activities.

II. Conceptual frameworks for ICT and e-business adoption and implementation

In the use of ICT for development and the adoption of e-business and e-commerce, [7] have used Roger’s diffusion of innovation (DOI). Rogers’s theory emphasises the role of individual behavior in use process [8]. The model classifies the users into innovators, early users, early majority, late majority and laggards. For an innovation to be perceived as beneficial, it stands to reason that a business application of information technology must address a specific business need or problem of the firm as well as convince the decision makers of these benefits. The importance of these according to Rogers’ innovation-decision process involves the following three sequential steps: (1) gaining knowledge about an

innovation (for example, awareness and know-how knowledge); (2) which leads to an attitude toward the innovation; and (3) then a decision regarding adoption.

Reference [9] also used DOI theory alongside the Technology Acceptance Model (TAM) [10], to evaluate the introduction of the Internet as a basis for business development in the hospitality sub-sector of the tourism sector. TAM, which is an extension of the Theory of Reasoned Action (TRA) [11], implies that perceived ease of use and perceived usefulness are predictors of attitudes towards use and intentions to use a technology [12]. This further shows that perceived usefulness is associated with perceived benefit, because it relates to the extent that an individual (such as an SME owner/manager) believes a technology (an ICT application for development in this context) will have a performance benefit [13].

Recent research has used a number of newer theories in e-business as well as in ICT developments. Reference [14] used the conceptual model of e-business development as a guide to understand the reasons behind online trade development. Reference [14] established a set of macro and micro-level factors that have been shown to impact the acceptance of e-business and ICT, its implementation and development in smaller firms. A number of issues like globalisation, technology, external and internal barriers, competences and entrepreneurial have been shown to interact with e-business development. The macro-level factors include the drivers behind technology change. The effects of globalisation have further given smaller firms opportunities in international markets. Hence specific industry factors will influence the SMME in its demand for e-business services. It is also perceived that the SMMEs and large scale enterprises will benefit in the adoption of ICT as well as e-business, because the former can trade their products virtually while the latter can save time searching for export related information, using the time saved to develop new products.

References [15] have used the adoption ladder and a managed strategic adoption approach for e-commerce. Reference [16] showed that at the implementation level, e-commerce transforms, requiring ICT to integrate supply chains and networks including sales and marketing. According to [16], a number of factors determine how quickly and to what extent organizations will adopt and implement e-commerce and e-business and these include behavioural and technical factors. These factors will further be reviewed to see to what extent they can be applied to ICT for development and e-business implementation.

III. Development of the conceptual framework

In identifying the issues and factors that can influence e-commerce and ICT development, [17] focussed on organisation barriers. The study identified culture, structures and systems, technology, expertise, and resources as the organisational barriers to the implementation of e-commerce and ICT development. Other barriers were also identified and these include human or individual perception, knowledge and leadership.

Reference [18] discussed organisational barriers at various stage of an organisation development. The study proposed an initial adoption and implementation stages with different barriers at each stage. Reference [19]; [16] do not agree with [18] with regards to the idea that adoption and implementation stages are the same and express the view that the adoption stage precedes the implementation stage.

Findings by [18] referred to technological resistance within organisation, growth acceptance, financial investment, and development of telecommunication infrastructure as initial organisational barriers. Other issues like cultural or language issues, development of Business-to-Business (B2B) interfaces were also regarded as barriers that could affect the adoption and implementation of ICT and e-business.

The framework of [19], in a paper titled "Barriers to Global Electronic Commerce: A Cross-Country Study of Hong Kong and Finland", looked at different organisational barriers and other barriers like technical, economic, political, cultural and legal barriers to electronic e-commerce. The authors state that organisational barriers consist of negative attitudes, lack of knowledge, resistance to change and lack of management commitment. Although implementation cost and operating cost were not mentioned, based on a study conducted by [20] these are regarded as significant barriers to implementation. Infrastructure establishment, integration of legacy systems, availability of applications and standards, capabilities and performance of the Internet security, governmental attitudes, and interagency coordination are also identified as barriers by [20].

In the development of e-readiness framework for small tourism enterprises in developing countries, [21] identified three purposes. The first is to identify the most relevant determinants of e-readiness (that is, what factors collectively contribute to the e-readiness of a business, both negatively and positively). The second purpose is to identify strategies for small tourism enterprises based on their level of e-readiness.

The third and final being to identify implementation issues applicable to small tourism enterprises in developing countries. Enabling environment was identified as the first determinant and according to [21] this refers to enablers such as supporting industries and government readiness. Supporting industry readiness includes telecommunications infrastructure, IT services, and financial institutions to allow online payments, while Government readiness includes government support in terms of policies, involvement, support, and enthusiasm. The second identified area is Market Readiness; which refers to an assessment of the market environment. The third area identified is Organisational Readiness; which refers to an assessment of the business readiness to adopt e-business and hence e-commerce.

Reference [16] identified a number of factors that will determine how quickly and to what extent organizations will adopt and implement e-commerce as well as ICT for development. These factors consist of behavioural and technical factors. Other factors identified in the adoption model of e-business include strategic (operational, technical, behavioural), operational an implementation levels. These factors as well as the factors identified by [22]; [21] will further be developed and adapted for the methodological framework of ICT for development and e-business implementation challenges.

III. PROPOSED ICT FOR DEVELOPMENT AND E-BUSINESS METHODOLOGICAL FRAMEWORK

The methodological framework selected for this paper is adapted from [16] and [21] framework. Warden's framework focuses on how quickly and to what extent organizations will adopt and implement e-commerce as well as ICT for development, while [21] framework focus on relevant determinants of e-readiness for small tourism enterprises.

The reason for selecting and adapting these frameworks is the overlapping or common challenges and barriers identified in the literature and these challenges will further be investigated in a later study. The framework will discuss and focus on the factors that collectively contribute to the e-readiness of a small business to manage and implement e-business as well as ICT for development. Some of these factors will vary across different organisations but will have varying degrees of influence on a business as well as communities.

The role these models play is that they assist managers to make decisions based on their underlying business

environments. The framework will further discuss the e-business development model after the various firms have ascertained their e-readiness and the underlying business environment. The final part of the framework

will then depict the implementation issues in managing the implementation of e-business as well as ICT for development. Fig. 3.1 depicts the proposed framework.

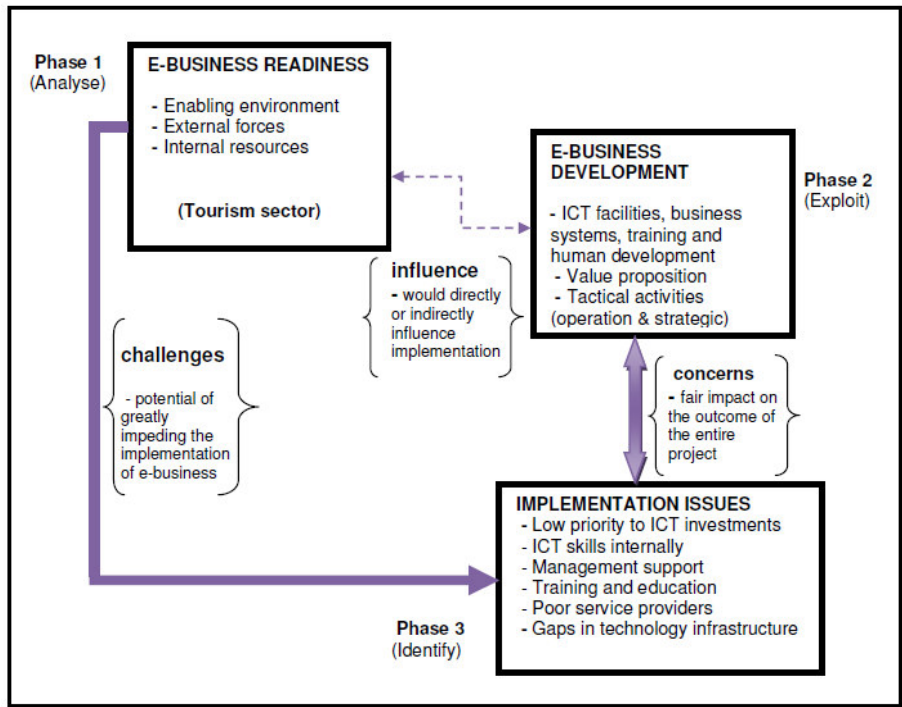


Fig. 3.1: Methodological framework of ICT for development and e-business management implementation challenges

The first step in the framework is the ICT and e-business readiness phase, which is designed to provide IT managers of e-business and ICT for development an instrument to allow them to analyse their environment. The implementation environment will greatly affect the extent to which a firm is ready to adopt and implement e-business as well as ICT for development. The external forces like legislation and Government policies will also play a role in a firm's e-business and ICT readiness. The internal resources (people, systems etc) of the firm will determine the e-business readiness.

The second step in the framework is the ICT and e-business development phase. Here the different resources of ICT development are identified to assist managers in areas they can exploit based on their level of e-business readiness. ICT facilities, business systems, training and human development are all identified in this phase. The final section of the framework examines the implementation issues associated with e-business as well as ICT for development. These issues include technical, behavioural, promotion, evaluation, and gaps in technology infrastructure.

The two-sided broken arrow depicts the **influence** e-business readiness will have on e-business development. Influences like ICT facilities, business systems, training and human development, value proposition, and tactical activities, etc, would directly or indirectly influence the implementation of e-business but might not necessarily pose a serious challenge. The one-sided arrow, from e-business readiness to the implementation issues phase, shows the perceived **challenges** to ICT for development and e-business implementation. The enabling environment, external forces, internal resources, technical and behavioural issues, lack of promotion, inadequate evaluation, and gaps in technology infrastructure have the potential of greatly impeding the implementation of e-business and ICT for development.

The final double-sided arrow between e-business development phase and implementation issues phase indicates the **concerns** that should be taken into consideration in managing the implementation of ICT and e-business for development, even after the development phase have been completed. These concerns in themselves might not impede the implementation process but could have a fair impact on the outcome of the entire project. These phases form the basis for the methodological framework of ICT for development and e-business implementation.

IV. CONCLUSION

The proposed conceptual framework model for ICT development and e-business implementation challenges will be applied to various research papers, journals and other academic works. It can also be applied to e-commerce adoption and development, project management in e-business, ICT for developments, etc. The aim, being to build a theoretical background concerning e-business and ICT implementation and the challenges being faced, in order to underpin and inform a study of developing countries ICT and e-business implementation. The proposed framework is not the be-all-and-end-all for ICT for development and e-business implementation challenges, but it is a useful analytical tool that deserves greater attention.

The experience gathered from this framework will be applied to other programs involved in ICT-for-development. It will assist decision makers in identifying potential challenges to ICT projects to the Millennium Development Goals (MDGs) especially in developing countries. It is hope that by sharing this theoretical framework in an open and candid fashion, it can stimulate the use of ICT as a tool to reach the

MDGs in a timely, cost-effective, and imaginative fashion. The proposed framework will further assist decision makers in gaining more knowledge on how ICT use for development can be improved base on the identified challenges.

V. REFERENCES

- [1] Standish Group. The CHAOS Report 2009, <http://www.standishgroup.com/chaos.html>
- [2] L. Harris, P. Jackson. (2003). "E-business and organisational change: Reconciling traditional values with business transformation". *Journal of Organisational Change Management*, 16 (5), 497-511
- [3] E. Turban, D. King, D. Viehland and J. Lee. (2006). "Electronic commerce 2006: a managerial perspective", New Jersey: Pearson Prentice Hall.
- [4] M. Wolf. (2004). "Why Globalization Works". New Haven, Conn.: Yale University Press, 2004, 398 pp.
- [5] R. Hinson, O. Sorenson. (2006). "E-Business and Small Ghanaian Exporters: Preliminary Explorations in the Light of a Digital Divide", *Online Information Review*, 30, 2, 116-138.
- [6] D.A. Dillman. (2007). "Mail and Internet Surveys: The Tailored Design Method 2007 Update with New Internet, Visual, and Mixed-Mode Guide", Hoboken, NJ: Wiley.
- [7] R. Boateng, R. Hinson. "E-commerce in Least Developing Countries (LDCs): Summary Evidence and Implications", IAABD 2007 Conference Proceedings, VIII,163-173.
- [8] E.M. Rogers. (1995). "Diffusion of Innovations", 4th Ed. New York, N.Y.: Free Press. 58-63.
- [9] S. Kamel, M. Hussein. (2004). "King Hotel Goes Online: The Case of a Medium Enterprise in Using E-commerce", *Journal of Electronic Commerce in Organizations*, 2, 4, 101-115.
- [10] F. D. Davis. (1986), "A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results", Doctoral Dissertation, Sloan School of Management, Massachusetts Institute of Technology, 1986.

[11] M. Fishbein, I. Ajzen. (1975). "Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research", Addison-Wesley, Reading, MA.

[12] E.E. Grandon, J.M. Pearson. (2004). "Electronic commerce adoption: an empirical study of small and medium US businesses", *Information & Management*, vol. 42, no. 1, pp. 197-216.

[13] C.K. Riemenschneider, D.A. Harrison, and P.P. Mykytyn Jr. (2003), "Understanding IT adoption decisions in small business: integrating current theories", *Information & Management*, vol. 40, no. 4, pp. 269-85.

[14] I. Fillis, U. Johannson, and B. Wagner. (2004). "Factors impacting on e-business adoption and development in the smaller firm", *International Journal of Entrepreneurial Behaviour and Research*, Vol. 10 No.3, pp.178-91.

[15] I.M. Motjopolane, S.C. Warden. "e-Commerce adoption factors: Supporting cases from South Africa", *Proceedings of the Information Resource Management Association Conference*, Vancouver, Canada, 19-23 May 2007.

[16] S.C. Warden. (2007). "E-Commerce Adoption by SMMEs – How to optimise the prospects of success", Published Doctorate Thesis, Cape Peninsula University of Technology, Cape Town.

[17] L. Be'gin, H. Boisvert. (2002). "The internal factors that can make or break e-commerce implementation", *CMA Management*, Vol. 76 No. 2, pp. 22-5.

[18] S.S. Rao, G. Metts, and C.A.M. Monge. (2003). "Electronic commerce development in small and medium sized enterprises: a stage model and its implications", *Business Process Management Journal*, vol. 9, no. 1, pp. 11-32.

[19] A.F. Farhoomand, V.K. Tuunainen and L.W. Yee. (2000). "Barriers to Global Electronic Commerce: A Cross-Country Study of Hong-Kong and Finland", *Journal of Organizational Computing and Electronic Commerce*, Vol. 10, No. 1:23-48, 2000.

[20] S. Barnes, B. Hunt. (2001). "E-commerce & V-commerce. Butterworth-Heinemann", Jordan Hill: Oxford.

[21] S. S. Karanasios. (2008). "An E-commerce Framework for Small Tourism Enterprises in

Developing Countries". Published Doctorate Thesis, Victoria University, Melbourne, Australia.

[22] S. Rotchanakitumnuai, M. Speece. (2003). "Barriers to Internet banking adoption: a qualitative study among corporate customers in Thailand", *International Journal of Bank Marketing*, 21(6/7), 312-323

APPENDIX: CLARIFICATION OF TERMS

ICT - Information and Communication Technology can be defined as an umbrella term that encompasses hardware, software, networks and media that facilitates or make it easy to collect, store, process, transmit, retrieve, present and communicate information (voice, data, text, images) (World Bank, 2003).

Evaluating Socio-Economic Impact of Mobile Phone Services Intervention in Rural India

Kasina V. Rao

Abstract— This paper examines how to evaluate the impact of the intervention of mobile phone services' on socio-economic development of rural India. The existing literature shows multiple ways of studying the impact of mobile phone services through different frameworks. The results are non-comparable since the applied methods are different and the problem domain is quite complex. A uniform framework is therefore needed to undertake research on socio-economic impact studies. Various user-centric mobile services are launched across rural markets. India is identified as a field testing ground for most of the multinational firms who want to test their innovative business models. The proposed mixed-method framework, based on the existing literature, may well suit the present research work. A survey adopting socio-economic criteria (SEC) used by Indian marketers for its randomized stratified sample collection is adopted. The sample well represents the entire rural population, as it includes parameters such as the education of the head of the family and the type of house(s) he possesses.

Index Terms— Mobile phone services, Socio-economic criteria, Socio-economic impact, User needs

I. AREA OF STUDY

Development of rural areas all these years was restricted due to limited infrastructure. Various difficulties facing governments in their struggle to overcome this include - inaccessible terrain, lack of funds, etc. The telecom revolution provided a chance to break this development divide to render basic need-based and user-centric value added services (VAS) at affordable cost to rural people who were unreachable till now. Mobile phone usage and acceptance is a phenomenon that is observed across all ages, genders, per-capita and areas. These services make life of rural users easy. The mobility provides ease of usage of m-services. But illiteracy and low per capita of most of the users are creating a major hurdle in its wider acceptance. The emerging business offers a win-win model for users and m-service providers due to its innovation, creating huge opportunities for their mutual benefit.

II. RATIONAL ABOUT THE WORK

India is marching towards the mainstream at a great pace by inclusive growth with the support of technology. However, the development of rural areas brings a challenge to various domain experts including policy makers, researchers, and technology transfer specialists. Emerging markets in particular are playing a major role showcasing technology based

information services. This emergence provided a chance for research community (technical, social, and domain specific) to develop tools and applications necessary for providing solutions. With these tools, the innovative business models are helping channels to provide potential services. These technology supported services seek to solve basic livelihood problems. M-services, in particular, have the potential for overall growth and development in this scenario.

The solution is very clear: support projects that provide user-required and demanded services. The other option is to invite private corporates to extend their businesses into rural areas. The social and market driven forces are providing an opportunity to invent new business models to extend m-services reach. An innovative idea with a rapid and responsible implementation into a creative and useful project is the key. The driving force for the m-services are the major projects that provide crop advisory services, market support (input and output) system, social networking, and financial support systems.

Adding wireless component to the existing limited mobility gives a fillip to the transition to adopt flexible mobile ICT applications and services. As per Confederation of Indian Industry and Earnest & Young, by 2012, India is expected to have 200 million rural telecom connections at 25 percent penetration rate. The technology (especially mobiles) is gaining a position for itself as a personal entity and occupy in people's pocket along with their money purse, keys etc [1]. The indirect impacts create long-term effect on development rather than the immediate ones. To get break even, a minimum user density is critical, as the price at which it is offered is low. It is productive to standardize a mixed method working framework for rural India, which can be used to assess socio-economic impact of mobile services intervention.

III. REVIEW OF LITERATURE

While urban community is relatively connected to multiple information gateways, rural India lags far behind. Researchers proved that the multi-faceted inter-linkages across social, cultural, political, and economic capitals are possible across ICT-enabled projects in businesses and social organisations [2]. Till date, technology intervention brings development is not well proved. But evaluation studies with various approaches are performed and results vary on the same project itself; therefore results cannot be generalized over entire population [2].

The impact of mobile phones on the lives of new rural adopters, therefore, will be insightful [3]. Nokia-CKS research study point out, when certain changes in personal identity, social structure, and social network occur, these may be linked to promote business, economic, and financial transformations

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of the people. There are definite benefits of the use of mobile phones in supporting development, although assured criteria are necessary for their application to be successful [4].

Table I

LIST OF PROJECTS UNDER STUDY

Project	Description
aAqua Mini	Local SME Agrocom started agri-domain venture catering to farmers' needs through real-time decision support mobile services. The major strength of the project is agri-advisory on various crops to farmers. The services are provided with text SMS and voice enabled MMS. This is revenue generating business model with company's strength lying in R&D to develop tools and applications for mobile and Internet platform to cater to socio-economic development of rural areas.
Reuters Market Light (RML)	Reuters most valued initiation for third world countries is RML project. Its major strength is market intelligence along with automated crop advisory services for farmers. The SMS based services cater farmers based on chosen crops and markets in their local language. This is public private partnership (PPP) revenue generating business model. Its strength lies in knowledge and information lifecycle execution.
Village Varta	SMSOne is a non-governmental organisation (NGO) catering to the needs of rural people. It is headed and implemented by rural people. Its strength is in providing social information networking across and within villages. The services are looked at as village varta (means news), which is a local SMS community newsletter. This NGO based revenue generating business model relies on building rural youth force as social entrepreneurs. It encourages rural youth to work for rural people.
Mobile Microfinance / Banking	Ekgaon is a local SME having strength in ICT and management services building mobile based banking and micro finance management for rural people. The services have been started with self help groups (SHGs), mostly formed by rural women. The strength of it is that it is able to carry out all the banking operations online through mobiles or through Internet at the user's place and provide action taken receipts. This is a private-NGO partnership revenue generating business model where the company's strength lies in novel approaches to rural financial services using ICTs and management services.

The demand and need of development depends on timely help in terms of advice about their crops, market information on produce, sustainable financial support for inputs, health of community and their animals, education and sanitation, etc., and form the basic criteria [5]. Most of the farmers are unable to get correct value for their crop yields. They often get as little as 25 percent of actual value against 40-50 percent in developed countries. In light of this, mobile phones gained footing within South Asia through various initiatives [6]. ICTs by virtue of being carriers and conduits of information play a role in correcting large-scale information asymmetries and inefficiencies that exist in developing countries, especially in rural and unorganized markets. Correcting these asymmetries makes these markets more efficient and raises productivity to some extent [7]. These basic needs form objectives of ICT4D projects (Table-I) to serve users with user-centric mobile services. At the same time they have to sustain in rural market for better market linkages. A paradigm shift in innovative business models is taking place by push or/and pull based methods. It attracts an academic interest to study the phenomena.

This literature review (Table-II) is to redress the methodological gaps evident in the previous studies. But the published literature on mobile services impact in the developing world [8, 9] is quite small. Fortunately, a small but methodologically diverse set of research studies have examined the mobile services intervention. In this multi-disciplinary research study, country-specific analysis can provide a way to standardize the methodology to implement in future studies. The result from this analysis is a 'standard framework' to study intervention impact that is going to be fulfilled.

Table III

COMPARISON OF RELATED STUDIES

Studies	Design	Strengths	Weaknesses
R. Jensen, "The digital divide: Information (technology), market performance, and welfare in the South Indian fisheries sector[10]"	<ul style="list-style-type: none"> Quantitative study Econometric analysis Time-series data analysis Micro level analysis 	<ul style="list-style-type: none"> The best quantitative study in the area till date The economic quantification is measured for about five year period Mobile acceptance reduced price in fishing supply chain 	<ul style="list-style-type: none"> The social component of development is missing Mobile acceptance on non-economic poverty is not tested The socio economic development of fisherman was not studied
R. Abraham, "Mobile phones and economic development: Evidence from the fishing industry in India [7]"	<ul style="list-style-type: none"> Case study method Quantitative study Cost-benefit analysis Micro level analysis 	<ul style="list-style-type: none"> The best quantitative study within case study method Mobile role in information asymmetries in fishing supply chain is measured 	<ul style="list-style-type: none"> The social component of development is missing The socio economic development of fisherman was not studied
David Souler, Nigel Scott, Christopher Garforth, Rekha Jain, Ophelia Mascarenhas and Kevin McKemey, "The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction: A study of rural communities in India (Gujarat), Mozambique and Tanzania [11]"	<ul style="list-style-type: none"> Quantitative study Individual interview as survey instrument Statistical analysis Both macro and micro level analysis 	<ul style="list-style-type: none"> The quantitative study to find out telecom impact on poverty in rural livelihoods Study was undertaken to build strong evidence based for policy development contexts 	<ul style="list-style-type: none"> It is a general study where the sample is collected from various pilot projects to conclude It is a broader study to know investment vs benefits for rural livelihoods The socio economic development of rural livelihoods were not seen
Krishna Reddy P., "A Framework of Information Technology Based Agriculture Information Dissemination	<ul style="list-style-type: none"> Quantitative study Pre-post study method Statistical analysis Micro 	<ul style="list-style-type: none"> It is a well structured pilot project with base-line data Knowledge & information transfer impact studied well 	<ul style="list-style-type: none"> The social component of development impact is missing Pilot to commercialization stage is

System to Improve Crop Productivity [5]"	level analysis	<ul style="list-style-type: none"> • The pre-post method applied to see the impact on rural people economic development 	missing – so the study loses its strength on results
Meera, S.N., Jhamtani, A. and Rao, D.U.M., "Information and communication technology in agricultural development: A comparative analysis of three projects from India [12]"	<ul style="list-style-type: none"> • Qualitative study • Individual interview as survey instrument • Statistical analysis • Micro level analysis 	<ul style="list-style-type: none"> • Implementation & uptake of three projects are studied • Looked well perceived implementer's view 	<ul style="list-style-type: none"> • The study lacked socio economic impact on rural people • Usage and information needs seen not of their impact on their life become easy
Surabhi Mittal, Sanjay Gandhi and Gaurav Tripathi, "Socio-economic impact of mobile phones on Indian Agriculture [13]"	<ul style="list-style-type: none"> • Qualitative study • Focus & Individual interview as survey instrument • Both micro and meso level analysis 	<ul style="list-style-type: none"> • The quantitative study tested well how agriculture extension services can reach to a small farmer • Study co-related productivity with mobile extension services • Well focused qualitative study 	<ul style="list-style-type: none"> • The study looked through all stake holders in extension system rather farmer focused • The quantification of economic component is missing
Aditya Dev Sood, "The mobile development report [3]"	<ul style="list-style-type: none"> • Extensive qualitative case studies • Case survey of individuals • Micro level analysis 	<ul style="list-style-type: none"> • Study looked well about social dynamics • In-depth qualitative case study on individuals' life to see the benefit due to mobiles 	<ul style="list-style-type: none"> • It is general study on urban and rural individuals • Case survey was not supported by quantitative impact values to generalize the outcomes

IV. DERIVED METHODOLOGY

Evaluation may be regarded by some as a diabolical exercise and they can contribute to increased transparency, accountability and cost-effectiveness [14]. It may be difficult to identify what effects are actually caused on society by an initiative (mobile services) and to separate these effects from the countless other influences on the socio-economic problems. The evaluation method arrived at from the existing evaluation techniques are used to measure outcomes.

Let us consider 'ex-post evaluations' which are conducted either 'upon' or 'after' the completion of an intervention (mobile services). Ex-post evaluations are 'summative in nature', and are often conducted to express intention of 'analyzing an initiative's impact'. The information needed to assess the impact of an initiative may often not be fully available until several years after the services launched [14].

But waiting for several years to study the impact of any initiative in the society is difficult. The 'quasi-experimental design' is a more practical approach to undertake. Here, control groups still can be used, but these have to be created through some non-random process. Alternatively, one can examine initiative's beneficiaries 'before' and 'after' their exposure to the initiative's intervention. Before-and-after design simply compares the situation after the initiative's intervention with the situation beforehand and attributes any difference to it.

Administering a before-and-after design is relatively easy, but causal inference tends to be quite weak. There is always a possibility that something else besides the intervention may account for all or part of the observed change over time. An improvement on the before-and-after design is the 'interrupted time-series design'[14]. It involves obtaining additional information over time, both before and after exposure, to an intervention in order to create a 'time-series of observations'. But in practice, we can have a variation to undertake the study. The 'counter factual' can be derived with position of time frame denoted by a simple relationship such as: $[(a - b) - (c - d)]$, where a, b are time based pre and post observations of experimental group and c, d similarly for control group. In other words, it is a 'delayed pre-test/post-test' design with a comparison group. It is a useful design where 'base-line data' does not exist. The minimum duration is about 6 months to measure the intervention results.

The intervention is formulated what the situation of participating people (or the treatment group) would have been, had they not participated in the project. This 'Potential Outcome Model' [15] is denoted as: $T_i = Y_i(1) - Y_i(0)$ where T_i is the treatment effect for the individual i , $Y_i(1)$ is the prospective outcome for individual, i where and when treated (the concrete outcome), and $Y_i(0)$ is the potential outcome for individual, i when (s)he would not have participated (the counterfactual). The missing data problem need to be solved by constructing a realistic counterfactual, i.e., the possible outcome if this person would not have participated [16].

One of the 'shortcomings' here is that the relation between project activities and the impacts are not always clearly explained [17]. This is partly due to lack of a comparison to comparable non-participating people. To solve it, a criteria-based sample selection is planned here. The classification considered is socio-economic criteria (SEC) of Indian marketeers (Table-III) to cover rural population. These categories are very important since they help segmenting markets effectively and target well to communicate with core consumers [18] across uniformly. In addition to income and consumer classification, households can also be segmented according to the occupation and education levels of the chief earner of the household (the person who contributes most to the household expenses) [19]. The prepared division members share similar values, interests, and behaviour [20].

Table III

SOCIO ECONOMIC CLASSIFICATION (SEC) 1998 MODEL FOR
RURAL AREAS [18, 20, 21]

Education of chief wage earner (CWE)	Type of House		
	Pucca	Semi-Pucca	Kuchcha
Illiterate	R4	R4	R4
literate but no formal school (Self-learning/home based oral learning)	R3	R4	R4
Below SSC (<10th Grade)	R3	R3	R4
SSC/HSC (10th or 12th Grade)	R2	R3	R3
Some college education (Not Graduate)	R1	R2	R3
Graduate / Postgraduate (Professional)	R1	R2	R3
CWE – the person who contributes the most to the household expenses Pucca House – One which has walls and roof made of burnt bricks/stones (packed with lime/cement)/cement concrete/timber, etc. Kuchcha House –The walls and/or roof of which are made of material other than those materials mentioned in Pucca house. Semi-Pucca House – A house that has fixed walls made up of pucca material but roof is made up of the material other than those used for pucca house. (Def. of houses – Min. of statistics & planning, GOI)			

V. ADOPTED FRAMEWORKS

The project type and necessity form the base for any framework. What we are considering here is a multi-project, multi-disciplinary problem; hence the selected framework could be an appropriate mix and provide at least some degree of compatibility [17]. Based on this, a mix of two frameworks clearly set for the intervention of mobile services study is adopted.

The first one is a four dimensional general one for any kind of intervention process: ‘input-output-outcomes-impacts’ framework, which stresses the need to identify the relationships between project activities and the impacts measured, and the measurement of impacts at different levels of ICT4D resources and processes. The main focus is on assessment of impacts rather than other value chain stages [17]. Undesirable outcomes are unexpected outcomes that a group did not want to happen but which did happen [17].

Measuring the impact of a project thus requires a multi-dimensional perspective. The ‘sustainable livelihoods framework (SLF)’ provides an all-embracing framework for assessing the impact of projects on individuals and communities based on context, assets, institutions, strategies, and outcomes. The points of intervention and impact of projects can be mapped on SLF, as an attempt is made in development projects [17, 22, 23]. The framework views people operating within a context of vulnerability in which they have access to certain assets [24]. The influence over, and access to these assets, is partly determined by the prevailing social, institutional, and organizational into five capitals: financial, human, natural, physical, and social. It provides ‘flexibility of indices selection’ from ‘each capital’ before undertaking impact study.

VI. ADOPTED EVALUATION METHOD

The adopted evaluation methodology is to interview about: change “before” and “after” in terms of asset changes, and causation investigating how the change was causally related to the ICT4D [17]. Hence, the change is measured with ‘delayed pre-test/post-test’ design with a comparison group and causation is measured with ‘input-process-impact’ combined with ‘sustainable livelihood framework’ choosing indices from capitals on need based. This evaluation methodology is the basis for ‘mixed evaluation framework’ design to measure mobile services intervention impact.

VII. RESEARCH STRATEGY

To study mobile services intervention impact, a two-phase research approach is adopted - a case study approach and a semi-experimental approach, namely, the qualitative and quantitative phases. By combining these two, a realistic counterfactual can be constructed.

A. Semi-experimental approach

The quantitative answer to the research question is planned using a quasi-experimental design that a comparison is possible because of naturally occurring ‘treatment groups’, i.e. ‘participating population’ in the project areas versus ‘non-participating population’ (i.e. control group). Apart from their participation in the project, the participating people and the non-participating people need to be as homogenous as possible. Besides constructing the ‘counter-factual’ based on the comparison of the socio-economic situation, a ‘before-and-after counterfactual’ is constructed using the ‘baseline data’ if available, else a ‘delayed pre-test/post-test’ is conducted.

B. Case study approach

Case study research is more often recommended as part of a ‘multi-method’ approach [25] (i.e. ‘triangulation’) in which the same ‘dependent variable’ is investigated using multiple additional procedures (e.g. survey research, cost-benefit analysis, etc) [26]. The case study is used as a framework to collect and document evidence about a phenomenon. It is applied in a vertical approach to study in-depth mobile services intervention of each case (project). Not only observational study, a qualitative measure is incorporated along with focused and open interviews. In view of the fact that the ‘causal links’ between the outputs and outcomes of the projects and the socio-economic well-being of the communities are ‘multi-faceted’ [27]. Hence, case study approach is useful in answering part of the research questions.

The ‘multi-case study approach’ follows replication logic not of sampling logic, each individual case study consists of a ‘whole study’, in which facts are gathered from a range of sources and conclusions drawn on those facts [28]. It is an essential part in multi-case study, but desirable for a single-case study - a case protocol should contain more than the survey instrument [29]. It is desirable when the intent of the research is descriptive, theory building, or theory testing. It permits us for cross-case analysis and in turn contributes towards extension of theory. Multiple cases yield more general

research results [30, 31]. Hence, a multi-case study based cross-site analysis is adopted.

VIII.CONCLUSION

India is a complex country in which each state has its own cultural, social, and economic variations. Hence the study has to be limited to a particular state where most of the projects are operational for a minimum time with sufficient number of users available across all its regions. The user density across all regions within a state is the limitation to undertake intervention impact study. The proposed mixed method framework is adopted using existing methodologies and frameworks available in the literature across various disciplines.

REFERENCES

- [1] Rao, V. Kasina and Sonar, "Farmers Needs and the Use of Mobile Services and Applications: A Study on Indian Pilots," Proceedings of the International Conference on Knowledge Management and Intellectual Capital, Institute of Management Technology Ghaziabad, India, 2009.
- [2] Subhash G. Bhatnagar and Nupur Singh, "Results from a Study of Impact of E-government Projects in India," Proceedings of the International Conference on Information and Communication Technologies and Development, (ICTD 2009). Doha, CA: IEEE, pp.183-191, 2009.
- [3] Aditya Dev Sood, "The mobile development report," Research Report, Nokia – Center for knowledge societies (CKS), Bangalore, 2006.
- [4] Banks, K. and Burge R., "Mobile Phones: An appropriate tool for conservation and development," Fauna & Flora International, Cambridge, UK, 2004.
- [5] Krishna Reddy P., "A Framework of Information Technology Based Agriculture Information Dissemination System to Improve Crop Productivity," Proceedings of 22nd Annual Conference of APEA, 2004.
- [6] Premasri, "Cellphones and (Rural) development," Think Change India, Web Magazine article, Available at: <http://thinkchangeindia.wordpress.com/2008/04/25/cellphones-and-rural-development-part-two/>, 2008.
- [7] R. Abraham, "Mobile phones and economic development: Evidence from the fishing industry in India," Proceedings of the International Conference on Information and Communication Technologies and Development, (ICTD 2006). Berkeley, CA: IEEE, pp. 48-56, 2006.
- [8] J. Donner and M. Escobari, "A review of the research on mobile use by micro and small enterprises (MSEs)," Proceedings of the International Conference on Information and Communication Technologies and Development, Doha, CA: IEEE, pp.17-26, 2009.
- [9] J. Donner, "Research approaches to mobile use in the developing world: A review of the literature," The Information Society, vol.24, pp. 140-159, 2008.
- [10] R. Jensen, "The digital divide: Information (technology), market performance, and welfare in the South Indian fisheries sector," Quarterly Journal of Economics, vol. 122, pp. 879-924, 2007.
- [11] David Souler, Nigel Scott, Christopher Garforth, Rekha Jain, Ophelia Mascarenhas and Kevin McKemey, "The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction: A study of rural communities in India (Gujarat), Mozambique and Tanzania," DFID KAR Project 8347, 2005.
- [12] Meera, S.N., Jhamtani, A. and Rao, D.U.M., "Information and communication technology in agricultural development: A comparative analysis of three projects from India," Network Paper no. 135, Overseas Development Institute, London, 2006.
- [13] Surabhi Mittal, Sanjay Gandhi and Gaurav Tripathi, "Socio-economic impact of mobile phones on Indian Agriculture," Working Paper no. 246, Indian Council for Research on International Economic Relations (ICRIER), New Delhi, 2010.
- [14] Nigel Nagarajan and Marc Vanheukelen, "Evaluating EU expenditure programmes: A Guide," Ex post and Intermediate Evaluation, XIX/02-Budgetary overview and evaluation Directorate general-Budgets, European Commission, 1997.
- [15] Robin, "Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies," Journal of Educational Psychology, vol. 66, No.5, pp. 688-701, 1974.
- [16] Fedes Van Rijn, Kees Burger and Eefje Den Belder, "A Socio-Economic Impact study of the DE Foundation Coffee Project Peru," M.Sc. Thesis, Wageningen University, 2008.
- [17] Heeks, Richard and Molla, Alemayehu, "Impact assessment of ICT-for-development projects: A compendium of approaches," Working Paper Series, Development Informatics Group, Institute for Development Policy and Management, University of Manchester, Manchester, 2009.
- [18] RetailBiz, "Socio Economic Classes (SEC categories)," Available at: <http://indiaretailbiz.wordpress.com/2006/10/15/socio-economic-classifications-sec-categories/>, 2006.
- [19] Naukarihub, "Socio-Economic Classification," Available at: <http://www.naukarihub.com/india/fmcg/consumer-class/socio-economic/>, 2008.
- [20] Kotler Philip, Keller Kevin Lane, Koshy Abraham and Jha Mithileshwar, Marketing Management - A South Asian Perspective, 13th Edition, Pearson education publication, 2009.
- [21] MSP, Socio Economic Classification (SEC), Ministry of Statistics and Planning, Available at: http://www.mospi.gov.in/ecs_Ins_Manual_part_1_two.htm, 2005.
- [22] Parkinson S. and Ramirez R., "Using a sustainable livelihoods approach to assessing the impact of ICTs in development," Community Informatics, vol.2.3, pp.116-127, 2006.
- [23] Molla A. and Al Jaghoub S., "Evaluating digital inclusion projects: a livelihood approach," International Journal of Knowledge and Learning, vol.3.6, pp.592-611, 2007.
- [24] DFID, "Sustainable Livelihood Guidance Sheet Section 2," DFID, London, Available at: http://www.livelihoods.org/info/guidance_sheets_pdfs/section2.pdf, 1999.
- [25] Laura Hosman, Elizabeth Fife and Laura Elizabeth Arme, "The Case for a Multi-Methodological, Cross-Disciplinary Approach to the Analysis of ICT Investment and Projects in the Developing World," Information technology for Development, Vol. 14(4), pp. 308-327, 2008.
- [26] Garson, D., "Case studies", Chass PA765, available at: <http://www2.chass.ncsu.edu/garson/pa765/cases.htm>, 2005.
- [27] Stephen G. West and Felix Theommes, "Campbell's and Rubin's Perspectives on Causal Inference," Psychological Methods, vol.15, No.1, pp.18-37, 2010.
- [28] Winston T., "Introduction to Case Study by Winston Tellis," The Qualitative Report, vol.3.2, 1997.
- [29] Winston T., "Introduction to Case Study [68 paragraphs]," The Qualitative Report [On-line serial], vol. 3.2, 1997.
- [30] Izak, Benbasat, David K. Goldstein and Melissa Mead, "The Case Research Strategy in Studies of Information Systems," MIS Quarterly, vol.11.3, pp. 369-386, 1987.
- [31] Yin, R., Case Study Research, Design and Methods, Sage Publications, Beverly Hills, California, 1984.

Understanding Cybercaf   Users behavior in Mainland China: An Exploratory Study

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Abstract

As a major venue of public access to Information and Communication Technologies (ICT), cybercaf  s in China have been contributing to the increase of ICT penetration, especially Internet penetration for the last decades. However, social problems related to Internet addiction and even juvenile delinquencies are considered as correlated with cybercaf  s. The objective of this research is to find influencing factors of users' intension to go to cybercaf  s and what are the impacts on cybercaf   users. The exploratory research proposes a conceptual framework for understanding cybercaf   users behavior based on Theory of Planned Behavior. Open questionnaires, interviews and observations are adopted to elaborate the user behavior framework. And a cybercaf   user survey is launched to test the framework and further explore user behavior patterns. The user behavior framework is well fitted with the survey data. Internet speed and cybercaf   facilities are found to be most influencing factors in users' choice of cybercaf  s. Chatting and gaming are found to be major activities in cybercaf  s. Urban and rural users behavior are similar in general. Rural users expect more but achieve less in cybercaf  s. Internet addiction is found not as serious as reported. Lack of installed software and printers is found to be a barrier of users' instrumental use. And differentiate government policy regulations with regards of rural and urban cybercaf  s could be beneficial to both the cybercaf   industry development and the ICT penetration.

Index Terms

Behavioral science, Cybercaf   user impact, Cybercaf   regulations, Internet

I. INTRODUCTION

IT has been widely accepted that information and communication technologies (ICT) adoption has a significant positive contribution to socioeconomic development. Public venues for ICT access enable more people to access ICT with lower cost, by sharing limited ICT facilities and infrastructures. It is crucial to develop public ICT access venues to encourage ICT use among mass majority, especially in developing countries.

The development of public access to Internet in China is characterized by paid cybercaf   as the dominant of public access venue. Cybercaf  s have become prosperous in China since the late 90's. However, teenager Internet addiction, illegal Internet trading, Internet safety issues, and social security risks occurred accompany with the thrived cybercaf   industry. Cybercaf  s in China, as major means to access Internet for rural and low income group, are now facing a hard situation of strict regulations and loss of business.

This study is designed to assess users of cybercaf   for ICT services and products based on their socio-demographic and economic characteristics, pattern of service utilization, intension to go and willingness to pay for services, as well as their perceived beneficial impact received from consumptions at cybercaf  s. With this information, we intend to test whether beneficial impact to users significantly exist and identify the best means of sustaining profit-oriented cybercaf  s and also formulate policy recommendations to make ICT services affordable and benefit all categories of users.

Furthermore, our study will target on identification of differences between urban cybercaf  s and rural cybercaf  s. Our study will identify choice of services and products for different categories of users and thereby be able to suggest the kind of services that should be provided by the PAVs, so that all categories of users will be enticed to use the internet.

II. REVIEW ON TYPES OF USE IN CYBERCAF  S

Cyber caf  s are used primarily to meet personal and social needs such as communicating with friends and family,

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entertainment, gaming, and developing computer skills. Adomi (2007) discovered that 60.7% of the internet users in cyber cafés are to explore the services and resources of the Net. Chachage's (2001) findings showed the largely male, Tanzanian population used the Internet primarily for personal communication and visiting recreational sites. Low levels of awareness and training among end-users and staff were noted.

Based on a multi-national survey of Internet use, and by making a distinction between "instrumental" and "recreational" use, Boase et al. (2002) found that recreational use is more common among younger users. The authors do not offer definitions of instrumental and recreational, but examples of instrumental use are sending and receiving e-mail, using online libraries and other sources of information, taking online courses, doing business, and various administrative activities. Examples of recreational use include chatting, collective role-playing, and playing online multi-user games. These authors additionally discussed a third category of use, which is "communication" and keeping in touch with relatives and friends. Also Shiu and Dawson (2004) found that teenagers in Great Britain, Germany, Japan and Taiwan use the Internet especially for activities such as communication and gaming, while older people to a larger extent use it for instrumental purposes such as purchasing goods and services.

Li and Kirkup (2007) compared the use of the Internet among Chinese and British students and found that men in both countries played more computer games than women. The Chinese were the most active game players. Generally, women were more inclined to use the Internet for study purposes and men for "personal interests". Gender differences in type of use were higher among the British than in the Chinese group, and the British students were generally more inclined to use Web-connected computers for study purposes. From the US, Montgomery (2000) concluded that a comprehensive policy agenda is needed to promote the positive potential and minimize the harms of new digital media in the lives of youth.

Instrumental use is statistically associated with user experience, in the way that "veterans" use the Internet significantly more for instrumental purposes compared to "newbies" (Boase et al., 2002; Center for the Digital Future, 2004). Less experienced users tend to spend more time playing online games, downloading music, and participating in chat rooms. From Indonesia, previous studies have reported on Web use patterns among a dominantly young and male user group. Based on "history files" in cyber café computers in Indonesia, it was found that pornographic websites exceeded 50% of visited sites at some locations (Hill, 2003). Another study from Indonesia found that chatting is the most popular online activity, followed by entertainment, reading online magazines, sports information, and educational use (Harkness, 2001). From another context, Jeffres et al. (2004) found that the diversity of Web use is clearly correlated with frequency of Internet use and the number of years one has been using the internet. Generally, it seems that the more people use the Internet recreationally, the more they use it instrumentally (Boase et al., 2002).

III. METHODOLOGY

A. Theoretical Foundations

According to Theory of Planned Behavior (TPB), a person's actual behavior in performing certain actions is directly influenced by his or her behavioral intention and, in turn, is jointly determined by his or her attitude, subjective norms and perceived behavioral controls toward performing the behavior (Ajzen, 1991). Behavioral intention is a measure of the strength of one's willingness to exert effort while performing certain behaviors. In this study, users' come and pay for a cybercafé services is actual behavior, which is lead by user's intension to come to the cybercafé (i.e. the behavioral intention). Attitude (A) explains a user's favorable or unfavorable assessment regarding his/her intentions to come and pay in cybercafé Subjective norm (SN) expresses the perceived social pressure of users who intends to come and pay in cybercafé Perceived behavioral control (PBC) reflects a person's perception of the ease or difficulty of implementing pay behavior.

Both cybercafé factors and users' demographic factors should serve as independent variables. Cybercafé factors influence users' intension to come through their attitude, whereas users' demographic factors influence users' intension to come through subjective norms and/or behavioral control. Users' past experiences are also important factors influence their intension to come and pay at a cybercafé Besides direct influences, users' past visits may also influence their behavioral control and indirectly influence their intension to come. Users' behavior of willingness to pay to come to a Cyber café may lead to beneficial impact on them, and these beneficial impacts (if there is any) may also influence their attitude and indirectly influence their intension to come.

B. Exploratory Survey Design

In order to elaborate the proposed conceptual framework, independent variables need to be explored for possible valuations. A user exploratory survey is conducted among a group undergraduate students and users in two cybercafé, one of which is located in downtown Beijing and the other is located in a small village near Beijing city.

Open questionnaires are used in user survey to exert most variety of influencing factors and perceived benefits. Answers are summarized by the frequency of factors. Similar factors in different expressions are considered as the same factor. Judgments are made by researchers. Observations on cybercafé environment, customers' identities and activities, seated occupancy ratio, service provided are recorded as supplemental information in future analysis.

C. Main Survey Design

According to theory framework construction and exploratory user survey, a questionnaire with 27 questions is designed to test the TPB-based cybercafé user model and to explore users' behavior in cybercafé. The questionnaire contains questions about users' demographic information, cybercafé factors, attitudes, social norms, perceived impacts, and past experiences.

To explore the problematic Internet use, the questionnaire also includes Internet addiction questions and personal objective questions.

20 cybercafés are randomly selected from 10 cities and their nearby counties using a cluster sampling approach. The sample frame is a cybercafé list provided by a cybercafé administration software company, which dominate around 60% market share in China. 10 investigators are sent out to collect the data from the field. 976 effective answers are collected during the survey. Among the collected questionnaire, 20% subjects are rural users. Results of the user survey, operation interview and the framework testing are presented in the next section.

IV. RESULTS

A. Exploratory Survey Result

Exploratory surveys contain open questions for subjects to write down factors influence their willingness to pay for a certain cyber café. Although the students tend to write down more vocabularies than cybercafé users from the field, the factors influencing their choices are similar, as shown in Table I. Most frequent cybercafé factor is environment, followed by Internet speed, hardware, price and services. Most frequent factor indicating their beneficial impact from come to a cybercafé is hanging out with friends, entertainment and information seeking.

TABLE I USER SURVEY RESULTS			
	Students	Urban users	Rural users
Numbers	29	18	20
Most frequent factors	Environment, speed, facility, price	Environment, services	Environment, speed, price
Most frequent perceived beneficial impact	Play with friends, kill time	Relax, search information, communication	Communication, relax, search information

Accord with the user survey results, user interviews also indicated that environment as most important factors and social networking as major activities. For the environment factor, both student users and urban users mentioned about whether there is a convenient setting for them to settle down with their friends is an important feature for their choice of cybercafé. Urban and rural users who are immigrant workers expressed a strong feeling of communication with their family as a beneficial impact from cybercafé services, and a comfortable setting for them to chat or talk to their family and friends are important for their decisions of cybercafé visit.

B. TPB-based Cybercafé User Model Testing

Structured equation model (SEM) is employed to test the aforementioned TPB-based cybercafé user model. Questionnaire answers are collected and analyzed using Microsoft Excel, SPSS and AMOSS. From the modeling result,

the questionnaire data fits the model (Minimum is achieved, Chi-square = 2330.729, and P<0.01):

1, Cybercafé factors have positive influence on users' attitude towards cybercafé. Internet speed and facility (computers and software) are most influential factors. Food service and stay-overnight serve are less influential factors.

2, Users' activities have positive influence on users' behavior control. Social networking users' and Internet surfing are most influential factors. Gaming and Movie/TV are less influential factors.

3, Behavior control, attitude and subjective norms are influencing factors of users' intention to come to a cybercafé. Behavior control and attitude have higher influencing level than subjective norms.

4, Users' intention to come to a cybercafé has positive influence on users' willingness to pay at a significant level.

C. Impact of Cybercafés

Cybercafés are proved to be places to access computers and Internet when there are no other means for their uses. Reasons of use cybercafés are summarized in Table II. ICT access and be with friends are major reasons for both urban and rural users. And more rural users use cybercafé because they do not have computers or Internet access.

TABLE II REASON OF USE CYBERCAFÉS			
	Urban	Rural	Sum
No computers	22.0%	41.1%	25.7%
No Internet access	16.4%	14.7%	16.1%
Be with friends	31.0%	26.8%	30.2%
Need help in cybercafé	2.7%	3.7%	2.9%
Better Internet access	21.6%	9.5%	19.3%
Others	6.2%	4.2%	5.8%
	100.0%	100.0%	100.0%

Numbers and achievement level of general self-determined objectives and self-determined objectives through use cybercafés are summarized in Table III. Rural users have more objectives than urban users however level of achievements are lower. Rural users have less cybercafé use experiences and more cybercafé use percentage (in terms of all the ICT access means) than urban users.

TABLE III CYBERCAFÉ USE OBJECTIVES AND EXPERIENCES			
	Urban	Rural	All
General Self-determined Objectives	7.16 44%	7.87 40%	7.3 43%
Self-determined Objectives thr cybercafé	7.95 47%	10.22 43%	8.39 46%
Cybercafé use percentage	38.29%	43.21%	39.25%
Cybercafé use year	6.74	5.96	6.59

D. Internet Addiction and Cybercafé

Internet addiction is usually associated with Cybercafé in media reports in China. Cao's Internet addiction measures are included in our questionnaire (Cao et al, 2007). Only 18.1% users are Internet addicted which is less than reported. We calculate cybercafé use time percentage (over time of all Internet access means, i.e. home, office etc.) for each individual. And no correlations are found between cybercafé use time and internet addiction. This means that the existence of cybercafé is at least not the major reason for Internet addiction problems.

V. CONCLUSIONS AND FURTHER RESEARCH

A TPB-based user behavior model is proposed for cybercafé user research. An exploratory study among students, rural and urban people is designed to discover related factors to elaborate the TPB-based cybercafé user model. And a main survey on cybercafé user behavior is designed and implemented to test the proposed TPB-based cybercafé user model and to explore other distinctive user behavior patterns.

TPB-based cybercafé user model are well fitted with main survey data. Urban and rural users show no difference in terms of cybercafé activities and behavioral models. But more rural users use cybercafé because they do not have other means to access ICT. And rural users are likely to have more personal objectives to achieve through using a cybercafé. However the objective achievement level of rural users is generally less than urban users. This may mean rural users need more assistance in using the cybercafé.

Since only basic statistical analysis and model testing are done to the survey data, more detailed analysis and tabulation on different view of the data will be done in the next step. Preliminary suggestions on encourage cybercafé business in low-income and rural area are also hopefully to be given after the detailed analysis in our future research.

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REFERENCES

- [1] E. E. Adomi, "Overnight Internet Browsing Among Cybercafé Users in Abraka, Nigeria", *The journal of community informatics*. Vol.3, No.2, 2007
- [2] I. A. Alao, and A. L. Folorunsho, "The use of cybercafés in Ilorin, Nigeria", *The Electronic Library*, Vol. 26, No.2, 2008, pp. 238 - 248.
- [3] M. Best, & S. Maier, "Gender, Culture and ICT Use in Rural South India", *Gender Technology and Development* , Vol.11, No.2 , 2007.
- [4] J.Boase, W.H.Chen, B. Wellman, M. Prijatelj, *Is there a place in cyberspace: The uses and users of public Internet terminals*. Toronto, Knowledge Media Design Institute. 2002
- [5] ———, "The 25th Internet Development Report", CNNIC, 2009.
- [6] X. Du, "Internet diffusion and usage in China". *Prometheus*, No.17, 1999, pp. 405–420.
- [7] QY. Fan, "Regulatory factors influencing Internet access in Australia and China: a comparative analysis", *Telecommunications Policy*, Vol.29 No.2-3, 2005, pp 191-203.
- [8] B.Furuholt , S. Kristiansen, and F. Wahid, "Gaming or gaining? Comparing the use of Internet café's in Indonesia and Tanzania", *The International Information and Library Review*, 40, 2008, pp.129-139.
- [9] Haseloff, M. Anikar, "Cybercafé's and their potential as community development tools in India", *The Journal of Community Informatics*, Vol.1, No.3, 2005
- [10] N. Li, Nai, G. Kirkup. "Gender and cultural differences in Internet use: A study of China and the UK", *Computers and Education*, Vol.48, No.2, 2007, pp. 301–317.
- [11] K. Montgomery, "Youth and digital media: A policy research agenda", *Journal of Adolescent Health*, Vol.27, No.2, 2000, pp.61–68.
- [12] F.L. Cao, L.Y. Su, T.Q.Liu, X.P. Gao, "The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents. ", *European Psychiatry*, Vol.22, 2007. pp.466-471

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