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AN EXTENDED FRAMEWORK TO INVESTIGATE ICT IMPACT ON DEVELOPMENT AT THE MICRO (COMMUNITY) LEVEL

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Abstract

It has been argued that Information and Communication Technologies (ICT) can lead to development in developing countries. With this in mind, developing countries have been rushing to implement ambitious ICT projects in rural areas through the direct-indirect supervision of institutions such as, the World Bank, United Nations (UN) and other donor/local agencies. The main focus of the interventions has been the implementation the ICT project, rather than understanding their impacts at the recipient level. This lack of understanding has led to many failures of ICT projects reported in the literature. We argue there is a need to understand impacts of ICT projects in their local context considering the participants' perspectives at the micro (community) level. Hence, this paper reports on the development and refinement of an extended framework to investigate ICT impact on development in three village areas in the developing country, Bangladesh. Through an interpretive study we argue that previous studies fail to encapsulate many socio-economic aspects of ICT impact, such as mobility restrictions, attitudes towards women and religious influences, especially at the community level. Our extended framework demonstrates that ICT projects can lead to development, but only when such social constraints are addressed.

Keywords: Information and Communication Technologies for Development (ICT4D), Developing countries, Digital-divide, Social constraints.

1 INTRODUCTION

The World Bank, the United Nations (UN) and other donor agencies are directly-indirectly implementing ambitious multi-million dollar Information and Communication Technologies (ICT)-supported initiatives or projects in developing countries. These projects aim to unlock the potential of ICT to improve the quality of life for poor, often rural, people. Previously, the initiatives have included a range of pilot projects, such as telecentres, multipurpose community access centres and information kiosks (Harris 2005). There is much hope for sustainable impact arising from development-oriented ICT interventions, especially in rural areas of developing countries. However, there remains a clear need to demonstrate that such an impact on economic and social development can be expected to arise (pre-hoc planning), or has arisen (post-hoc evaluation), in the regions (Mbarika, Okoli, Byrd & Datta 2005; Meso, Datta & Mbarika 2006). In the past, emphasis has been placed on the supply side (for example, infrastructure building) rather than the demand side (for example, users' willingness and capacity to acquire/use services) (Ashraf, Hanisch & Swatman 2007; Heeks 2002). Hence, the main focus of the interventions has been the implementation the ICT for development (ICT4D) project, rather than understanding the impact at the micro (community) level. This lack of understanding has led to many failures of ICT4D projects reported in the literature (Heeks 2002). Rather than a top-down imposition of infrastructure approach, with little understanding for their ultimate consequences, we consider there is need to understand impact of ICT4D projects at the local context, which can then inform the policy and strategic levels.

The research question framed is: 'How does an ICT4D project impact participants' quality of life at the micro (community) level?' To address the research question, this paper provides a review and analysis of the ICT impact research, demonstrating there is a broader consideration of what constitutes impact and its assessment, especially for the local context. From this analysis, we develop an extended framework for understanding impact. To support this framework, we provide a summary of field work undertaken in Bangladesh. The findings indicate the utility of the framework, focusing on the impact of an intervention from an extended perspective centred on the community.

2 ICT4D – AN OVERVIEW

In general, ICT4D projects are funded by international organizations (for example, UN, World Bank or AusAid) or by National organizations (for example, ICT strategy). This usually occurs on the basis of proposals for an ICT-mediated intervention to be developed by another organization, with subsequent implementation within at least one group, community or organization. The ICT4D 'system' can be evaluated from various perspectives, but especially from three inter-connected levels, which we designate as Macro, Meso and Micro levels. Table 1 explains the layers and some inter-connections.

Macro	Funding Programmes – provide (normally on a competitive basis) financial and other support for ICT4D projects which meet Programme-specific guidelines. Domain interest groups (DIG) define the intervention projects and seek funding for them. DIGs may, for example, be national strategically focused bodies or multi-national groups. There is a potential for tension – to be seen within the project proposal; between the aims of the DIG and the guidelines of the various potential Funding Programmes through which the project may be funded.
Meso	Projects may be implemented by teams drawn from a range of organization types (sometimes project teams/leadership and management may be drawn from by the DIG, more often from specialist international consultancies). In addition to normal commercial pressure, a tension is potentially observable between the specifications of the project (the contract to be fulfilled) and the needs of the end-users.
Micro	Community or group which is impacted directly by the project – the "participants" and their socio-organizational context.

Table 1: Adoption and Implementation of ICT4D projects.

3 NEED FOR ICT4D IMPACT RESEARCH AT MICRO LEVEL

While there is much promise that ICT4D projects will actually lead to development, without rigorous research concerning ICT impact, it is difficult to postulate the extent to which there are influences/changes, and whether these influences are positive for the community or recipients of the intervention. ICT impact research towards development can be undertaken in many ways; namely evaluating a programme; tracking change; monitoring progress; assessing impact; and comparing project objectives with outcomes (IDRC 1993). Generally, the aims of any of these impact evaluations are to see how far the intervention has reached its desired audience, and to identify effects or changes. As such '…impact evaluation of ICT-led development projects will enable researchers to understand the extent to which activities reach the people and the magnitude of their effects on people's welfare' (infoDev 2006, p.7).

In the literature, the ICT4D impact research is predominately at the macro and meso levels rather than the micro level (Adam & Wood 1999). Though there exists some literature at micro level (Adam & Wood 1999), little attention has been paid to the participant or recipient perspective (Huerta & Sandoval-Almazan 2007), which Keniston (2002) considers an 'empirical vacuum' of ICT4D impact research. As we suggested earlier, the conventional practices of ICT4D impact follow a top-down approach where the assessment framework or indicators are generated from the top level. Several authors challenge this approach considering that a bottom-up approach is necessary (Heeks 1998; Mansell & Wehn 1998; Huerta & Sandoval-Almazan 2007). These researchers argue that participants within a particular community can themselves describe or decide what constitutes development, as they are conscious of their own well-being. Hence, they suggest that the impact of changes resulting from the ICT4D intervention can easily be understood from the participants' viewpoints (Menou & Potvin 2007). Heeks (1998) supports this notion through identifying users' actual demands of what they are capable of, and willing to pay for, the services associated with ICT4D initiatives from their points of view. According to Mansell and When (1998, p.95) '…ICTs have many revolutionary implications, but in order to achieve their full potential benefits it is necessary to focus on user-oriented and cost effective applications rather than of technology-driven application.' Therefore, we contend that ICT enabled development needs to be better understood from the participants' perspectives, providing another dimension and more rigour to the ICT impact research.

4 EXISTING CHALLENGES OF ICT IMPACT RESEARCH

Accepting that ICT impact research towards development may be undertaken in many ways, there are also several conceptual frameworks found in both the academic and practitioner literature. After investigating many of the relevant frameworks, this paper identifies several challenges of ICT impact research. Table 2 presents a summary of the key challenges we have identified and some conceptual frameworks indicating their respective authors. While there are a variety of frameworks for assessing ICT4D interventions, all of those reviewed (Table 2) rely heavily on short-term measures of success, including for example, questionnaires set by donor agencies. None of the frameworks assessed the actual demand of the recipients at micro level. Further, while many of the recent studies concerning consumer adoption and usage of broadband (Dwivedi, Khan & Papazafeirpopulou 2007; Choudrie & Dwivedi 2007) appear attractive, these are focused on acceptance and usage of technology which fail to go beyond and understand the socio-economic influences, including the benefits of usage at the community level. This research addresses the need to examine in-depth the impact of ICT on the participants' quality of life.

In addition, many previous frameworks consider indicators for measuring ICT impact towards development which are designed in one context and then applied in another. While it appears attractive to derive indicators from one context and apply them to another, there remains the problem of drawing theories or frameworks from other disciplines without taking into full account the local contexts and

issues (Sahay & Avgerou 2002; Mbarika et al. 2005). Heeks (2005) argues that improved ICT4D interventions need to be associated with local data content and local ICT skills.

Key Challenges	***Concept/framework***	***Author(s) of ICT impact research***
Techno-centric approach: little focus on societal perspective.	ICT diffusion index at the national level. Indicators are connectivity, access and policy.	UN (2005)
Unfocused local agenda: addressing Millennium Development Goals (MDG) set by UN.	'Inputs-Outputs-Outcomes' model. ICT impact assessment	ITU (2006) infoDev (2006)
Difficulty on operationalizing theory: capability approach by Sen (2000)	Assessing impact of e-governance projects in rural India. Assessing ICT impacts on indigenous peoples' empowerment in Peru. Processes and appropriation of ICT in human development in rural India.	Madon (2003) Gigler (2004) Garai & Sahadrach (2006)
This top-down prescribed understanding of development: does not reflect users' actual demands.	Evaluating Telecentre in rural areas of developing countries using five indicators; structural conditions, community characteristics, Telecentre characteristics and information characteristics. An assessment guideline for ICT and gender initiatives in 25 UNDP country offices.	Harris (2005) UNDP cited in Initiative (2006)
Inadequate field testing: heavily depends on local agencies reports based on secondary data and short term success stories only.	ICT impact assessment research in evaluating community multimedia centres. Assessment framework for measuring the impact of information on development. Framework for ICT projects evaluation. Guidelines for monitoring and evaluating ICT programmes	UNESCO cited in Orbicom (2005) IRRC cited in Gigler (2004) CIDA cited in UNESCO (2005); UK Department for International Development's (DFID) cited in IDRC(1993)

Table 2: Current challenges of ICT4D impact (monitoring & evaluation) research.

Therefore, indicators for measuring ICT impact towards development should either be generated or adapted within their own surrounding local contexts. Hence, further theoretical analysis of the difficulties of ICT4D impact research cannot be ignored. Addressing the challenges in Table 2, this paper now suggests a conceptual framework for investigating ICT impact towards development at local community or micro level.

5 TOWARDS AN EXTENDED FRAMEWORK

Traditionally, ICT impact research towards development has been carried out in order to 1) understand the economic/social developmental impact (Adam & Wood 1999), or 2) assess or measure the impact (impact assessment) considering different quantifiable indicators (ITU 2006). This research takes the former perspective of ICT impact research towards development. Having established the need for micro level research and the challenges surrounding existing frameworks, the literature provides a starting point to address the research question from the economic/social developmental perspective.

Literature on 'ICT and development' in developing countries emphasizes that local context and content are important while studying the impact of ICT towards development (Conradie & Jacobs 2003; Krishna & Madon 2003; Roman & Colle 2003; Avgerou 2006). Once the local context is identified, the next step is to identify the broad areas of development. Previous studies have demonstrated that ICT impacts can be applied in many ways, with various perspectives such as economic, education, health, and so on. Our initial framework focuses on the economic and social areas of development at micro level in rural areas of developing countries, based on the scholarly literature and reports from development agencies. As we focus on the economical and social impact within a specific context, Heeks' (2005) information chain model is a useful technique to understand ICT led developmental impact. Figure 1 demonstrates how an individual processes data into information and as such acts upon it to achieve desired outcomes. In this model, data are used as the input which is then processed through assessment (assessing its relevance) and applying (applying assessed data to a specific decision); with information as the output. According to Heeks (2005), the information chain model must be understood in its surrounding context of economic, social, data and action resources which assists human beings to transfer data to information.

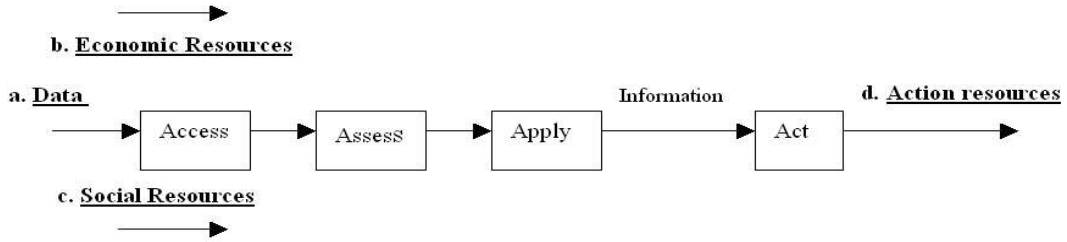

Figure 1: Heeks' (2005) information chain model

Supporting Heeks (2005), Avergou (1998) and Gigler (2004) argue that focusing on technological factors such as rate of technology adoption, Internet hosting and computer ownership volume, should not be the only solution towards ICT led development in developing countries. Access to information via the Internet or telecommunication is not a very difficult task. A greater challenge is the assessment and transformation of that data to meaningful knowledge, as well as the availability of the social resources. Hence, peoples' capabilities to access and assess data; and acquire and share knowledge need to be considered in ICT impact research in developing countries. This research views the issues through the lens of Heeks' (2005) information chain model as a foundation to improve understanding of the process of outcome/impact of ICT led development from the participants' perspectives.

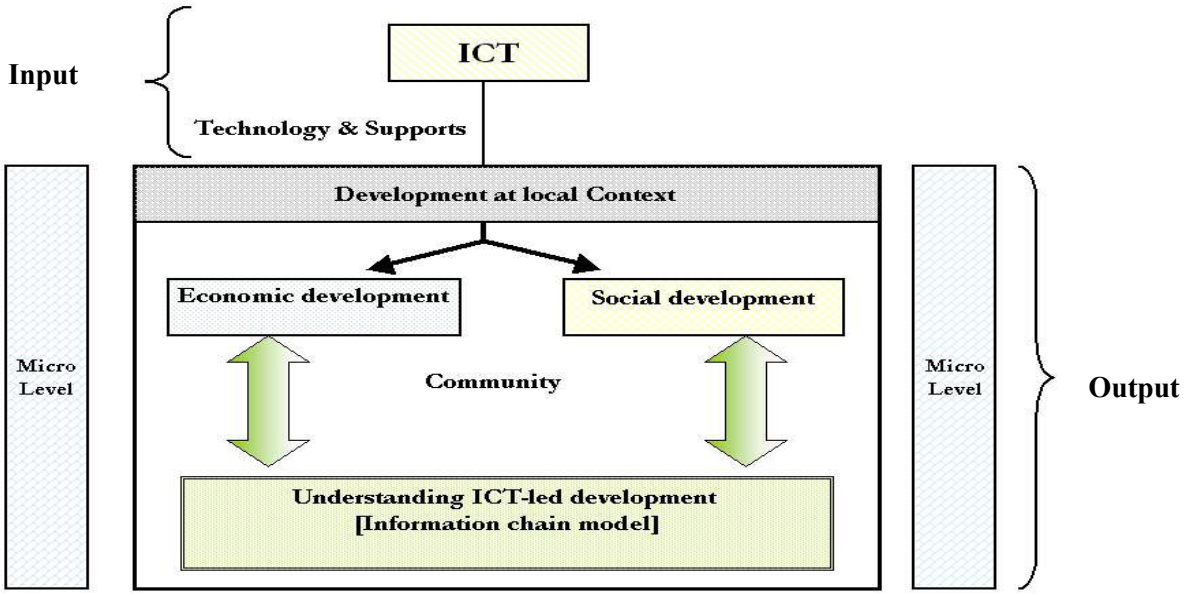

Figure 2: An extended framework for investigating ICT impact towards development

Figure 2 summarises this by placing Heeks' (2005) model within a contextual framework, taking into account the understanding of ICT-led economic and social development at micro level from the participants' points of view. Figure 2 is divided into two segments; 1) *ICT*, act as input, where the aim is to provide technology and support in rural/village areas conducive to an improved standard of living, and 2) *Development,* as the output, which is perceived and experienced by the participants due to the presence of ICT in their localities (rural/village areas). Hence, *input* is the term used for the programme itself (ICT intervention's goal) and *output* impact is considered to be the results (actual impact) of that *input*. The two broad developmental facets provide us some areas of development to view in general, and then, Heeks' (2005) model enables us to understand the process of ICT led development from the participants' viewpoints. We propose that our extended framework may be used for deductive study purposes. The following sections describe the context of this research, and the collection and analysis of field data, which are then used to further refine the framework.

6 SETTING THE SCENE

Bangladesh, one of the most densely populated countries, has a population of approximately 138 million and an economy primarily based on agriculture. It is considered that ICT has the potential to provide practical and effective enhancement of the economic and social well-being of villagers in Bangladesh. ICT-mediated interventions may deliver information on, for example, farming methods or practices, basic health practices, environmental awareness, access to market pricing, education or training (Anwer 2007). In this paper, we focus on one particular ICT intervention, the Gonokendra programme, established in 1995, as a collaborative effort between local communities and the Bangladesh Rural Advancement Committee (BRAC), an NGO. A 'Gonokendra' is a multi-purpose community access centre which provides computer training and multi-media based information dissemination for villagers. The rural community provides a room (400-500 square feet) for the library premises free of cost, and must sign up a body of local members contributing a minimum of Taka 50,000 (US$ 1=68 taka). BRAC provides an equal matching grant to create a reserve fund for the Gonokendra (BRAC 2003). The total amount (at least Taka 100,000) is then deposited on a fixed term basis in the name of a Trustee Board in a recognized financial institution (BRAC 2003). The Gonokendra's recurring expenses, such as the librarian's salary, electricity and stationery are paid from the monthly interest on this investment. In this way, Gonokendra become financially or operationally self-sustainable within two to three years.

7 RESEARCH METHOD

The study is interpretive in nature. An interpretive study (Walsham 1993) is appropriate when the research is about understanding human behaviour within the surrounding context, and where phenomena and contexts are difficult to isolate. To best address the research question, an interpretive study allows the researchers to immerse themselves in the community and gain a rich understanding of the influences of the ICT intervention. This research addresses the need to explore how ICT influences the community in a broader context rather than merely determining levels of adoption and usage. The field study was undertaken from September-December 2006 of three Gonokendras located in different villages in rural Bangladesh. Researchers collected primary and secondary data from each Gonokendra and their surrounding local offices. Gonokendra were selected for this study on the basis of their type, ICT programme availability, the length of time in operation (minimum 5 years) and infrastructure facilities, including accommodation for the researchers and transportation. While some of the selection criteria were designed for convenience, the 'length of time in operation' criterion was intended to ensure that the intervention was self-sustaining and the impact of the intervention was mature. This was deemed necessary because many externally-funded interventions discontinue soon after the withdrawal of external impetus and funding.

A team, comprising both male and female researchers, resided for one month in each village. Primary data were collected through personal taped-interviews, focus group discussions and observations of

Gonokendra's activities. Secondary research included analysis of Gonokendra's official records, reports and statistics from local public offices. In each village, the Gonokendra's librarian was the key informant who assisted the researchers to identify potential interviewees, who were then invited to participate in the research. As most of the interviews took place at the Gonokendra premise, the librarian selected potential interviewees who were present during data collection period. With the librarian's assistance, we sometimes relocated to the guardian's and local peoples' residences or workplaces to conduct the interviews. The participants included a minimum of: two officials, one librarian/trainer, eight trainees, six trainees' guardians and six local people for each village. In addition, on-site observations and five focus group discussions were conducted in each village. During the course of, and following the field trip, an iterative thematic analysis of field notes and interview transcripts (Miles & Huberman 1994) was undertaken under the two broad categories of economic and social development. Within-trip analysis was allowed to influence the evolution of the data collection strategy adopted both in semi-structured interviews and focus groups and in opportunistic observation. In undertaking this research into the impact of the Gonokendra, we consciously aimed not to focus simply on the direct impact of the intervention (for example, the numbers of villagers trained) but rather sought to expand the context in which we might identify impact. In particular, we sought to identify the secondary and tertiary impacts of the programme.

8 FINDINGS FROM THE FIELD STUDY

In this section, the field results are presented from the participants' perspectives towards ICT led development. The discussion centres on the economic and social development perspectives as displayed in the extended framework in Figure 2.

8.1 Access to information via technology

Our field data revealed almost non-existent 'computer' facilities in three villages (that is, only 8 PCs were available in the entire Gonokendra Chandabari village). As the Gonokendra programme is an attempt to include previously excluded villagers into technology and information, one BRAC Regional Manager recalled, *Not everyone in Gonokendra villages has the financial capability to buy computers. BRAC Gonokendra has provided computers in this village as a way of introducing computers at a grass roots level* (BRAC Regional Manager). Villagers using the Gonokendra also pointed out their financial inability to purchase computers for their own use and welcomed the Gonokendra's initiatives in providing access to this technology. There was general consensus that access to technology enabled villagers to gain access to information relating to socio-economic development.

8.2 Employment opportunity and migration

The Gonokendra created employment opportunities in all three villages through the recruitment of official staff, the librarian and assistant trainer from the host village. When respondents were asked to identify what impact in respect of employment opportunities, one of the official staff responded; *Look at me; I am not sitting idle like other villagers...I am earning a reasonable amount of money…. Prosperity has increased in my family. Earlier, I was not financially able to send my daughter in school but now I am sending her… We now have tin house in place of house built in leaves* (BRAC Regional Manager).

The ICT programme also provided some opportunity for participants to migrate from rural to urban areas. According to another BRAC official, *After getting the further training the employee becomes a man with potential … city based companies or NGO's provide more salaries with those skills so these men switch their jobs and migrant to urban areas* (Focus group). The quest for higher income and employment opportunities formed the clear motivation for the participants to migrate to urban areas with a hope of improved standard of living, or to further support their dependents.

8.3 Social status:

Social status emerged as a sub-theme of economic development with some importance to participants directly or indirectly related with the Gonokendra. Social status, reflected as self-respect and self-confidence both in the family and societal context, was reported on many occasions. Our field data shows a strong positive relationship between income (employment opportunities) and social status. We noticed that increases in rural women's income and status have increased their role in family decision-making and significantly enhanced their status within the family. However, this is not a straightforward benefit when considered in the broader social context. While discussing the social status of librarian/trainer with villagers (both with librarians/trainers and general rural people) we found that the contemporary patriarchal and conservative social structures, norms and beliefs still offer less respect even to the working female group.

8.4 Education

There is no substitute for education and illiteracy is nothing but a curse (Focus group male) recalled a carpenter from one Gonokendra village. Parents consider education in general, and Gonokendra computer training in particular, increases knowledge and makes good citizens. Further, eagerness to learn computers overcame some language barriers of trainees. Though the computers used an English interface, which is not the trainee's local language, their eagerness to learn the computer enabled them to find a way of learning. For example, they memorize *MS Window*™ icons in order to run multi-media CDs. One general rural person suggests, *It is true that learning computer requires some education but an illiterate or a semi-literate person also can learn computer. People learn to use their tool by using them* (General rural person).

8.5 Social (health and legal issue) awareness

Apart from the computer training programme, Gonokendra's multi-media based information dissemination programme serves the villagers by creating awareness of various social, health and legal issues. In Gonokendra's multi-media sessions, villagers have the opportunity to access information related to cleanliness (for example, personal hygiene, household cleanliness), knowledge of disinfection, immunization systems, nutrition, family planning, scientific sanitation systems, diarrhoea and institutional health care systems. Access to multi-media sessions gave villagers both awareness, and the ability to act on that awareness. For example, villagers gained knowledge about basic cleanliness which was evident in practice. *...my child is now used to washing his hands before taking a meal and after using the toilet* (Guardian). However, not all information disseminated by the Gonokendra is uniformly welcome. The Gonokendra's multi-media sessions disseminate legal information which differs from local customs. For example, the prohibition of child marriage, of dowry in marriage, and of general or poor people participation in *salish* (informal village arbitration) to the participants so that they can practice or act upon it. Dowry (where bride's family gives valuable gifts: cash or assets to the groom's family during marriage) is considered by the government to be a social curse within rural Bangladesh. While the increase in dowry transactions were generally viewed as a negative social change, several other participants held the view that dowry was helpful in that it ensured that the bride would be well-installed and well-respected when joining the marital household.

8.6 Some issues of social constraints to development

In this section, we discuss some social constraints on development mentioned by our participants. One of the major social constraints stems from localised religious interpretations. A mobility restriction on women and *Purdha* (women's gown for veiling) goes against the aim of the Gonokendra development goals. One group of participants held the perception that the Gonokendra's activities were linked with Christianity, while another group protested that such a viewpoint was simply an absurd rumour. Though it is difficult to extract the 'truth' from these two sharply divided views, our field data has at least identified the importance of religious sensitivity and the potentially dire consequences of any strike against the religious sentiment of villagers. We identified instances where women were not

allowed by their husbands to attend multi-media sessions. According to our participants, it has been considered a sin if a woman was seen or spoken to by a man unless she was dressed in the *Burkha* (women's gown covering body from head to ankle). However, many of our respondents believed that such a viewpoint represented an erroneous interpretation by some religious leaders. It has been the norm (somewhat weakening over time) for villagers to seek health related treatments from *Kabiraj* (traditional healer) or *Pir-Fakir* (Religious leader). *Kabiraj* and *Pir-Fakir,* who are mostly illiterate and not authorized by the government, dispense holy water to demonstrate witch-craft to heal patients. Some apparent miracles following such treatment and their consequent attitude and confidence have reinforced peoples' beliefs in them. Generally, our respondents believed that, although villagers have become aware of scientific treatment, many still rely on traditional treatments. There is a pervasive belief amongst our respondents that it may take considerable time to change peoples' attitudes to scientific treatments.

8.7 Addressing social constraints

Our participants believed that tackling social constraints was problematic. We probed possible ways to address social barriers and respondents suggested two main ways: (i) continuing education and awareness generation among villagers; and (ii) focusing attention on key decision makers such as influential persons like religious leaders, politicians, and teachers. We witnessed how a few participants addressed social constraints by motivating, inspiring and influencing key decision makers within their society towards a complementary structural change. For example, one female trainee convinced her family to participate at Gonokendra despite the external pressure against her education. *People often ask us* [female group] *what would be benefited for you by moving at Gonokendra? ….But I made my parents understand that from school and Gonokendra I learned so many things……I can also help my father in agriculture by suggesting him to use high breed seeds and organic fertilizer and in legal support by know-how to measure and register the land with proper legal authority* (Focus group). Further, we can see that rural people are aware of the national laws against early marriage or dowry payments, but these activities are still routinely practiced in the countryside. Some parents feel that if dowries are not given, their daughter will not be married or may be tortured by her in-laws. Resolving this kind of social constraint remains a fundamental challenge for our respondents. Within the particular social context of Bangladesh, the social, cultural and institutional barriers at the village or local level are poorly documented in the literature (Obijiofor, Inayatullah & Stevenson 2007).

9 DISCUSSION AND REFINED EXTENDED FRAMEWORK

We now consider the interpretation of results through the lens of existing theoretical or conceptual understanding, refining our conceptual framework from Figure 2. We adopt Heeks' (2005) information chain model and Sen's (2000) notion of 'development as freedom' to understand our field results. We therefore map the field results to the information chain model. Hence, participants gain access to Gonokendra (access); they participate in multi-media based information dissemination programme and become aware of different social issues. They apply their informed knowledge in their real world, such as family health seeking behaviour and ask others to follow accordingly. Heeks' (2005) approach towards development can be very useful as a foundation of ICT related development activities, but questions may arise if the entire context is different (Heeks 2005). Our field results demonstrated some social constraints or barriers that prevent full development potential. Literature on ICT impact research mainly focuses on poor telecommunication infrastructure and insufficient power supply, illiteracy or language problems, lack of computing skill, motivation and awareness as major obstacles to development (Dyson 2004; Husing 2004). Our field data, however, found that the conventional barriers to development are important but neither insuperable nor, sadly, exhaustive. For example, people can easily access ICT at the Gonokendra located at convenient place in their village. Even language barriers, primarily lack of English proficiency, are not perceived by our participants as a major barrier to learning about computers. However, our research found that barriers resulting from

other social situations, such as mobility restrictions of female participants by the local culture (and so on) are actually creating impediments to development and their quality of life.

We now see, Heeks's (2005) uni-directional information chain model as a useful starting point for analysing ICT-mediated intervention initiatives, but as not fully addressing the challenges of the ICT led development from the perspective of the target community. We borrow Sen's (2000) notion of development as a process of enlargement of human freedom which ultimately shaped our participants' perceptions of ICT-mediated intervention. The freedom-centred development concept considers the removal of this kind of socio-economic deprivation of the individual (Sen 2000). Our field data documents many participants' attempts to influence their family members in order to gain permission to participate in economic activities (and their success). Therefore, we argue, the ends and means of ICT for development can be achieved by expanding human freedom.

Hence in Figure 3 we now present the refined framework, which includes consideration of social constraints that hindered the ultimate process of development. In Figure 3, the broad right-left arrow represents this inter-connection. Addressing social barriers remains a challenge which, if successfully resolved, can then be linked with development. This interconnection is represented by the broad left-right arrow. Sen's (2000) notion of 'development as freedom' connects these two parts of our refined framework. Finally, the two broad developmental impacts (output) might usefully be compared with the initial statement of desired impact, finally in order to evaluate the programme, and importantly if employed early, potentially to guide modifications to the intervention.

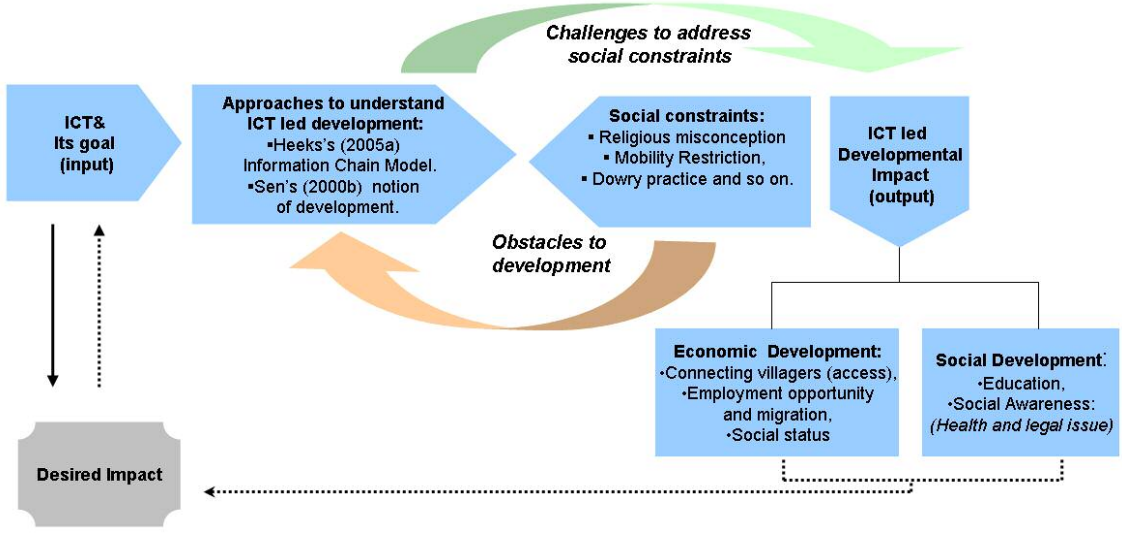

Figure 3: Refined framework to investigate ICT led development at micro (community) level

10 CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

This research is an attempt to investigate the impact of ICT-mediated interventions at the micro level (at the level of target community) through constructing, and refining on the basis of a significant field study, an extended evaluation framework. The empirical work summarised here is qualitative/interpretive exploratory research. It both considers, and is guided by, the research context and the data from the context of three villages in Bangladesh. We have aimed to analyse our field data and make interpretations based on the participants' points of view, allowing the aims of the programme being studied to have only a very limited impact. Our aim, then, has been to collect evidence of community perceptions of impact NOT to evaluate the programme within the framework of the expectations of those intervening or those funding the intervention. There is a relative dearth of serious research on ICT impact at the micro level – and specifically from the perspective of the target community. This research attempts to address this gap. As we might expect the donors' and interveners' goals for the intervention (to improve the standard of living in rural areas by providing

access to technologies, improving literacy and skills building, infrastructural development and creating awareness amongst uneducated, poor rural people) are represented in our data and analysis. Also apparent and of significant importance, however, are social constraints that act as ultimate barriers to the development. The previous aspirations are necessary but not sufficient for the development of effective micro level impact. In this research, we collected primary data over specified period of time at three single points where participants were selected through general invitation and through the reference of the librarian. No particular questions were asked to investigate their existing socio-economic condition. Future research should include clustering of the participants on the basis of some common indicators so that they are representatives of each cluster. Another limitation is generalization of the field results. We have no reason to believe that the findings might be different from village to village. Though interpretive case studies do not suggest generalizing the results, future research using different methodologies may assist with generalizing results across the villages.

We are concerned that the developmental impact of ICT in a context is not fully understood unless the social constraints are fully addressed. While this research makes a contribution to expanding the scope for impact assessment, and to identifying social constraints (religious issues, perception of female community members and so on), addressing these constraints demands further investigation. One further insight arising from our analysis concerned us greatly. We heard repeatedly that those villagers trained at the Gonokendra were able to leave the village for better paid urban jobs, returning money to their families in the village. Superficially, this is a benefit of the programme. We asked ourselves however, what might be the long term impact of a drift of the young, educated and proactive from the village? Do we see here the beginning of a slow decay of the village community? We believe that further expansion of the context to be explored for impact is justified and that further research in this area is required.

References

Adam, L. & Wood, F. (1999). An investigation of the impact of information and communication technologies in sub-Saharan Africa, *Journal of Information Science*, 25 (4), 307-318.

Anwer, M. (2007). ICT for Better Society, In *Proceedings of 9th International Conference on Computer and Information Technology (ICCIT)*, Bangladesh, 21-23 December.

Ashraf, M.M., Hanisch, J. & Swatman, P. (2007). ICT intervention towards development in the third world countries: some perspectives of IS research, In *Proceedings of 9th International Conference on Computer and Information Technology (ICCIT)*, Bangladesh.

Avgerou, C. (1998). How can IT enable economic growth in developing countries? *Information Technology for Development*, 8 (1), 14-15.

Avgerou, C. (2006). *Taking into account Context in IS research and practice,* London School of Economics and Political Science, UK, London.

BRAC (2003). Project proposal: 2004-2009, Bangladesh Rural Advancement Committee, Dhaka.

Conradie, P. & Jacobs, S. (2003). Bridging the digital divide, *Engineering Management*, 30-33.

Choudrie, J. & Dwivedi, Y.K. (2007). Broadband impact on household consumers: Online habits and time allocation patterns on daily life activities, *International Journal of Mobile Communications*, 5(2), 225-241.

Dwivedi,Y.K., Khan, N. & Papazafeirpopulou, A. (2007). Consumer adoption and usage of broadband in Bangladesh, *Electronic Government: An International Journal*, 4(3), 299-313.

Dyson, L.E. (2004). Cultural issues in the adoption of information and communication technologies by indigenous Australians, In *Proceedings Cultural Attitudes Towards Communication and Technology*, Sudweeks. F. & Ess, C. (Eds) Murdoch University, Australia, 58-71.

Garai, A. and Sahadrach, B. (2006). Taking ICT to every Indian village: opportunities and challenges, *One World South Asia*, New Delhi.

Gigler, B-S. (2004). Including the excluded - Can ICTs empower poor communities? In *Proceedings of 4th International Conference on the Capability Approach,* Italy, 5-7 September, 2004.

Harris, R.W. (2005). Explaining the success of rural Asian telecentres, *In Information systems in developing countries: theory and practice*, City University of Hong Kong Press, 83-100.

Heeks, R. (1998). Foundation of ICTs in Development: Pushing and Pulling, *Information Technology in Developing Countries Newsletter*, 4 (1), 1-2.
Heeks, R. (2002). Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *Information Society*, 18 (2), 101-112.
Heeks, R. (2005). Foundation of ICTs in Development: The information chain, *e Development Briefing*, 3(1), 1-2.
Huerta, E. & Sandoval-Almazan, R. (2007). Digital-Literacy: problems faced by telecentre users in Mexico, *Information Technology for Development*, 13 (3), 217-232.
Husing, T. (2004). The impact of ICT on social cohesion: beyond the digital divide, *In Proceedings 14th Economic Forum*, Krynica Zdrój, Poland, 9-11 September.
IDRC (1993). Measuring the impact of information on development, The International Development Research Centre, Ottawa, ON, Canada.
infoDev (2006). About us, InfoDev, Washington, retrieved 25 July 2006, <http://www.infordev.org/section/aboutus>.
Initiative, C. (2006). Gender Indicators, The communication initiative, Canada, retrieved 12 July 2006, <http://www.comminit.com/strategicthinking/steval/sld-2157.html>.
ITU (2006). World Telecommunication/ICT Development Report, *International Telecommunication Union,* Geneva, Switzerland.
Keniston, K. (2002). Grassroots ICT projects in India: Some preliminary hypothesis, *ASCI Journal of Management*, 31 (1) and (2).
Krishna, S. and Madon, S. (Eds) (2003). Digital Challenge: Information Technology in the Development Context, ASHGATE, Aldershot.
Madon, S. (2003). Studying the developmental impact of e-governance initiatives, In *Proceedings of IFIP Working Group 8.2 and 9.4*, Athens, Greece, 15-17 June.
Mansell, R. and Wehn, U. (1998). Knowledge societies: information technology for sustainable development, Published for and on behalf of the UN, Oxford University Press, NY.
Mbarika, V.W.A., Okoli, C., Byrd, T.A. and Datta, P. (2005). The neglected continent of IS research: A research agenda for sub-Saharan Africa. *Journal of the AIS* 6 (5) 130-170.
Menou, M.J. and Potvin, J. (2007). Toward a conceptual framework for learning about ICT's and knowledge in the process of development, retrieved 2 January 2007 <http://www.cidcm.umd.edu/>
Meso, P., Datta, P. & Mbarika, V. (2006). Moderating information and communication technologies' influences on socioeconomic development with good governance: A study of the developing countries. *Journal of the American Society for Information Science & Technology*, 57 (2), 186-197.
Miles, M.B. and Huberman, A.M. (1994). Qualitative data analysis, (2nd edition), Sage, CA.
Obijiofor, L., Inayatullah, S. and Stevenson, T. (2007). Impact of new ICTs on socio-economic and educational development of Africa and the Asia-Pacific: private, Metafuture, retrieved 1 Nov 2007, <http://www.metafuture.org/Articles/icts.htm>
Orbicom (2005). From the digital divide to digital opportunities: measuring infostates for development, NRC press, Montreal, Canada.
Roman, R. & Colle, R.D. (2003). Content creation for ICT development projects: Integrating normative approaches and community demand. *Information Technology for Development*, 10 (2), 85-94.
Sahay, S. & Avgerou, C. (2002). Introducing the special issue on Information and Communication Technologies in developing countries.' Information Society,18 (2), 73-76.
Sen, A. (2000). Development as freedom, (1st edition), Oxford University Press, New Delhi.
UN (2005). The digital divide: ICT development indices 2004 In Proceedings United Nations Conference On Trade And Development, New York and Geneva.
UNESCO (2005). Evaluation of UNESCO's multimedia centres, United Nations Educational, Scientific and Cultural Organizations.
Walsham, G. (1993). *Interpreting information systems in organizations,* Wiley, UK.