Building Sustainable Digital Communities: A Five-Pronged Social-Informatics Research Approach in Bangladesh

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Abstract. In a developing society, critical issues highlighted are not just about the technology, but with social factors such as culture, institutions, organizational issues, and individual identities. Understanding such factors is significant to illustrate how best to create sustainable communities using technology. Researchers at Monash University have collaborated with Oxfam International and developed a 5-year international development project known as PROTIC. This paper aims to give readers an overview of the PROTIC project and describe how the five doctoral research students are designing their research to achieve a common goal of developing sustainable digital communities in Bangladesh. The students follow different research methods in their respective projects, targeting overall long-term sustainability for the vulnerable communities identified in each of their studies. Although using five distinct research project approaches, the PROTIC project aims to use the exploratory study to make information and communication technologies (ICT) more sustainable for underserved communities. The findings from these researchers will impact on design and implementation of ICT-based socio-economic development projects undertaken by international development organizations.

Keywords: ICT4D, Social Informatics, Information Sustainability, Sustainable Community, Women's Empowerment.

1. Introduction

Despite significant achievements in multiple sectors including social and economic growth, agriculture, health and more; Bangladesh is still struggling to reach the targets of the Sustainable Development Goals (SDGs) proposed by the United Nations. One of the political manifestos of the country's government is to enhance every aspect of developments using digital technology. To achieve information sustainability, Bangladesh strives to improve every aspect of citizen development with an emphasis on marginalized communities through appropriate uses of digital technologies [1].

Agriculture is the backbone of social and economic developments in Bangladesh. More than three-quarters of the total population in rural Bangladesh are economically dependent on agriculture [2] while about half of them are rural women farmers [3]. Women contribute to the economy widely as well but still live most of their lives underprivileged and undernourished as a part of the patriarchal society [4]. A rich body of literature shows that Information and Communication Technologies (ICTs) can

contribute to improving women's condition in developing countries [5, 6, 7, 8]. ICT scholars have pointed out the importance for further ICT for development (ICT4D) research on how people in developing countries can take advantage of digital innovation as a part of overall sustainable development [9, 10, 11, 12].

To achieve this common goal, academics at Monash University in Australia, have collaborated with Oxfam International and developed a 5-year international development project based on information communication technologies, known as PROTIC (Participatory Research and Ownership with Technology, Information and Change). The five doctoral projects presented in this paper are part of PROTIC and focus on developing sustainable digital communities which benefit the women of rural Bangladesh. The next section gives a brief overview of the PROTIC project and what it entails. Following this, a five-pronged research approach from the five doctoral students is described along with their research problems, aims and methods. This paper concludes with a brief discussion of the expected outcomes from these doctoral research projects, all of which aim to contribute to creating sustainable information communities in Bangladesh.

2. About PROTIC Research

PROTIC means a 'sign' or 'symbol' in Bengali, and it articulates the symbol of 'development and progress', the sign of digitization, a token of recognition of community voices [13]; it is used as an image for action research by Monash University and Oxfam. We at PROTIC follow the action research approach, which allows the project to understand and evaluate the existing interventions within the project cycle and incorporate learnings from the field [14]. PROTIC is working with the women farmers in rural Bangladesh for their sustainable socio-economic development by providing them with information support for improved agricultural production through mobile technology.

One of the project's focus is on making ICT initiatives more sustainable, which can be used as an example of designing and implementing ICT-based projects for sustainable development. Five key areas of research were identified to make sustainable ICT for development initiatives in the context of Bangladesh and other developing countries. The five doctoral projects are progressing with the common aim to build sustainable digital communities in Bangladesh (see Fig. 1). Each project is briefly described in the following section.

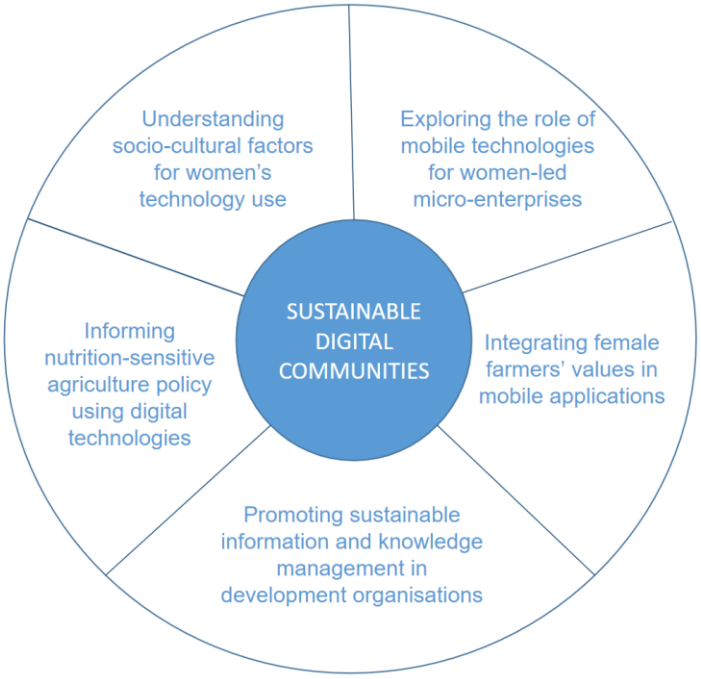

Fig. 1. Building sustainable digital communities in Bangladesh - PROTIC Research Overview

3. A Five-Pronged Research Approach

3.1. Understanding Socio-Cultural Factors for Women's Technology Use by Anindita Sarker

ICTs have the potential to empower women in the international development context. Bangladesh is one of those countries where both government and non-government organizations (NGO)-supported initiatives are focusing on designing and implementing ICT-supported interventions for development and women's empowerment. Most of the development initiatives have been working to support women to access and use ICTs by providing devices and other technical and information support. Despite these efforts, little research has explored the role of the socio-cultural, contextual factors and their influence on women's access and use of ICTs in society.

This study involves both PROTIC and non-PROTIC participants in rural Bangladesh to explore the potential of ICTs to enable women's empowerment by understanding rural women's experience with and without ICTs. This research focuses on the social power dynamics and social construction of women's gender roles to understand women's empowerment.

The approach of this study emphasizes the need for having a socio-cultural and contextual understanding of the participants' worlds, their experience and their challenges in accessing and using ICTs. Having reached the final thesis writing stage for this PhD, Anindita believes that such an approach will help researchers and practitioners to have a comparative understanding of social dynamics and women's experience with ICTs.

The outcome of this study will result in recommendations for promoting sustainable ICT initiatives for women's empowerment in rural Bangladesh. The concepts and models developed will assist development organizations, policymakers and government bodies to design and implement ICT for development programs by considering the active participation of the people from the grass-roots rather than reinforcing status quo solutions.

3.2. The Role of Mobile Technologies in the Sustainability of Women-led Micro-enterprises and Women's Empowerment in Rural Bangladesh by Monisha Biswas

This qualitative PhD research aims to understand the role of mobile technologies on the lives of rural women entrepreneurs and sustainability aspects of micro-enterprises as a result of mobile-based technological interventions in the context of Bangladesh. Monisha Biswas will observe, document and analyse major trends in mobile technology-driven societal change processes in rural Bangladesh. The focus is mainly on the role of mobile technologies in promoting the emergence, growth and sustainability of microenterprises led by the women.

The specific objectives of the research include 1) exploring the roles of mobile technologies in improving livelihood outcomes and empowerment of rural micro-entrepreneurs in Bangladesh, 2) observing and analyzing the nature of transformative changes happening in rural women micro-entrepreneurs' lives with the usage of mobile technologies for solid policy advocacy recommendation, and 3) exploring the relationship between the usage of mobile technologies and women empowerment for useful insight to design women-friendly socio-technical projects.

The expectations from these research findings will provide a reference point into the significance of social factors (information culture, communicative transactions, power, class and social capital) in designing socio-technical projects focusing on women's empowerment and other mobile-based development interventions in Bangladesh. Currently, this PhD project is halfway through completion, having conducted data collection and preliminary data analysis.

3.3 Integrating Female Farmers' Values in Agriculture Mobile Applications by Rifat Ara Shams

Software is ubiquitous in all aspects of daily life; therefore, it gives rise to the need for developing software that respects human values. However, existing software engineering techniques have paid limited attention to human values. This is reflected in frequently occurring value breaches incidents. To build a sustainable digital

community, it is necessary to take human values into account while developing software.

In this project, Rifat is working on integrating human values into the software in a development context by using Schwartz's theory of basic human values [15] which is the most cited and widely applied classification not only in the social sciences but also in other disciplines [16, 17]. In particular, the focus is on the values of female farmers in rural Bangladesh. She also aims to integrate those values in agricultural mobile applications as the availability of mobile phones in rural areas is increasing. The research is conducted by adopting a mixed method of research in a post-positivist paradigm. It is expected that this research will increase the awareness of the importance of considering human values in mobile applications and of their contribution to the sustainable use of the applications.

This PhD research is in a nascent stage where the fieldwork is being conducted in late 2019 and will continue until early 2020. As expected outcomes, this research aims to provide a set of values of female farmers in rural Bangladesh and their value priorities in existing Bangladeshi agriculture mobile applications with features-values mapping. It will also help in determining the available practices in software engineering, human-computer interaction, information system and ICT4D to enable the embedding of human values in software. Finally, this research aspires to propose a set of practices to embed Bangladeshi female farmers' values in mobile agriculture applications.

3.4 Informing Nutrition-Sensitive Agriculture Policy Using Integration of Digital Technology by Manika Saha

Despite impressive economic growth and poverty reduction, more than one-third of the population (35%) in Bangladesh is currently food and nutrition insecure [18]. Food and nutrition security is one of the UN SDGs and is underpinned by agricultural development through a nutrition-sensitive lens [19]. The government of Bangladesh has emphasized the development of coherent nutrition-sensitive agriculture (NSA) policy. This initiative highlights the necessity of inclusive multi-sector stakeholder coordination between government, donors, UN, research, INGOs and other sectors. However, while the emphasis is on the importance of inclusive participation of multi-sector stakeholders, there is little focus on citizen-level agriculture stakeholders, let alone on the representation of marginalized groups who are directly engaged in agriculture, such as women farmers.

About 87% of the rural population in Bangladesh is involved with agriculture [2]. Half of these farmers are women who are consistently suppressed with poor social, economic and health outcomes [3]. Their challenges, needs and priorities need to be heard by the policymakers. Although there are government surveys and reporting systems, these do not capture citizen's life experiences and challenges through their own voice (in a more meaningful way). This research aims to bridge the divide between multi-sectoral policy stakeholders and women farmers in Bangladesh to enhance sustainable NSA programs and policies.

The ubiquitous uses of digital technology in the international development context, another agenda of UN SDGs, brings a potential opportunity to mitigate this divide. Adopting action research in a case study approach in Bangladesh, this study explores

three areas and comprises three phases: understanding the complexity of multi-sector nutrition and agriculture policy environment (phase-1); exploring the systematic processes of participatory media production to capture community voices (phase-2); and investigating potential digital media to connect community voices with the multi-sector policy stakeholders (phase-3). This engagement will allow the collaborative development of a 'community manifesto', or 'design brief', on nutrition-sensitive agriculture policy. In phase-1, 15 in-depth key informant interviews were conducted with multi-sector nutrition and agriculture policymakers. During phase 2, participatory media productions (participatory videos and podcast) were created with the PROTIC women farmers to capture their challenges and needs in the areas of agriculture, health and nutrition, gender and digital technologies issues.

Results from these two phases will help us to design the third phase. This research aims to contribute a conceptual framework to incorporate community voices into the agenda-setting. It will provide a set of processes and concerns that need to be considered in using digital technology for effective agenda settings towards community-driven sustainable nutrition-sensitive agriculture policy in Bangladesh.

3.5 Promoting Sustainable Information and Knowledge Management in Development Organizations by Jigya Khabar

While it is essential to study the role of technology on people's lives and livelihood, there is also an increasing need to explore how the information and knowledge is created, shared and used for the betterment of communities using technology. To achieve information sustainability through digitization, the understanding of the cultural and social role of how information is generated and shared is exceptionally significant. In the context of a development organization like Oxfam, this elevates to become a considerably higher concern because of the cash-flow issues usually familiar to the non-profit world.

Within a typical organization, nearly half (46%) of the employees have reported a severe challenge in retrieving information and documents for their work; with about 83% confessing to recreate many existing documents as they are unable to fetch these in time from their corporate network [20]. Inadequate information and knowledge management (IKM) is a silent killer of productivity for its people and the organization culture [21], costing a fortune as well. In the case of a development organization, the sustainability of the social good is directly related to the sustainability of the organization resources itself [16].

To ensure the long-term sustainability of development organizations, it is imperative to reduce the overall cultural and economic burden associated with poor IKM practices. This research aims to study the cultural and social factors, discussed by Walsham [21], such as institutional memories, organizational issues and individual identities, which form the culture of an organization. By addressing these factors through the study, academics can further understand the management of information in a development organization. Jigya is currently conducting a preliminary analysis of the qualitative data collected during fieldwork's first phase.

The findings from this research will have direct understanding and influence on the knowledge management and information sharing practices of organizations within the development sector. These findings can then be used to design an appropriate and

feasible intervention to ensure effective information management, which will contribute to the increased sustainability of the development projects undertaken by the organization.

4 Conclusion

Building sustainable digital communities is one of the SDGs' manifesto for developing countries like Bangladesh. For contribution towards this goal, the PhD students involved in the PROTIC project are exploring multiple research approaches towards longer-term information sustainability. As outcomes of these research projects, the team is expecting to provide guidelines for international and local NGOs and the relevant government authorities for designing and implementing more appropriate and sustainable ICT-based initiatives for women by addressing their context-specific needs and priorities.

The research findings generated from these projects will also provide a robust theoretical basis for ICT4D academics and practitioners to understand the impact of mobile technologies in the context of sustainable development with a particular focus on rural women farmers. These outcomes will increase our knowledge of the practices for designing sustainable mobile applications based on the values of the participants and will help to develop a conceptual framework to share the factors, challenges and opportunities for community-led effective policies for sustainable community development. Lastly, digital communities can be built, but for sustainability, the project will also inform policies and guidelines for continual information and knowledge management support and practices to NGOs and government authorities.

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