Impact of ICT usage on indigenous peoples' quality of life: Evidence from an Asian developing country

Ashraf, Mahfuz, Grunfeld, Helena and Quazi, A (2015) Impact of ICT usage on indigenous peoples' quality of life: Evidence from an Asian developing country. Australasian Journal of Information Systems, 19. 1 - 16. ISSN 1449-8618

Impact of ICT usage on indigenous peoples' quality of life: Evidence from an Asian developing country

Md Mahfuz Ashraf
University of Dhaka
mashraf@univdhaka.edu

Helena Grunfeld
Victoria Institute of Strategic Economic Studies
Victoria University
helena.grunfeld@live.vu.edu.au

Ali Quazi
University of Canberra
ali.quazi@canberra.edu.au

Abstract

Indigenous communities across the world have been suffering disadvantages in several domains, e.g. erosion of land rights, language and other cultural aspects, while at the same time being discriminated against when prepared to integrate into the dominant cultures. It has been argued in the literature that information communication technologies (ICTs) have the potential of contributing to addressing some of these disadvantages – both in terms of rebuilding what has been eroded and facilitating integration into non-Indigenous societies. In trying to understand how ICTs can be useful for these processes, it is important to do so from a conceptual framework that encompasses the multi-dimensionality of the issues faced by Indigenous communities. The conceptual frameworks frequently used in the ICT literature tend to focus on adoption, use and diffusion of technologies rather than how the use of ICTs affects the livelihoods of the users, which is the focus of this paper. The conceptual framework is informed by the capability approach (CA), in particular by the five freedoms identified in the seminal work of Amartya Sen (2001), "Development as Freedom" (DaF). Data were collected from a purposive sample in an Indigenous community in Bangladesh, using a qualitative method to map how ICTs had affected the lives of these community members The findings suggest that the participants perceived that ICTs had made positive contributions, particularly the benefits they gained from learning how to use computers in the domains that are relevant from the perspective of the five freedoms espoused in DaF. The findings reported in this paper are useful for policy formulation in Bangladesh. As the study is contextualised in a transitional economy setting and can therefore not be generalised, but we believe that the conceptual framework has much to offer future research designed to understand how ICTs can improve the livelihoods of Indigenous individuals and communities.

Keywords: Information Communication Technologies (ICTs); Indigenous people; Amarty Sen's Five Freedoms; Qualitative approach; Bangladesh.

1 Introduction

Indigenous people have not only faced serious discrimination in terms of their basic rights and erosion of their ancestral lands, languages, cultures, and forms of governance, but also in terms of access to basic social services (Gigler 2009, Hunter 2005). Today, information communication technologies (ICTs) offer unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and expand the range of opportunities for income generation and social change among socially disadvantaged groups e.g. the poor and people living in remote locations are often represented in both of these groups (Randoll 2011, Mayerhofer & Taylor 2010, Randoll, Fleissner, Stevenson & Gardner 2013, Thapa and Saebo 2014). Their experiences of using ICTs are often different than in other communities (Radoll 2010, 2011). One of the reasons for this is that knowledge of traditional culture is an important

asset to their social capital and constitutes a key livelihood resource (Lwoga, Ngulube, & Stilwell, 2010). So ICT applications specific to Indigenous communities are associated with storage, management, retrieval, dissemination and preservation of Indigenous knowledge which helps to maintain a sense of community (Daly & Haahr 2007, Taylor 2012). Another common ICT application for Indigenous communities is interaction between Indigenous communities on a global level (Lima & Brito 2012, Raitt & Roy 2003, Stavenhagen 2002).

A major obstacle to the deployment of ICTs in remote Indigenous communities has been the costs of establishing and maintaining reliable infrastructure (ACMA 2008). Low literacy and numeracy rates often limit the ability to use other than simple forms of ICTs (Salazar 2007). While there is much promise that ICT projects will contribute to improved livelihoods of Indigenous people (Table 1), without rigorous research on outcomes and impacts of initiatives aimed at achieving this, not much is known of the extent to which different community members have actually benefitted from ICTs and/or if there has been any adverse outcomes (Corbett, Singleton & Muir, 2009). Such information is important for policy formulation and for the design of future initiatives.

Some previous frameworks have adopted indicators for measuring the impact of ICT on socially disadvantaged communities (Thapa & Sæbø 2014) from other contexts. Several of those could have been relevant for this study, e.g. the Sustainable Livelihoods Framework and using the Millennium Development Goals as a framework. The suitability of the capability approach (CA) for exploring impacts of ICTs on Indigenous communities lies in the multi-dimensional nature of this framework and it focuses on human development and freedoms. In the CA development and freedom are closely associated in that development is defined as capability expansion that enables individuals to choose the lives they value and have reason to value (Sen 2001, 1989). Through the application of conversion factors, these capabilities are converted into functioning, which reflect what people are actually doing with their capabilities When applying these concepts to ICTs, physical access in combination with requisite skills provides individuals with the capability of using ICTs. The use of ICTs is thus a functioning, which not all who have access to ICTs would necessary avail themselves of. Access to ICTs can potentially expand the set of functionings through relevant information being easily accessible, together with the greater ease with which it becomes possible to communicate.

There has been a growing interest in using the CA in ICT research (e.g. Andersson, Gro¨nlund & Wicander 2012, Hatakka & Lagsten 2012, Johri & Pal 2012, Thapa & Sæbø 2014). There are two basic streams in the literature operationalising Sens's theory: understanding market power/structure and understanding or measuring the five freedoms. Despite the CA's methodological difficulties in operationalising the CA, there have been many attempts to do so, using both qualitative and quantitative methodologies. For instance, Alampay (2006) used a quantitative approach in evaluating ICT access and use in the Philippines, Wresch and Fraser (2012) quantified only one aspect of Freedom (economic freedom) in their research of e-commerce in 23 Caribbean companies and Lunat (2009) interpreted five freedoms through the lens of structuration theory (ST) in the university sector in Palestine. According to Zheng and Walsham 2008 (cited in Hatakka & Lagsten 2012, page 26) ' Even though Sen's theories can be abstract and sometimes hard to apply on empirical data, the key concepts can be used as sensitising devices in analysing empirical cases'. This is what is done in the research reported in this paper.

The purpose of the research was to explore whether and the extent to which an ICT project contributed to any change in the functionings in an Indigenous community in a rural area of Bangladesh. The functionings are assessed within the framework of Sen's (2001) five freedoms, which were operationalised in this research. To this end, our research question is: *Can Sen's five indicators of freedom be used in evaluating impact of ICT interventions on indigenous community/people development in rural areas of Bangladesh?*

Author (year)	Objective	Research Design	Study Area/Level	Key Findings
Radoll, P. J. (2011)	To examine the factors and develop the theoretical framework that affect adoption of ICTs.	Grounded Theory	ICT adoption by Indigenous community in Australia	The practice of using ICTs in everyday activities outside the Indigenous field creates new practices where individuals can take those new practices into the Indigenous field and adopt ICTs in the households.
Taylor, A. (2012)	To investing how development of indigenous people is facilitated through using mobile phone.	In-depth interview	Mobile internet & Indigenous groups in Australia.	• Access to new social, business and transnational networks via Internet based technologies co-facilitates opportunities for other forms of mobilisation to be harnessed by Indigenous people • Identified the baseline indicators about the extent of ICT ownership and its use in remote Indigenous communities.
Amato, S. (2013)	To provide a structural overview about learning approaches of indigenous in South East Asian region	Interview methods (Discussion)	ICT & Indigenous population in South-east Asian.	• The development interventions contribute to the uses of mass communication tools for indigenous residents. • The engagement of local governments and indigenous groups to ICT initiatives has worked to the extent that their involvement has gradually been chosen for poverty reduction.
Watson, S. (2013)	To explore how higher education for Australian indigenous is achieved by using ICT.	Literature review	ICT & Indigenous people in Australia.	• Found the possibilities for increased educational outcomes with the uptake of digital technology in Indigenous learning contexts. • Found a good fit between the cultural characteristics of Indigenous people, and the connectivity enabled by digital learning environments.
Johnston, A. L. K., (2010)	To evaluate the effectiveness of aboriginal programs through the use of Digital technology.	Theoretical framework	Technology and aboriginal people at the global level.	• Technological Approach enhances the use of traditional knowledge to convey the importance of evaluation. • A visual tool helps convey teaching about how to self-evaluate the program's as well as the individual's concerns.
Suresh, S., &Nath, L. (2014)	To build the concept of Telemedicine System	A cross-sectional Interviewing methods	ICT & health service for indigenous population in India.	• There is tremendous scope for Public Private Partnership where government centres are already available and private organization can use its expertise. • Telemedicine can enable experts to make more timely adjustments to healthcare service, which reduces the number of hospitalizations and hospital visits, thereby creating new horizons.
Lima, A. P. D., & Brito, C. (2012)	To analyse the tribal dimension of groups of individuals who organize themselves in communities based on ICT	Use of focus groups in interacting and getting acquainted with community people.	ICT & tribal community in Portugal.	• Online consumers are more active, participatory, resistant, activist, socially engaged than members of mobile communications communities. • The value of the connection involving members can overcome geographic and demographic barriers, based on a shared passion and on the significance and influence of the opinions exchanged. • The main practical contributions are exploration of emotions, passions, feelings, creation of and encouragement for the use of media interaction and creation of an identity.

Table 1: Summary of ICTs adoption and implementation in indigenous community

2 Literature & Operationalisation of Five Freedoms

Conceptually, the five freedoms are informed by the CA, which has evolved since the1970s as a collective effort by scholars from different disciplines (e.g. Alkire, 2005; Comin, 2001; Corbridge, 2002; Gasper, 1997; Nussbaum, 2000, 2006; Robeyns, 2001, 2005; Stewart, 2005; Stewart & Deneulin, 2002).

The 'expansion of freedom ... both as the primary end and as the principal means of development' (Sen, 2001,:xii) is central to the CA, according to which development is an extension of freedom. Freedoms are the basic building blocks for development, together with 'the expansion of "capabilities" of persons to lead the kinds of lives they value - and have reason to value' (Sen, 2001, p.18). There is a mutual relationship between freedoms and capabilities in that certain capabilities are necessary for the exercise of freedom, which in turn facilitates the achievement of capabilities. Another way of looking at capabilities is as freedoms to achieve functionings, which describe what a person is actually doing or achieving with his or her capabilities. The ability to convert capabilities into functionings is influenced by personal and external, e.g. institutional factors. In terms of ICTs, this means that having access and skills to use these technologies represent capabilities, whereas the actual use of them, e.g. to tweet, is a functioning. There can be several impediments preventing capabilities from being converted to functionings. In the case of the tweets, lack of political freedom to express certain views could be one barrier.

When moving from the conceptual to the practical domain, the CA becomes important for policy formulation, as Sen (1982) suggested that the right to capabilities should form part of a society's goal. The process of deciding on important capabilities and their translation into functionings should be of a participatory and deliberative nature, with input from a vast array of stakeholder, including individuals and communities.

The versatility of the CA is illustrated by its application in diverse fields, ranging from definition by children of their capabilities in an endeavour to understand appropriate dimensions of children's well-being (Biggeri, et al. 2006) to gain insights into how to resolve a river dispute between different Indian states (Anand, 2007) and an analysis of poverty alleviation programmes in New Zealand and Samoa (Schischka, Dalziel, & Saunders, 2008). There is a vast philosophical discourse on social justice and human rights from a CA perspective (e.g. Nussbaum, 2003). In applying the CA, the focus is often on the expansion of freedoms, which often requires the removal of "unfreedoms" in the form of various types of deprivations that can occur in different domains. Access to ICT can directly and indirectly influence the various dimensions of freedoms, e.g. by increasing the awareness of people about their rights and entitlements to these freedoms and give guidance about ways in which they can be achieved. One measure of the success of interventions based on ICTs is therefore the extent to which they have effectively enhanced freedoms. The five dimensions of freedoms necessary for individuals and communities to flourish identified by Sen (2001) are: political freedoms, economic freedoms, social opportunities, transparency guarantee and protective security.

a) Political freedoms

Political freedoms represent the opportunities enabling people to participate in deciding principles for governance and associated structures, including the freedom of expression, freedom to scrutinise and criticise authorities, the right to elect and be elected. These freedoms and rights require uncensored media.

b) Economic freedoms

Economic freedoms include rights to utilise economic resources for the purpose of consumption, production, and exchange. These extend to rights to employment, to participation in markets,, access to credit and other financial instruments as well as a proper share in national income and growth.

c) Social opportunities

Social opportunities cover the provisions that societies offer for education, health care and other basic services. These opportunities foster the substantial freedoms of individuals to lead better lives and are also important for the achievement of political and economic freedoms.

d) Transparency guarantees

Transparency guarantees comprise practices required to prevent corruption, financial mismanagement and other underhand dealings and include disclosure of information to all stakeholders and trust between parties.

e) Protective security

Protective security are arrangements aimed at reducing abject misery among those excluded from market opportunities and refers to social safety nets in the form of various transfer payments such as unemployment benefits, old age benefits, facilities for people with disabilities and statutory income supplements.

3 Research Methodology

This research follows an interpretive approach through using qualitative technique that provides researchers an opportunity to uncover the information from the deep of minds of the respondents using in-depth interviews, observation and focus group discussion. An interpretive research lends itself to investigation of complex human processes within their social context (Evert, 2003; Myers & Avison, 2002; Walsham, 2002). The aim of the data collection was to gather information to answer the research question. A flexible research instrument was designed to enable us to ask questions that could capture the perspectives of participants and respondents within their settings (Evert, 2003; Taylor & Bogdan, 1984).

We applied a purposive sampling procedure to select the ICT project in an indigenous dominated village. Criteria included the length of time an initiative had been in operation (minimum 5 years) and convenience. Respondents included the operator/trainer (in-charge of operations), users, government officials, and other villagers who were aware of the ICT project. The sample size was not pre-determined and data were gathered from the above categories and from local secondary sources (official records, reports and statistics from the local public offices) during the one month stay in the village. Together these sources formed a rich data set.

This research site for this study is from one of the *Grameen phone* Community Information Centres (GPCIC), a shared ICT access facility where participants can access a wide range of ICT services, e.g. Internet, voice communication, videoconferencing, and locally relevant and customised information services on topics such as agriculture, education, health, legal, environment and politics. The GPCIC that is the subject of this study is located in the Chittagong Hill Tracts (CHTs), which is mainly inhabited by the Indigenous peoples of Bangladesh. About one third of the tribal population live in this region. The different ethnicities of CHTs have their own traditional social systems, practices, customs, languages, literature, heritage, religious practices, costumes, food habits and festivals (BEOD 2014). Data were collected from a small village, Ruma, which has a population of approximately 80 households. It is located in the Bandarban district, which has a population of 19,000 and an area of 492.1 square km (BBS 2013). The literacy rate of the region is 27.8% (7+years) and the main livelihood of the area is handicraft production (BBS 2013). A flexible research instrument was designed to enable us to ask questions that could capture the perspectives of participants and respondents within their settings. In total 35 participants have been interviewed (20 male and 15 female). The respondents were asked unstructured questions about the use, challenges, outcome and opportunities of ICT on development in ways that encouraged them to tell their stories. Questions included but not limited to:

1. How do ICTs benefit you?

2. How do ICTs help create more employment opportunity?

3. How do ICTs help you in getting socio-cultural-political support?

4. How do ICTs help in demonstrating creativity?

During the interview sessions, the participants shared their experiences and attitudes relating to ICTs. The interviews were audio recorded and then transcribed. Some important notes were maintained in writing by the researchers during the interviews. The stories were later extracted from the transcripts. The respondents were given a brief on the research purpose and asked whether they want to participate in the study and their rights to privacy. Data analysis is presented into, "stories" focusing on how the use of ICTs has brought changes in the lives of indigenous people across their community.

Following Stake (1995), we avoid 'generalisations' and give a clear description of the context along with the interpretation in our case study before introducing the theme statements for each study site, thereby facilitating 'particularisation', as advocated by Stakes (1995). In this paper we describe particular case studies and interpret the participants' experiences in context; so the focus is on the uniqueness of each case. Taking this approach to our research produced unique knowledge within a particular context. The quality of research was enhanced through the following measures:

- Triangulation through the various data-collection techniques and data sources for our research, which increased the data validity and reliability and reduced the risk of bias;
- A wide spectrum of perspectives was obtained by in-depth interviews, focus group discussions, observations and document reviews involving different participating groups. This enabled us to obtain interpretations from different participants, as proposed by Benbasat, Goldstein and Mead (1987), cited in Myers & Avison (2002);
- We followed Klein and Myers (1999) as a guide to principles for conducting and evaluating interpretive field study research.

4 Setting the Context:

The population of Bangladesh was 149,772,364 in 2011, of which 1,586,141 (1.1% of the total population) belonged to Indigenous nationalities (BBS 2014). Most of the Indigenous peoples live in clusters in different parts of the country and are commonly called "Adivasi" (ancient people) and most of them also identify themselves as "Adivasi". There are about 45 distinctly recognisable Indigenous nationalities in Bangladesh (Rahman, 2013).

The Chittagong Hill Tracts (CHTs) is a remote area located in the southeastern part of Bangladesh bordering Myanmar to the southeast, the Indian state of Tripura to the north, Mizoram to the east and the Chittagong district to the west. CHTs consist of three hilly districts: Rrangamati, Khagrachhari and Bandarban. The area of the CHTs is approximately one-tenth of the total area of Bangladesh (CHT n.d)

4.1 Socio-economic Condition of Indigenous Peoples in Bangladesh:

The population in the CHTs is considered as one of the most vulnerable because of low incomes, high poverty and inadequate and poor housing, health, water, sanitation and education facilities and inter-community relations (Hossain, 2013). Sharmin (2011) identified different types of discrimination, including unfair prices for goods produced, unfair wages, violence against children and adolescents, discrimination in the classrooms, access to credit, high rates of land tax/ mutation and low levels of government services and other facilities. The opportu¬nities for diversified livelihoods are very limited in the hilly areas, which also limit the scope for agriculture as the main livelihood. Those who do not own any or insufficient land work as farm labourers or tenant farmers. There is also some fishing opportunities in the area (Hossain, 2013). Approximately 62% households in the region across ethnic groups lived below the absolute poverty line (2,122 kcal/day), while 36% were destitute (living on less than 1,805 K.cal/day) (Barkat et al. 2008). In terms of per capita savings, the average amount per household member was Tk.702 in the region, while the average among the Indigenous

population was Tk.467 and Tk.890 across Bangladesh (Barkat et al., 2008).The average annual net income of a rural household in the region was about Tk. 65,852, while the same in rural Bangladesh was 1.28 times higher (Barkat et al. 2008).

4.2 Present ICT scenario in Bangladesh:

As early as 1991, the Export Promotion Bureau (EPB) of Bangladesh with support from United Nations Development Programme (UNDP) and International Trade Centre (ITC) had taken an initiative to explore market potential of ICTs (Digital Bangladesh 2009). After that considering the necessity of ICT the ruling political party of Bangladesh named "Bangladesh Awami League" announced the "Digital Bangladesh" in pre-election commitment. "Digital Bangladesh" is now a government policy aimed at establishing E-government, E-business, E-learning, E-health, E-employment, E-environment, E-agriculture, E-science to ensure job placement and poverty reduction (Bhuiyan, 2011). The total number of internet subscribers has reached 39353.142 thousand at the end of July, 2014 where 37846.096 thousand subscribers use mobile internet, 276.046 thousand use WiMAX and 1231.00 thousand use their internet by ISP+PSTN indicating that 26.3% of the total population use internet services (BTRC, 2014). Despite these developments internet growth is constrained by poor telephone infrastructure, low international bandwidth and high-dial-up tariffs levied on internet users. In October, 2012 state owned mobile operator company "Teletalk" introduced 3G meaning third generation, mobile services.

5 Results and Discussion

This section presents the results from the field research, in the form of story-telling by the participants and analyses the discussion from the perspective of the five freedoms identified by Sen (2001). We treat participants' statements as "proof of concept". We believe the reliability of our interpretations is reinforced through the provision of statements from many participants, whether these are unique or common within and between different groups of respondents.

5.1 Political Freedom:

The politics of Indigenous identity has become a global phenomenon with numerous groups active at the international level, raising issues related to prior occupation, way of life associated with land and lack of safeguards for future generations (Lawson, 2014). The 1989 International Labour Office Convention 169 (ILO 2014) on Indigenous and Tribal People recognised the aspirations of Indigenous peoples to '*exercise control over their own institutions, ways of life and economic development and to maintain and develop their identities, languages and religions, within the framework of the States in which they live*'. After many years of drafts and negotiations, the United Nations Declaration on the Rights of Indigenous Peoples (hereafter 'UNDRIP') was adopted on the 13th of September 2007 (Wright, Tomaselli & Ganoza, 2014). It enshrines both the individual and collective rights of indigenous peoples: including the rights to self-determination, education, development, land and natural resources, intellectual property, culture, and the right to treaty recognition (Xanthaki, 2009).

To address the challenges faced by the local indigenous peoples, GPCIC has continuously worked on raising their awareness of existing laws, including their legal and human rights, and encouraging them to seek assistance from a formal court rather than a 'Salish' (informal village court); and motivating people to raise their voices against the injustices of the 'Salish'. Our field data demonstrate that participants have become conscious of many legal issues (divorce law, human rights, etc.) and now approach the courts for legal assistance. They realise that the 'Salish' system takes advantage of their ignorance regarding different legal aspects; and that it has imposed injustice upon them on many occasions. However, the situation is changing since the Indigenous people have been involved with GPCIC. One example is cited below:

> A poor housewife came to a GPCIC complaining that her husband beat her regularly; though she intended to make the complaint in 'Salish', she knew that it wouldn't succeed without good connections with influential people in her village. As soon as she

> understood the legal aspects of women's and children's rights from her GPCIC training sessions, she decided to seek assistance from the legal court rather than from 'Salish'. Later, the court called in the plaintiff's husband and proper justice was done.

There are two sources of legal support for disadvantaged people living in rural and remote areas of Bangladesh. One of these is the central government, which has a constitutional obligation to provide legal services to all its citizens. The Bangladesh Ministry of Social Welfare has a unit in every District Judicial Magistrates court to assist poor people with legal protection, free of charge. Local government agencies, known as Union Parishad (the micro rural administrative units) are also supposed to mediate disputes among the rural/indigenous peoples which is some form of legal assistance and is practices as, it saves time, money and effort of both parties to the dispute. Along with this, there are also traditional legislative councils in villages, such as 'Panchayeta', 'Darbar', 'Salish' etc. But functional inefficiencies, lack of transparency and accountability hinder the proper availability of these services to those who are entitled to them. In the case of traditional legislative councils, there is class and religious bias. Religious and cultural fundamentalisms have also contributed to the malfunctioning of this system.

Since the Indigenous people live in remote districts which are inadequately serviced by telecommunications infrastructure they have very limited access to ICTs. Furthermore, because of their poverty, they cannot afford expensive ICTs. In Bangladesh, the government has proposed to introduce an e-voting system which will further disadvantage Indigenous people due to lack of adequate ICT facilities. They are already disenfranchised due to their low awareness, partially stemming from lack of communication facilities, depriving them of information on policies of various candidates standing for local and national elections. As one young (female) user of the GPCIC commented:

> "*Being Indigenous, I also have the equal right to vote but I can hardly exercise it at the moment. I hope one day I will be able to exercise my political right to participate in the governance of the country by selecting my representative at the local and national levels.*"

Through the help of GPCIC, users of the centre played an active role in the political and legal systems and also became involved in implementing development programmes. Those who did not participate in this process were aware of its importance, as illustrated by a young (male) participant:

> "*When any important decision is taken in the village arbitration, we become so curious to see whether the justice is in place or not because the outcomes of the arbitration would affect our interests, anyway.*"

As the GPCIC created awareness of legal issues, encouraged users to play an active role in the planning and maintenance of village facilities, express opinions, participate in setting the agenda for development and to interact with local government officials, it contributed to the political freedoms of members in this Indigenous community.

5.2 Economic Freedom:

Irrespective of ethnicity, 95% households in the CHT areas own some land (BBS 2013) and this ownership provides them with some degree of economic freedom. However, more than 80% of the households do not have electricity and this limits their level of economic freedom. 52% of the total household members is either employed or employable. Plough and Jhum cultivation has been found in more than 50% of all indigenous households, Jhum cultivation is the second most pronounced source of income across the districts (Barkat et al., 2008). There have been many initiatives e.g. technical education and training for youth, women and other disadvantaged groups by different government and non-government organisations to improve the economic status of indigenous people in the CHT areas. The key objective of GPCIC in the CHTs is to make the benefits of the dynamic ICT sector in Bangladesh available for the economic development challenge of Indigenous groups through the making use of ICTs. The GPCIC participants get opportunities to improve their livelihoods after obtaining training

from GPCIC. The benefits of computer training far exceeded the low course fees charged to make the GPCIC sustainable, as articulated by a male teacher in an interview:

> *"I must say that this computer training with a minimal cost is very useful especially for youth. In the present time, the knowledge of basic operations of IT is required for all kinds of people. There's no such training institute available in our village."*

Livelihoods were improved as participants learned from GPCIC about opportunities to generate income from online commerce. One male participant mentioned:

> *'My mother runs the family since my father passed away many years ago. She is the only earning source of our family who makes and sell handicraft goods. Since she is getting older, I thought to help her by any means. One of my friends from GPCIC told me that Internet/web site could be an alternative way to sell handicraft goods. I joined GPCIC, learned web site designing and used this skill in selling the products. This helped me in boosting sales and thereby enabled me to better help the family.'*

The GPCIC program included development of entrepreneurial skills, especially for the youth. One young male participant expressed his gratitude to the ICT program:

> *"I have neither higher education nor sufficient capital to invest. With the motivation of past trainee at GPCIC, I got general training which helps me to understand the basics of computing and doing business. After successfully completing the courses I started setting up a computer compose business with the help of my friends. My business is now going very well."*

Through training in ICT and entrepreneurial skills, GPCIC contributed to improving the economic freedom of participants. The removal of some barriers to gaining economic benefits, the centre contributed to the improvement of livelihoods of Indigenous community. The word of mouth communication of participants about GPCIC to prospective members of indigenous community playing pivotal roles in attracting increasing number of participants to the program.

5.3 Social Freedom:

The CHTs areas are in a post-conflict situation, following years of civil unrest, which officially ended in 1997 with the signing of the Peace Accord between the indigenous leaders and the Government of Bangladesh (CHT n.d.). One of the elements of the Peace Accord was to recognise the rights of Indigenous communities to land and other sovereign issues. Although the situation has improved over the last few years in the CHTs areas regarding access and use of basic social services such as education, health, nutrition, water and sanitation services, there are nevertheless significant health issues prevailing in the region.

GPCIC contributes to improvement of health in the community, e.g. by boosting their awareness about health through showing documentaries about HIV/AIDS. One young participant conveyed what she had learnt about AIDS and its prevention through GPCIC:

> *"In GPCIC, I watched a CD on AIDS showing that AIDS is not a contagious disease. I also learnt that AIDS is caused by sexual interactions, blood transfusion or sharing syringes or needles with people infected by AIDS. With the help of GPCIC I am now fully aware of the causes of AIDS"*

The manager of the GPCIC operates the programs with the guidance and support of a selected management committee. The participants of GPCIC are encouraged to develop their management and leadership skills, e.g. by arranging cultural and sports events in the community. For example, having learned about drugs at the GPCIC, an adult participant (male) started an anti-drug campaign that encourages children and youth to visit the GPCIC. According to one male participant,

> *"The anti-drug campaign organised by the GPCIC contributed to enhancement of our consciousness about what is good and what is bad for the society. More participants should join the program to keep themselves away from drugs'.*

The GPCIC also introduced mobile banking system for securing financial transaction in the community. According to one young (female) participant:

> "*We used to send or receive money to other parts of Bangladesh for personal or business purpose through informal channels which is obviously very risky. After GPCIC introduced mobile banking system, we felt very secure with our transactions.*"

The GPCIC programs are well accepted by family members of the participants and one of the main reasons behind this is the equal learning opportunities provided by the non-discriminatory course composition and training curriculum. A female trainee supported this view:

> "*My participation helps the girls convince their parents to participate in the ICT course and many parents visited the GPCIC and express their willingness to continue their support.*"

The GPCIC has thus contributed to social freedoms by enabling community members to secure better control over their health through training on various healths related issues. Through its non-discriminatory policies GPCIC encouraged gender equality.

5.4 Transparency Guarantees:

While access to information is necessary for transparency, which is in turn required to discover corrupt conduct, it is not sufficient to achieve transparency freedoms. Other measures required include accountability, education, free media and free and fair elections (Lindstedt & Naurin, 2010). The proper balance between confidentiality required by some government decisions and the rights of civil society is subject to public debate. Citizens have different degrees of interest in and demand for governmental transparency (Piotrowski & Van Ryzin 2007).

GPCIC provided different kinds of information to the community members and assisted them with gaining knowledge in diverse areas and establishing good governance across public/private institutions. ICT programs also help the schools in concerned village to initiate lab-based education system, as suggested by a Committee member:

> "*The success of this program helps us to introduce 'Lab based education' in our village. Since students are familiar with computer through this ICT training, it was much easier for us to foster lab based education amongst indigenous people*".

Also a member involved in managing organisation of GPCIC felt that:

> "*The participants can learn computer, read books & newspapers in addition to their normal curriculum from the internet. Now a day they play creative games instead of the traditional game. As a result the mental development may rise higher than physical growth. In this centre a new method of learning & teaching has been introduced where both trainer and trainee participate & interact.*"

Learning about current affairs at GPCIC also helped participants understand the importance of transparency with respect to the workings of the legal system and environmental issues. With the help of GPCIC, community members were able to witness organisational accountability and transparency and the importance of these for their basic rights in society. It is widely acknowledged that corruption has negative effects on economic growth, investment, and social welfare and illicit flows associated with it has become the subject of much attention (OECD 2014). Relly & Sabharwal (2009) found that many countries ranked as 'most transparent' had significantly higher levels of access-to-information laws, telecommunication infrastructure, e-Government, free press, and higher income levels, than countries with low transparency levels. In Bangladesh, the Information Right Act 2009 is designed to provide access to information in an effort to reduce corruption. GPCIC provides free access to and interpretation of the Information Right Act to Indigenous people. According to one adult (male) participant:

> "*We have been informed of the activities of local government land office through GPCIC. We can handle land registration on the Internet and don't need to go to office*

> *physically. This reduces the time of processing our registration and also avoids paying bribes to corrupt officials."*

GPCIC has facilitated access to transparency guarantees for the indigenous population, through training showing as to how to access information that will make government action more transparent. Also GPCIC provided tools, such as a land registration system through which they have been able to experience greater transparency.

5.5 Protective Security:

In addition to social safety net that are important to people everywhere, protective security in the context of climate change and other natural disasters (e.g. Cyclones, floods, and droughts) is particularly important in Bangladesh. These natural calamities devastate people's lives and are also very damaging for the agricultural economy and people's livelihoods. In the CHT areas, earthquakes and heavy rainfall are common phenomena that adversely affect local communities. ICT-based information provided by GPCIC had provided protective security for the local community. One young (female) participant member said:

> "*We get information related to natural disasters (e.g. flood, earthquake etc.) from the GPCIC centre. This helps us with our advance preparations for disasters management."*

The participants also shared the information related to natural disasters with others, as indicated by another adult (male) participant:

> "*When I get disasters information on heavy rain or earthquake which would affect my family and others, I warn my bothers/sisters/family members and others to take pre-caution."*

According to the UN General Assembly (2007), Indigenous peoples have the right to the conservation and protection of the environment, health and the productive capacity of their lands or territories and resources. Trees are important to protect soil and human lives during heavy rainfall in hilly areas. Unfortunately, illegal logging has become common in CHT areas. To protect the environment there, the participants are committed to uncover this type of crime with the help of management. One of the adult (male) participants explained:

> "*We are divided into different groups with 5 to7 persons including government officials. We visit our forests occasionally and check out any unexpected events. We also arrange road shows to increase awareness of the diverse effects of environmental damages."*

The main mechanisms through which the GPCIC has contributed to the improved protective security of the Indigenous population is through providing access to the early warning system for disasters and by facilitating the detection and prosecution of illegal loggers.

The field research results provided us with the perceptions of Indigenous people in the CHT area of Bangladesh, rather than any 'objective' measures of causality between GPCIC and Sen's (2001) five freedoms. It is to be noted that since other activities contribute to socio-economic development of the indigenous community, it is not possible to attribute development/changes only to this project.

Freedom type	Major findings of the study
Political freedoms	In general the GPCIC was found to be effective in term of developing awareness in indigenous people about exercising their political freedoms. In particular GPCIC helped create awareness of legal issues, encourage users to play an active role in the planning and maintenance of village facilities, express opinions, participate in setting the agenda for development and to interact with local government officials, it contributed to the political freedoms of members in this Indigenous community.
Economic freedoms	GPCIC made positive contributions towards improvement of indigenous peoples' economic freedom through specific training in ICT usage and entrepreneurial skills. In particular the training was instrumental in the removal of some barriers to gaining economic benefits resulting in improvement of livelihoods of the Indigenous community.
Social opportunities	The GPCIC contributed to social freedoms by enabling community members to have better control over their health through training on critical health issues affecting indigenous people. Most importantly, through its non-discriminatory policies, GPCIC encouraged gender equality amongst indigenous community.
Transparency Guarantees	GPCIC has facilitated access to transparency guarantees for the Indigenous population, through training in how to access information in making government action more transparent and by providing tools, such as land registration system enabling indigenous people to experience greater transparency.
Protective securities	The main mechanisms by which the GPCIC has contributed to the improved protective security of the Indigenous population is through providing access to the early warning system for disasters as well as by facilitating the detection and prosecution of illegal loggers.

Table 2: Summary of results at a glance

6 Concluding Remarks

This pioneer study has addressed a lacuna in the extant literature as to the possible influence of application of information technology on indigenous peoples' lives in general and in the context of a developing country. More specifically this research examined if ICTs have any role to play in achieving the five freedoms developed by Noble Laureate Amarty Sen (2011). The qualitative results emerging from the study of the indigenous people in the remote regions of Bangladesh show that ICT training was instrumental in creating consciousness amongst indigenous people about achievement of many elements of the five freedoms. Participants mentioned about a wide range of issues pertaining to their quality of lives that were enhanced through the programs set by the Grameen phone Community Information Centres (GPCIC). In particular this research found that GPCIC's programmes has potential to reduce various forms of unfreedoms, thereby opening up new opportunities in the five freedom types in domains ranging from income generating activities, education, health, improved transparency and disaster warnings. ICT based training has, thus, emerged an informational tool to help indigenous people overcome the disadvantages and discriminations they have been exposed to in Bangladesh. It is noteworthy that GPCIC is not only devoted to imparting mere ICT training, rather its programmes are more broad based in terms of addressing the various issues impacting the lives and livelihood of indigenous people in Bangladesh. In this sense, this study sets the stage for further research encompassing the emerging issues affecting socio-economic and political future of the indigenous population in other developing countries where the situation would probably be the same. It is not denying the fact that in addition to the impact of the GPCIC, other factors may have contributed to the realisation of five freedoms which may have been integrated in the comments made by the participants of this research. Nevertheless, ICTS have emerged as a useful communication tool which was made easily accessible (including training) to indigenous population of Bangladesh many of whom cannot

afford it simply because of their low income status in the community. Although ICTs cannot have direct impacts on behavioural changes of indigenous population in Bangladesh, the tool can be useful in creating awareness about the importance of the issues that are of interests to indigenous people which may have indirect effects on their behavioural changes in relation to the five dimensions of freedoms. Interestingly, this reality was paramount in the comments of the participants of this study.

6.1 Limitations and future research

This paper has a number of limitations that are to be considered in generalising the results across other developing and well as developed countries. First, this paper uses qualitative technique in collecting and analysing data based on a limited sample size in only one developing country. Future research should use mixed methodology approach using more broad based samples drawn from a number of developing countries to ensure better generalisation of the findings. Second, when focussing on the GPCIC, there is a question of attribution in terms of whether ICTs alone facilitated the changes in participants' behaviours or ICTs were provided in a mediated form in conjunction with other activities? This issue need to be addressed in future research by isolating ICTs' impact from those of others. Third, indigenous peoples' rights and freedoms are affected by inter-communal tensions with the main stream population living side by side with them. This issue need to be investigated further in future studies. Third, it would not be wise to draw conclusion about the influence of ICTs on indigenous peoples' lives based on a limited study conducted in a single point in time. Longitudinal studies focusing on behaviour changes in indigenous people would capture the changes initiated by ICT over a period of time. Finally, future research can use other appropriate frameworks along with Sen's (2011) four dimensional framework of freedoms to broaden and deepen our understanding of the complexities associated with ICTs and achievement of freedoms of indigenous people.

References

ACMA. (2008). *Telecommunications in remote Indigenous communities*. Canberra: Commonwealth of Australia.

Alampay, E. (2006). Analysing socio-demographic differences in the access & use of ICTs in the Philippines using the capability approach. *The Electronic Journal for Information Systems in Developing Countries*, 27(5), 1–39.

Alkire, S. (2005). Why the capability approach? *Journal of Human Development, 6* (1), 115-133.

Amato, S. (2013),"Addressing indigenous (ICT) approaches in South-East Asian learning systems", *Multicultural Education & Technology Journal, 7(*1), pp. 46 -63.

Anand, P. B. (2007). Capability, sustainability, and collective action: an examination of a river water dispute, *Journal of Human Development, 8*(1), 109–132.

Andersson, A., Grönlund, A. &Wicander, G., (2012): Development as freedom – how the Capability Approach can be used in ICT4D research and practice, *Information Technology for Development*, 18:1, 1-4

Barkat, A. et al. (2008). *Socio-Economic Baseline Survey of Chittagong Hill Tracts, conducted for UNDP-CHTDF,* Human Development Research Centre (HDRC), Dhaka.

BBS (2013). Bangladesh Bureau of Statistics. *Statistics and Informatics Division (SID),* Government of Bangladesh.

BEOD (2014), *Bangladesh Ethnobotany Online Database*, Dhaka, Bangladesh. Retrieved July 2014 from http://www.ebbd.info/indigenous-communities.html

Bhuiyan, S. H., (2011), Modernizing Bangladesh public administration through e-governance: Benefits and challenges, *Government Information Quarterly* 28, pp. 54–65.

BTRC (2014), Internet Subscribers in Bangladesh: *Bangladesh Telecommunication Regulatory Commission*, Retrieved from http://www.btrc.gov.bd/content/internet-subscribers-bangladesh-july-2014

Biggeri, M., Libanora, R., Mariani, S. &Menchini, L (2006). Children conceptualizing their capabilities: results of a survey conducted during the first Children's World Congress on Child Labour. *Journal of Human Development,* 7(1), 59 – 83.

Comin, F. (2001 June). OperationalisingSen's capability approach. *Paper prepared for the conference Justice and Poverty, examining Sen's capability approach*. Cambridge. Retrieved August 20, 2006 from http://st-edmunds.cam.ac.uk/vhi/sen/papers/comim.pdf.

Corbridge, S. (2002). Development as freedom: the spaces of Amartya Sen. *Progress in Development Studies, 2*(3), 183-217.

CHT (n.d). Chittagong Hill Tracts issues: Geographic and physical feature, *Ministry of Chittagong Hill Tracts AffairsWeb site*. Retrieved August 22, 2014. from http://www.mochta.gov.bd/index.php/index/othercontent/Other-Details__14/7/0/12

Corbett, J., Singleton, G., & Muir, K. (2009). Web 2.0 for Aboriginal cultural survival: a new Australian outback movement. *Participatory Learning and Action*, 59(1), 71-78.

Daly, E. M., &Haahr, M. (2007). Social network analysis for routing in disconnected delay-tolerant manets. In *Proceedings of the 8th ACM international symposium on Mobile ad hoc networking and computing* (pp. 32-40). ACM.

Digital Bangladesh (2009), *Access to Information Programme,* Prime Minister's Office, Dhaka, Bangladesh.

Evert, G. (2003). All research is interpretive! *Journal of Business & Industrial Marketing, 18*(6/7), 482 - 492.

Gasper, D. (1997). Sen's capability approach and Nussbaum's capabilities ethics. *Journal of International Development, 9*(2).

Gigler, B. S. (2009). Poverty, inequality and human development of indigenous peoples in Bolivia. *Center for Latin American Studies.* Working Paper Series 17, Georgetown University.

Hatakka, M., &Lagsten, J. (2012). The capability approach as a tool for development evaluation–analyzing students' use of internet resources. *Information Technology for Development, 18*(1), 23-41.

Hossain, D.M. (2013), Socio-economic Condition of the Indigenous People in the Chittagong Hill Tracts (CHT) of Bangladesh, *Middle East Journal of Business*, *8*(2), 22-30.

Hunter, J. (2005), The Role of Information Technologies in Indigenous Knowledge Management, *Australian Academic & Research Libraries*, 36(2),109-124, DOI:10.1080/00048623.2005.10721252

ILO (2014), Convention No 169, *International Labor Organisation*, Retrieved August 20, 2014. from http://www.ilo.org/indigenous/Conventions/no169/lang--en/index.htm

Johri, A. & Pal, J. (2012): Capable and convivial design (CCD): a framework for designing information and communication technologies for human development, *Information Technology for Development*, 18:1, 61-75

Johnston, A. L. K., (2010), Using technology to enhance aboriginal evaluations, *The Canadian Journal of Program Evaluation, 23* (2), 51–72

Lima, A. P.D., &Brito, C. (2012). An Examination of the tribal community dimensions of ICT users. *Journal of Internet Commerce, 11,* 291–308, DOI: 10.1080/15332861.2012.729468

Lunat, Z. (2009). The Palestinian hidden transcript: Domination, resistance and the role of ICT in achieving freedoms. *The Electronic Journal for Information Systems in Developing Countries*, 37(1), 1–22.

Lwoga, E. T., Ngulube, P., & Stilwell, C. (2010). The management of indigenous knowledge with other knowledge systems for agricultural development: challenges and opportunities for developing countries. In *Scientific and Technical Information and Rural Development–IAALD XIIIth World Congress,* Montpellier (pp. 26-29).

Mayerhofer, P., & Taylor, A. (2010). *The influence of ICT on indigenous mobility,* Population Studies Research Brief 2010059

Nussbaum, M. (2000). *Women and Human Development: The Capabilities Approach*. Cambridge: Cambridge University Press.

Nussbaum, M. (2003). Capabilities as fundamental entitlements: Sen and social justice. *Feminist Economics, 9*(2/3), 33-59.

Nussbaum, M. (2006). Capabilities as fundamental entitlement. In A. Kaufman (Ed.), *Capabilities equality: basic issues and problem*, 44-70. New York: Routledge.

OECD (2014), *Better Policies for Development 2014: Policy Coherence and Illicit Financial Flows,* OECD Publishing. DOI: http://dx.doi.org/10.1787/9789264210325-en.

Radoll, P., Fleissner, S., Stevenson, D., & Gardner, H. (2013). Improving ICT support for aboriginal land councils in New South Wales. Paper presented at the *Proceedings of the Sixth International Conference on Information and Communications Technologies and Development*: Notes-Volume 2.

Radoll, P. J. (2011). The primary determinants of Indigenous household information and communication technology adoption: remote, rural and urban. *Australasian Psychiatry, 19*(1 suppl), S49-S52.

Radoll, P. J. (2010). *Stone Chips to Silicon Chips: A Grounded Theory of Information and Communication Technology adoption in Australian Indigenous households rural, urban and remote*. PhD Thesis. The Australian National University. Page 345

Rahman, M. (2013). *Problems and Prospects of Development: Intervention for the Indigenous People* Bangladesh.

Raitt, D., & Roy, L. (2003),"The impact of IT on indigenous peoples", *The Electronic Library*, 21 (5), pp. 411 – 413. DOI: http://dx.doi.org/10.1108/02640470310501412

Robeyns, I. (2001). *Understanding Sen's capability approach*. Wolfson College, Cambridge. UK. Retrieved on August 20, 2006, from http://www.ingridrobeyns.nl/Downloads/Under_sen.pdf.

Robeyns, I. (2005). The capability approach: a theoretical survey. *Journal of Human Development, 6*(1), 93-114.

Salazar, J. F. (2007). Indigenous peoples and the cultural construction of information and communication technology (ICT) in Latin America. *Information Technology and Indigenous People*, 14-26.

Schischka, J., Dalziel, P., Saunders, C. (2008). Applying Sen's capability approach to poverty alleviation programs: two case studies. *Journal of Human Development*, 9 (2), 229 – 246.

Sen, A. (1982). Rights and agency. *Philosophy and Public Affairs, 11*(1), 3-39.

Sen, A. (1989) Development as Capability Expansion, *Journal of Development Planning*, no. 19, pp. 41-58.

Sen, A. (2001) *Development as freedom*, London: Oxford University Press, First published by Alfred A. Knopf in 1999.

Sharmin, S. (2011). Socio-Economic Situation and Land Rights of the Indigenous People in Bangladesh. *OIDA International Journal of Sustainable Development*, *2*(11), 85-96.

Suresh, S., &Nath, L. (2014). Challenges in managing telemedicine centers in remote tribal hilly areas of Uttarakhand, *Indian Journal of Community Health*, 25(4), 372-380.

Stavenhagen, R. (2002). Indigenous peoples and the state in Latin America: An ongoing debate. *Multiculturalism in Latin America: Indigenous rights, diversity, and democracy*, 24-44.

Stewart, F. &Deneulin, S. (2002). AmartyaSen's contribution to development thinking. *Studies in Comparative International Development, 37*(2), 61-70.3.

Stewart, F. (2005). Groups and capabilities. *Journal of Human Development, 6*(2), 185-204.

Taylor, A. (2012). Information communication technologies and new Indigenous mobilities? Insights from remote Northern Territory Communities. *Journal of Rural and Community Development*, 7(1), 59-73.

Taylor, S. J., &Bogdan, R. (1984). *Introduction to qualitative research methods: the search for meanings* (2nd ed.). New York: Wiley.

Thapa, D., &Saebo, O. (2014). Exploring the Link between ICT and Development in the Context of Developing Countries: A Literature Review. *The Electronic Journal of Information Systems in Developing Countries, 64*.

Watson, S. (2013). New digital technologies: educational opportunities for Australian indigenous learners, *The Australian Journal of Indigenous Education, 42*(1), pp. 58-67, doi 10.1017/jie.2013.8

Wresch, W. & Fraser, S. (2012): ICT – enabled market freedoms and their impacts in developing countries: Opportunities, frustrations, and surprises, *Information Technology for Development*, 18:1, 76-86

Zheng, Y. &Walsham, G. (2008). Inequality of what? Social exclusion in the e-society as capability deprivation. *Information Technology & People*, *21*(3), 222-243.