

Articles

ICT Use, Collective Agency and Community Transformation in Rural Bangladesh

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ICT Use, Gender Norms, and Community Transformation in Rural Bangladesh

Abstract

*This paper presents a collectivist or communally-oriented interpretation of the Capability Approach (CA), within an Information and Communication Technology for Development (ICT4D) project targeted at rural communities. The paper examines how rural women in Bangladesh appropriated smartphones introduced through a digital inclusion initiative. Informed by Kleine's Choice Framework, the study explores how agency interacts with assets and structures to shape strategic life choices. In this case, the focus is on and how these engagements show expressions of **collective agency** within restrictive socio-cultural environments.*

Findings demonstrate that while women used smartphones to access information and services, the more significant outcomes emerged through relational and collective practices. A communally-oriented perspective provides valuable insights into an ICT project's design and implementation process. It highlights the importance of recognising the community members as active participants oriented to communal, rather than solely individualistic, outcomes. This article contributes to the literature on ICT4D and Community Informatics by highlighting the need for community-centric engagement and a contextually sensitive approach in designing and implementing ICT projects in rural communities.

Keywords: ICT4D, capability approach, social inclusion, rural communities, collectivity.

Introduction

This paper investigates the collective response by women to the introduction of smartphones in an ICT4D project (referred to as 'the Project') aimed enhancing agricultural livelihood in traditional, remote villages in Bangladesh. While the Capability Approach (CA) is often applied to analyse individual well-being and agency, this study argues for a shift in focus towards collective agency—the capacity of individuals to act in concert with others in pursuit of shared goals.

In many rural, collectivist societies, including Bangladesh, collective action and social cooperation play critical roles in shaping individual and group outcomes. Within this context, the introduction of smartphones does not merely enable individual empowerment but also facilitates forms of collective practice, decision-making, and advocacy. Therefore, this paper highlights how collective agency can better address the socio-technical processes underpinning ICT adoption in rural communities. Gendered roles, particularly within collectivist contexts, emerge as a vital dimension for understanding the interplay between individual choices and collective action.

Drawing on Kleine's (2010) Choice Framework, this study explores how women's individual assets with communal structures and norms to enable collective action. The

framework is adapted here to better account for agency exercised within collectives, such as families, kinship networks, and village-level institutions. While the literature on CA has increasingly addressed collective capabilities (e.g., Ibrahim, 2006), this paper intentionally focuses on collective agency as process that can be observed in the women's interactions with mobile technologies.

By highlighting the socio-technical and gendered dynamics underpinning smartphone adoption, this study contributes to ICT4D and Community Informatics literatures by showing how digital interventions can strengthen collective agency among marginalized groups. These dynamics ultimately contribute to both individual and collective empowerment, contributing to greater participation in the digital and socio-economic spheres.

Review of literature

The capability approach: An overview

While Information and Communication Technology (ICT) has become a recognised stream in international development research, the human development perspective has given rise to a new strand of research studies that relates ICT and the CA. The present study is a further contribution to this strand.

The Capability Approach (CA), developed by Amartya Sen (1999) and expanded by Martha Nussbaum (2000) and others (Alkire, 2005; Robeyns, 2005), provides a framework for evaluating human development beyond economic indicators, focusing on the freedom individuals have to achieve functionings they value.

The core concepts of the CA are the material, social, and psychological resources that are drawn upon for potentially agentic capabilities and achieved functionings (Sen, 1999). Capability refers to the conversion or combination of different material, social, and psychological resources into a form of asset or “set” that provides a freedom to achieve a person’s or group’s choices. These are not just about access to resources, but the actual ability to convert these resources into valuable outcomes. For example, having access to a mobile phone is a resource, but whether someone can use it effectively depends on their capability to do so, which may be shaped by factors like digital literacy, social norms, or access to reliable networks. Conversion factors are crucial in explaining why the same resources result in different outcomes for individuals. These factors can be personal, social and/or environmental factors. Functionings are called the achieved “beings and doings” (Robeyns, 2006, p. 95) of a person, the realised and capabilities achievements resulting in better well-being.

Sen’s original framing left the notion of capabilities relatively underspecified, encouraging contextual interpretation (Robeyns, 2005; 2006). Robeyns developed a schema of conversion factors—personal, social, and environmental—that influence how individuals translate resources into capabilities (see Figure 1). However, this schema does not fully account for how agency is shaped or exercised in collective environments, where shared norms, expectations, and responsibilities mediate access to opportunities.

While the CA traditionally emphasises individual capabilities, scholars have increasingly called attention to its relevance for analysing collective dimensions of well-being and action (Ibrahim, 2006; Pelenc et al., 2013). In particular, the concept of collective agency—defined as the ability of people to act together toward shared objectives—has emerged as a useful lens for examining development in communally oriented settings such as rural Bangladesh. Closely related is the concept of collective intelligence, which offers a lens for understanding how collective agency is enacted and sustained. Sassi et al. (2022) describe collective intelligence as emerging from distributed knowledge systems that enable decentralised communities to co-create, coordinate, and apply knowledge in adaptive and meaningful ways. It encompasses not only the content of shared knowledge but also the socio-technical conditions that allow groups to process complexity and respond collectively.

Thus, while collective capabilities highlight the new “functioning bundles” that individuals acquire through group participation (Ibrahim, 2006), collective intelligence stresses the processes of knowledge co-production and exchange that underpin these capabilities. These go beyond aggregated individual outcomes and highlight how shared resources and group identity can shape developmental freedoms. While valuable, this paper intentionally focuses on collective agency that are observable in our dataset.

The traditional, collectivist gendered community and empowerment

Traditional community is a term of convenience used here to include peasant groups that are closely linked to the land and traditional ways of life that have a collective orientation. “International development should aim to work well at this local level, which represents the life and history of a people” (Escobar, 1995, p. 98). Since the 19th century, traditional societies and their social systems have remained of particular interest to students of anthropology (Geertz, 1973). Giddens speaks of traditional societies living with the dominance of collective memory, ritual, certain collective property relations, and guardians of traditions, as well as the significance of co-presence (Giddens, 1984, p. 16-19; 1996, p. 45-50). Embedded within the shared sense of “we” is a corresponding sense of “collective agency” based on collective capabilities. (Snow, 2001, p. 2213).

The CA has long emphasised the importance of gender in shaping people’s freedoms and choices (Sen, 1987; Nussbaum, 2001). Collective capabilities are defined as “the newly generated functioning bundles a person obtains by virtue of his/her engagement in a collectivity that help her/him achieve the life he/she has reason to value” (Ibrahim, 2006, p. 398). At the same time these “bundles” can also act to constrain. Outcomes are not inherently positive, particularly for women. In patriarchal societies, women’s agency is often constrained not only by material deprivation but also by entrenched social hierarchies and relational dynamics.

The capabilities of women are doubly disadvantaged: by both the behavioural limitations set upon their gender and the structurally unequal conditions under which they live as compared to men (Murzacheva et al., 2019). Critically, women “are defined by their relationships” (Arens, 2011, p. 22). Predominantly unequal relationships with the immediate family, relatives, and the

community determine their subjective and physical well-being as well as sense of fulfilment or its absence in undertaking a particular (Moore, 2010, p. 36). And agency, so fundamental to the CA, can be constrained by the exigencies of the “patriarchal bargain” in village collective environment (Kabeer, 1997). Thus, when applied to the case of land in village Bangladesh, “... *the decision is determined by the class structure and other factors, such as a woman’s own personality, her family background, and education. The social structure can constrain or enable a woman’s agency, her freedom of choice*” (Arens, 2011 p. 32).

From this perspective, women’s capabilities must be understood as relational which is emerging through collective negotiations, social learning, and shared cultural norms. This supports a shift from focusing on individual outcomes to considering how collective agency is enacted within gendered, social structures.

Gender analysis also arises in the field of ICTD and particularly CI. Gurumurthy (2014) emphasizes that digital spaces are shaped by gendered hierarchies, but CI aligned with feminist principles can challenge these structures and enable women’s agency in collective contexts. Similarly, Buskens and Webb (2009) explored how ICTs shape and are shaped by women’s empowerment. Studies in Nigeria (Abubakar et al., 2017) and elsewhere (Graf, 2020) highlight both the empowering potential of ICTs and the contextual barriers women face. Anwar (2014) observed collective behaviours among women micro-entrepreneurs in Indonesia, reinforcing that gender in collective contexts is key to understanding the individual–collective choice nexus.

Choice framework: Operationalising collective agency

Kleine (2010, 2014) proposed the **Choice Framework** to operationalise the Capability Approach for ICT4D research. Drawing on Sustainable Livelihood Framework originally initiated by the UK Department of International Development (UK DFID, 1999). Kleine (2010, 2014) conceptualizes development as a function of individual assets (material, social, psychological, informational) interacting with structural dimensions (institutions, norms, power relations) to produce capability sets and achieved functionings. Within the framework, the primary development outcome is choice itself (Kleine, 2010, p. 122). Agency is understood as the ability to pursue goals one has reason to value, based on one’s asset endowment.

Kleine embeds agency within the individual–structure dynamic, making her framework more practical for understanding situated and relational agency. Kleine categorised different types of agencies into 10 groups, including material resources, financial resources, geographical resources, health resources, human resources, educational resources, psychological resources, information, cultural resources, and social resources including social capital. Within this framework, social and cultural resources particularly represent a nexus between individual and community dimensions.

The dynamics of this within the Choice Framework are represented in Figure 2 below, developed by Kleine. The outcome of the dynamics between structure and agencies is manifested in a person’s capabilities, resulting in development outcomes (that is, achieved functionings). However, the nexus between group and individual dimension is not immediately apparent when, as suggested, women are considered not just as isolated individuals but as members of a specific

group or collectivity, which is heavily affected by social norms and traditions that form women's gendered preferences, and which in turn, influence their aspirations and their effective choices (Ibrahim, 2006).

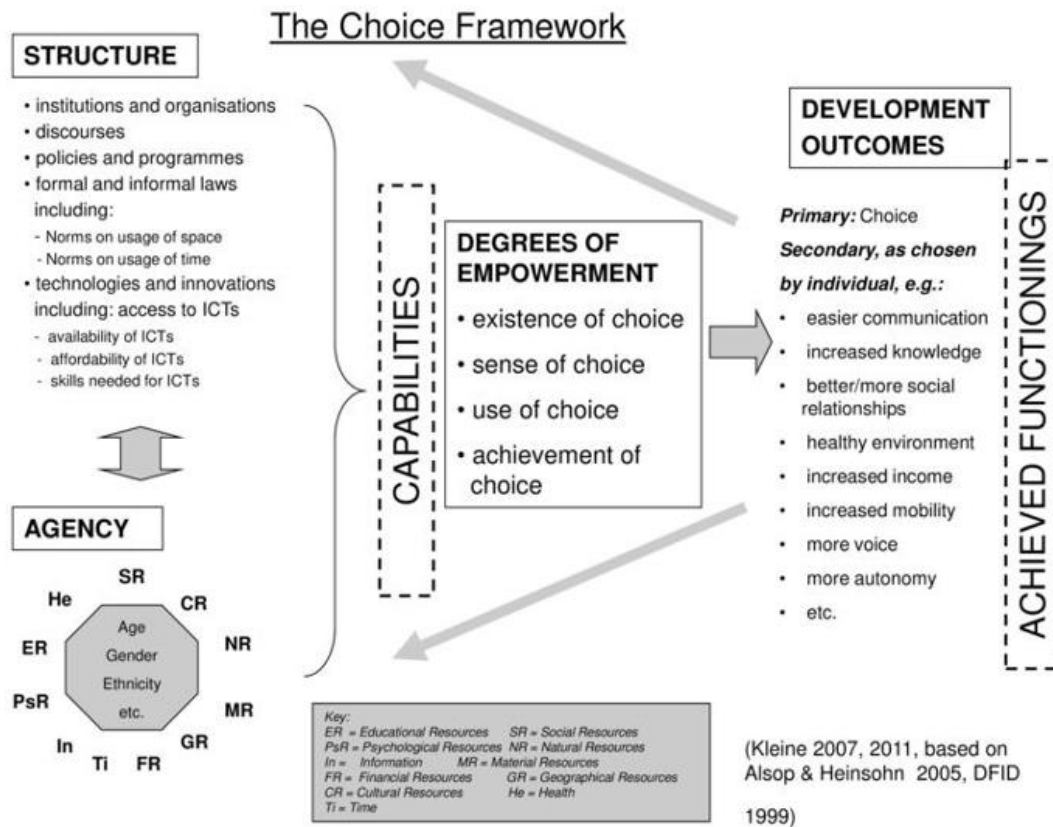


Figure 2. The Choice framework (Kleine, 2014)

However, Kleine's framework remains focused on the individual level of analysis. This paper proposes an adaptation of the Choice Framework to better account for collective agency. When assets and resources are the basis of agency, then it is necessary to look at how they are utilised to result in agency. When we are talking about collective agency, do we then consider combined resources of individuals? With this collective approach in mind, the case study of this project in Bangladesh can be considered.

ICT4D and CA

The application of CA within ICT4D and Community Informatics (CI) is increasingly gaining interests. The CA has provided an important theoretical lens to evaluate how digital interventions contribute to development goals. It goes beyond the purpose of the present paper to present an exhaustive review of the literature which has been partly covered in other publications (e.g., Stillman & Denison 2014; Abdulrashid et al., 2019). Scholars such as Stillman and Denison (2014) argue that the CA provides a sociological framework, allowing for deeper theoretical engagement with concepts like human well-being and empowerment. As examples of key themes, Giger

(2011) highlights that ICT can play an important role in enhancing the human capabilities of the poor (ICT literacy and skills), and that extensive use of ICT expanded people's "informational capabilities." Grunfeld and others presented an assessment framework to evaluate ICTD projects in a Cambodian study based on the CA (Grunfeld et al., 2007).

Abubakar et al. (2020), illustrate how women exercise their agency to use mobile phones in ways that enhance their effective participation in society. As another example, Hoque (2020) added a specific case of how ICT projects can be implemented to effectively address the capabilities of rural populations in Bangladesh. He argued that while ICT can significantly aid in socio-economic development by improving access to information and services, the actual benefits are closely tied to the existing capabilities of users, such as their educational levels and economic conditions. In line with this, Kirya and Lutaaya (2024) explain how CI initiatives in rural Uganda, such as telecentres, play an important role in community development by giving access to information that supports health, education, and economic activities. These studies emphasise that ICTs do not automatically translate into capabilities—they depend on users' pre-existing assets, literacy levels, and social positioning.

However, there has not been consensus about the dynamics of ICT with the CA. Are ICTs inputs or resources, capabilities, conversion factors, functionings, and what is the nature of their agency? Zheng (2007) and Heeks and Molla (2009) conceived of ICT as a commodity with a value only in relation to what it helped individuals to do or to be. Heeks and Molla (2009), extending Zheng (2007), stated Heeks and Molla (2009) suggest ICTs can play multiple roles—as conversion enablers, constraints, or choice developers.

The unique characteristics of ICTs makes it imperative to consider the place of the technology within CA, in light of new capabilities and resources they can help create. ICTs become both the medium and outcome for capabilities and resources for the creation of new social practices (Jones and Karsten, 2008). Gigler suggested that ICTs can assume a more important role than just another useful technology but through the positioning of its creative agency act to strengthen other resources (Gigler, 2004). Haensgen and Ariana (2018) thus suggested the "transformative nature" of ICTs because they are capable of modifying the characteristics of other inputs in the same way as other conversion factors previously discussed. Such qualities are not intrinsic to ICTs but assigned to it or emerge through interaction with them within the socio-technological context. Kleine's (2010) Choice Framework provides a useful operationalisation by treating ICTs as informational assets embedded in structural and institutional contexts that shape users' agency and capability sets. In this paper, smartphones are understood as socio-technical enablers of agency, especially when used in ways that enhance participation, advocacy, and shared problem-solving.

While these conceptual discussions provide rich ground for interpreting the relationship between ICTs and development outcomes, grounding them in empirical realities like rural Bangladesh is crucial. There is a growing body of ICT4D research in Bangladesh that examines how digital technologies, in particular mobile phones, are shaping livelihoods, information access, and gendered forms of empowerment. For example, Biswas (2022) investigates how rural women used mobile phones to manage micro-enterprises and increase their visibility within their communities. Her study emphasises the significance of ongoing social support in sustaining

women's digital use beyond initial access. Similarly, Rahman and Huq (2023) explore how women farmers in the Teesta River Basin leveraged ICT tools to enhance agricultural productivity and decision-making. Their findings reveal that even basic SMS or voice-based agricultural information services can shift household dynamics and improve farming outcomes.

Other studies foreground broader patterns of digital inclusion and structural constraints. Nandi and Duvander (2025) use large-scale survey data to show how mobile phone use correlates with women's decision-making power and social participation in Bangladesh. These correlations, however, are mediated by factors such as age, income, and education, revealing how ICT access interacts with persistent gender and socio-economic inequalities. Meanwhile, Shams et al. (2021) examine the development of agriculture-focused mobile apps and raise concerns about how design processes often overlook users' values, information needs, and contextual realities. These localised studies highlight both the opportunities and limitations of digital interventions in rural and patriarchal contexts.

Collective and structural process of empowerment

Frediani et.al. (2019) asserted that the reason that participation is seen as a key factor in development is that it enables personal, collective and structural processes of empowerment. This perspective on participation resonates with the underlying values of the CA concept of freedom. Empowerment is a prominent construct found within CA prospective studies of ICT (Nyemba-Mudenda & Chigona, 2017; Jimenez & Zheng, 2017; Abubakar & Dasuki 2018).

As an example, a Malawian study of mHealth intervention programs for pregnant women revealed that not only participants managed to achieve the program's health related outcome but that they also gained informational economic and self-development capabilities (Nyemba-Mudenda & Chigona, 2017). Similarly, looking through innovation and development in Zambia, Jimenez and Zheng (2017) showed how being members of a tech hub supported collaboration and learning, enhanced agency, encouraged a sense of community and promoted gender equality.

Finally, a study in Nigeria examining how women use smartphones, specifically Whatsapp, to enhance different aspects of their capabilities showed that promoting economic capabilities is very essential (Abubakar & Dasuki 2018). The smart application was found to be a tool that contributed to women's wellbeing and for women to participate in social, economic and political activities. The study further demonstrated how CA can be used to show relationships between commodities (here, smartphones and WhatsApp) and instrumental freedoms, and also how this relationship is shaped by personal, social, and environmental factors that either enable or restrict them.

Research Design

This study adopts a qualitative, interpretivist approach grounded in the belief that knowledge is socially constructed and shaped by cultural and contextual meanings. The aim was to explore how rural women collectively engage with smartphones in ways that may enable or constrain

their agency. Qualitative inquiry was appropriate given the study's emphasis on relational dynamics, lived experience, and the evolving nature of social practices.

Research design and context

Bangladesh's village-based agriculturists are challenged by frequent physical isolation and environmental fragility that affects their basic food security. ICTs are becoming part of local technological importation and innovation for development. 100% of the country is covered by the digital phone network to at least 3G. According to the Bangladesh Telecommunication Regulatory Commission, in December 2019, the total number of mobile phone subscribers was 165 million (of a population of 163 million. However, at least 11% of Bangladeshis did not approve of a woman owning her own phone (GSMA, 2020). Thus, equitable access ICTs in Bangladesh pose new challenges.

Women have inferior social status. Gendered and culturally determined inequality due to lack of information is also regarded as a critical issue in Bangladesh and elsewhere (Islam & Slack, 2016). There is the cultural norm of being a "good woman"; obedient, quiet, and not bringing about familial dishonour in communities typified by male-dominated kinship relations between households and the strong role of the mother-in-law. Women also have a low level of knowledge of agricultural practices and access to markets. Related to this is the relatively poor access to health services, family planning and nutrition information.

This study draws on a 5-year applied research and development initiative (2015–2019) that aimed to enhance rural women's capabilities in agriculture through digital inclusion. The project was co-designed and implemented by an international NGO, three Bangladeshi NGOs with deep ties to local communities, and researchers affiliated with a university in Australia. The project implemented field activities that included information dissemination, user support, and training to enable women to effectively use smartphones, apps, and internet services. The project targeted women farmers, recognising their potential as agents of social change. To support their digital engagement, women were provided with smartphones to own, along with modest mobile credit, ensuring that the devices remained their personal assets beyond the project's duration.

The project also developed localised agricultural information content via SMS and apps assisted by a well-established telecommunication and content developer company. This content was curated and co-developed with input from experts, local extension officers, and women farmers to ensure relevance and accessibility. It is regularly updated to reflect seasonal changes and emerging pest or disease issues. It was localised to suit each project area to help farmers plan their agricultural production. There was also a call centre service. While the project was implemented across three rural districts, this paper focuses on the two main intervention areas.

Data collection and analysis

The project targeted women from selected villages across two districts—one in the north (N) and one in the south (S) of Bangladesh. Participants were primarily women farmers and housewives aged between 19 and 52. Smartphones were provided directly to these women through established community-based organisations with long-standing local presence and trust. To

assess the project's longitudinal impact, a mixed-methods approach was adopted, combining surveys, semi-structured interviews, and focus group discussions. Purposive sampling was used to ensure representation across social and economic lines, reflecting the diversity of women's roles and contexts within the community.

This paper is based on a set of qualitative data taken towards the final year of the Project which involves ongoing evaluation and refinement based on discussions with the communities and other partners from the target areas of the Project. This data set includes:

- **40 semi-structured interviews** with women participants (farmers/housewives, age range 20-50) focusing on social and personal changes from their use of smartphones, household dynamics, agricultural practices, and day to day activities. These took place during site visits to villages, typically in participants' homes or neighbourhoods. Researchers also took observation notes of daily interactions and phone use in the home and community settings to understand usage in context.
- **2 focus group discussions (FGDs)** involving 12 participants each, to complement the interviews, to explore their perceptions of digital literacy (W1) and cyber safety (W2), following their increased engagement with online platforms and social media.

Due to distance and the lack of Bengali-language skills by the Australian university researchers, field interviews and FGDs were conducted by trained INGO-affiliated female researcher in Bengali language. This approach helped mitigate gender and cultural power imbalances and promote a safe space for participants to share their experiences. Data analysis followed a thematic coding process guided by Choice Framework, adapted to highlight instances of secondary outcomes arising from interaction of individual and their agency and the collectives. Data was encoded and thematised with NVIVO.

Findings

Several themes emerged from the qualitative data from the second round of interviews and observations and two workshops that took place in the fifth year of the project. Themes were captured around secondary development outcomes and the interrelation of agency and structure in the process of achieving those outcomes, as defined by Choice Framework. Themes include the role of smartphones in enhancing knowledge and agricultural practice, strengthening kin relationships, enhancing women status, social solidarity and the online safety and privacy concerns. These are presented below and will be discussed with reference to interlinked relationships with other constructs in the Choice Framework.

Enhancing community agricultural knowledge and advocacy

Women received high quality and verified advice on agricultural practices from the call centre, SMS services and apps on agriculture and social benefits set up by the Project. Some have put photo posts of their crops on Facebook to share. Some have used Google search to go beyond agricultural information as well, to search for sari design patterns or to promote tailor design to a wider customer base.

Women had been sharing information with family, relatives, neighbours and at village community gatherings. They actively looked for other information including welfare provisions such as blankets and maternity or old age allowances that are crucial in supporting household daily needs and this concern not only their own household needs but also those of relatives and neighbours. This was conveyed by a participant in Southern area, *"I have communicated with the Union Parishad (local council) to add the name of my daughter in law to get maternity allowance. Previously I was unaware about that"* (S4).

The social structure often precludes women from communicating with men and those from "higher" strata, including government officials or agricultural advisors. Being part of the project, women are afforded with ease of communication with these actors. Some women felt enabled enough to directly call external male stakeholders. Thus we heard, for example, *"I feel that if needed I can also communicate to the Union Parishad chairman and members fearlessly"* (N2).

Strengthening kinship relationships

Perhaps the most frequent use of smartphones discussed by participants is related to personal communication with others. The affordances offered by mobile technologies can have the effect of enabling closer communication with family and relatives. This contributes to deeper personal relationships across time and space. Participants reported that regular, frequent, and quality communication is imperative in maintaining relationships.

Women were using their Smartphones to contact family and relatives, particularly husbands who often work away from the village and parents who reside in different areas. Maintaining and strengthening this personal relationship is especially important in the context of Bangladesh where society is guided by religious understanding and local traditions in which parents hold a very respected position. There are cases where women also felt they could trust their husband when they are away from home because he is easily contactable via the Smartphones. This was expressed as, *"My husband works far away from home and he usually stays there... Sometimes I got misleading news that my husband was not doing well. Now I can communicate with him through my mobile phone. Now I am relaxed but earlier I was very tense. In the past I had to go to a larger town to call my husband. But now I can do it through my cell phone. The world is in my hand."* (N4)

With its connectivity and portability, the smartphone enables participants to maintain and enhance a sense of togetherness with a video call beyond the confines of the village when physical encounters are not possible. Many participants expressed gratitude about being able to use video calls. This demonstrates its viability for situations whereby face-to-face communication is not possible. Smartphones are seen as providing ways of mimicking physical/face-to-face interaction that the community is so accustomed to and prefers.

"Before getting a smartphone I used to call via audio but I could not see them. But now with the help of my smartphone I can see everyone in my father-in-law's house. That feeling cannot be expressed in words." (S15)

Enhancing social solidarity

There is ample evidence suggestive of the collective nature of community solidarity from the way the women perceive the use of smartphones and information received from various sources via the device. There is a tendency to share information to relatives and friends and the wider community. Women farmers have been assisting family, relatives, and neighbours with various information or communication related errands. Villagers go to them to get solutions to agricultural problems *"I am now also able to support my neighbours and relatives with their crops and livestock. I always share the information with them that I get from the Project call centre. For example, a few days ago one of my neighbours asked me for support with her sick cow. I immediately made a call to the call centre. I talked about the medicine suggested by the Project call centre"* (N5).

Calling the doctor or arranging transportation when someone became sick or informing relatives when someone died are a few other examples of communal tasks that the women have been helping with, *"When one of my aunts died, nobody could inform her brother who is living abroad. My husband told me to contact him by my phone. Then I communicated with him by using IMO (a low-bandwidth communication app)"* (S6)

Social solidarity is apparent in the way women talk about benefits they gain from being involved in the Project and that they would have liked for others in the community to benefit as well. An important example in the Project was the passing on of skills in animal vaccination resulting in healthy animals, which mean more food and increased income generation.

Enhancing women status in rural communities

In a patriarchal society like Bangladesh, women's roles within household and community are often taken for granted and under-appreciated. Some groups may limit women's participation in social assistance or community action, and involvement in household wealth creation, management, and decision-making). Participants often talked about how they can now contribute to helping family and community, be it in terms of family income, sharing information or assisting neighbours during emergencies or other needs. For instance, a participant remarked, *"I am now more respected by my family and relatives as I am able to ensure more support than before. It became possible because of the smartphone. This type of change is very important to me. By using this phone, I have benefitted both socially and economically"* (S2).

They are now more involved in a broader range of matters that affect the security of the household. For example, one participant said that her husband has started discussing farming issues with her, something that he never did in the past. *"With the use of mobile phones, change is positive. My husband did not discuss agriculture with me, but now he does"* (N8).

Women are included in community meetings, and their voices are heard more so than before, with villagers welcoming their suggestions. Some women felt they are now 'visible', able to show their capability, *"I am the woman from the char [river island], no one knew me before, I did not get any opportunity to expose my good work. After getting a smartphone I got the opportunity to expose myself through my good work and supporting attitude"* (N9).

However, the culture of gendered behavioural control and internalised restraint continues to govern and limit agency. Thus, while being able to assist villagers with information,

some villagers perceived access to information and particularly to social media as against their and others' image of being a "good woman". This is shown in the following statements.

"Many people came to me with their problems. After solving these problems, they give me more priority than earlier. Some people condemn me because I use Facebook. Because for them it is not a good thing for a woman to do so" (S7).

Similar remark was mentioned by another participant in the northern area,

"For using a smartphone, I got many comments. People now see us maybe in different ways. But they observe us if we do anything bad" (N12).

While the use of technology such as mobile phones can be associated with limited agency and capability, some of the participants' show that they are able in fact act positively. As one woman explained:

"Firstly, my family members show more respect. They now accept women can also use mobile phones. Now they say no bad things. Now they take advice from me" (N10).

Another participant reflected on shifting community perceptions,

"At the beginning, villagers said that the women will be derailed with the phone as they think technology is not a women thing. They believed that men can perform better with technology rather than women. This type of perception was at the initial stage but now some of them treat us better as helping hands" (N11).

Several years into the Project, participants were developing a sense of confidence which is seen as valuable skill. Increased self-esteem was conveyed not only in the use of technology but also in what they have been able to do with the technology. All this contributes towards increasing their importance within the community. *"Before getting this phone, I could not go to the agriculture officer. I did not know him but after getting this mobile phone communication with them has become easier. Now, I feel that if needed I can also communicate to the Union Parishad chairman and members fearlessly" (N2).*

Overcoming gender-technology stereotypes

Being normally viewed as less competent technology users, women now place a high value in the ability to use the phone proactively. This, to them, represents a heightened sense of independence. There was a sense of achievement and pride to be able to operate the smartphones independently, often conveyed with for example *"I can do it myself, I can use my phone without help of others"*. This assertion is a push away from overt and internalised socio-cultural restrictions. Previously, the phone was most often under the supervision of the husband or another male family member.

Having acquired the smartphones and learned to use it provided women with more freedom to communicate and to explore online content as they liked, for example, to listen to their favourite music or watch videos. *"When I got my own phone I felt more independent than before. Because in the past father used to scold me when I touched his phone. But the feelings of having my own phone and my independence was quite different" (S3).*

But despite all this, being in such a secondary social position, they can have little understanding of the physical dynamic of the device and can be fearful of potential danger in use: *"My first experience was both scary and funny as I thought I could get electric shock from the phone! My son helped me to understand the functions of the phone and then gradually learnt it. I mostly made calls and received calls on that phone"* (N12).

But it is not just a perceived danger from the device, but a potential social danger as well—the social consequences of breaking something belonging to a relative, in this case, an uncle: *"I used a phone in 2004 for the first time. Then I was in class 9. My uncle had a phone and I talked with my friend using it. It was a Samsung button phone which I used for the first time in my life. When I used my uncle's phone, I was very much excited. But I was also little bit nervous, thinking that, if I pressed any wrong button or damaged the phone"* (S10)

Online safety and privacy concerns of using technology

Despite positive outcomes, there are concerns around online safety and privacy which are mainly associated with the women's level of information literacy and the lack of awareness of cyber safety coupled with the village community culture. Low level of information literacy makes it challenging for women to assess the veracity of information they get from the Internet. Understanding this determines whether to act on a piece of dubious information that may present inherent risks to their livelihood. *"Many of us got the call on winning the lottery. Someone asked to send some money to get the prize money through mobile banking. Some of us believed that and lost some money"* (W1, Group 2)

The women are accustomed to operating in groups, be it with family, friends or in other collective settings. The practice of sharing phones is a norm. Women let their husband and other relatives use their smartphones and look at some of the applications they use like their Facebook page. Consequently, passwords for some applications are often shared with others. For fear of losing or forgetting the phone passcode, they share it with family members. *"Along with the husband, if we have a young son/daughter, we can also share with them. Their memory is quite sharp"* (W1, Group 4). For these women, the importance of ensuring access to the smartphone means that the password is to be kept safe instead of something personal or confidential.

At the same time, the women convey how their online activities are often adjusted to social norms within the community. It was evident that the way participants share information online was influenced by their view of how women in their community should behave. Something like posting pictures can be problematic and may invite negative comments from others. *"We do not share our pictures or our beautiful girl's pictures on Facebook... Sometimes our relatives do not like to see our pictures on social media, they think this is not very good."* (W2, Group B).

Discussion

The preceding section illustrates a range of valuable outcomes for women's daily livelihood and well-being from the affordances of information and technology provided through the Project, as well as concerns arising from the use of the technology. Our findings show that the broader

impacts were shaped by how women collectively negotiated structures of gender, authority, and knowledge. It can be observed that many of these outcomes and concerns result from the impact on family, other kinship relations, group and village level community.

Kleine's (2010) framework uses the perspectives of individuals but embedded in the collective context. Our research focuses on the collective aspects and processes, primarily at the level of family and kinship networks, neighbours, the village and local patronage and administrative structures in which agency is exercised. Our findings suggest that both individual and collective agency were critical in enabling women to navigate and reshape the structural conditions surrounding digital use. The expression of agency was evident in women's increasing comfort with using smartphones for their own purposes. The phones were used to help promote women's agency both individual and particularly community. Being motivated to be involved in the project along with activities and programs it offered brought about opportunities for self and group development. The women, collectively, were in a situation where they could better exercise their agency. Having access and skills to use the smartphones and acquire informational resources, including the ability to search information from the Internet afforded women an enhanced status in their community.

Additionally, there are learning processes and women's learning capacity that contributed to agency. Women's first experiences with smartphones were through the use of someone else's phone, mainly male relatives, so there was a very cautious attitude, if not fear, towards the technology because the thought of it being broken, an electric shock or something might happen during the time it was lent to them. Even after owning their first smartphone (often second hand) or smartphone (from the Project), women were still cautious. Over time however, women became more confident and able to utilise the smartphones in different ways, from getting agricultural information to access to government services, from searching for market information, to finding resources for children's education. This confidence developed through peer support, project training, group learning, and interactions with extension officers. For instance, women now can contact Union Parishad representatives directly to inquire about information or services. They then relay this information to their peers during informal gatherings, enabling others to access the same resources. Initially this may result in individual empowerment, but because of the communal setting, they are converted into community knowledge and resources through group interactions and collective learning. Over time, some women emerged as informal change agents, influencing community perceptions of women in tech. Their growing roles reflect a shift from individual empowerment to collective agency and improved communal well-being (Pelenc et al., 2013).

Furthermore, women's capability in building their social capital and solidarity was evident, not only within the Project area but with external relationships. Social, cultural and intellectual capital was enhanced with increased frequency of contacts with other Project stakeholders, including the Union Parishad and government services, and external informational capital was shared as a collective informational resource. These interactions often occur within a complex framework of social norms and power dynamics, where technology acts as a mediator and facilitator of community-oriented activities.

Social solidarity as emerged from the data creates commitment towards the community, which implies introducing collective agency and collective capabilities to do things and achieve states of being that would not be possible by acting alone (Ibrahim, 2006). Sharing within the collective then becomes a means of collective capability, the sharing of information which the women have been practising will collectively enhance community knowledge. The women's natural tendency to share phones is also evidence of strong collective practices. Figure 3 illustrates how women's interactions with smartphones, situated within household and community structures, generated a range of secondary development outcomes. These outcomes emerged through the dynamic interplay of assets and structure as conceptualized in the Choice Framework. In this case, these outcomes emerged through socially embedded practices.

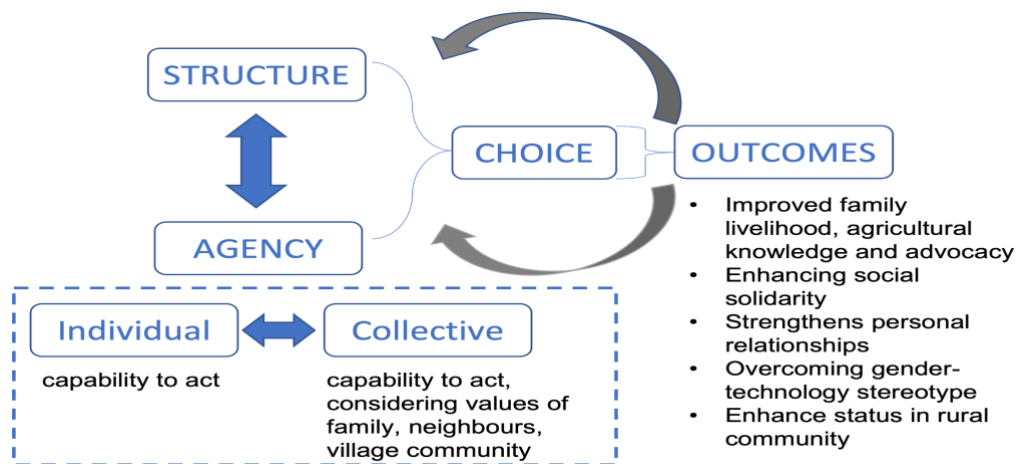


Figure 3. Collective agency abstraction through Choice framework (Adapted from Kleine, 2010).

Community Informatics research has long emphasized socio-technical processes that facilitate changes, in particular the interactions between women in their situational instance and others. Here we are exploring women's agency within their community, the traditional village, in the context of a project involving mobile phones, within a social process that "happens in relationships – between individual and collective; between local and global; between people and state" (White, 2010, p. 161). In the case of the project, the smartphones became tools not just for individual empowerment but for collective action within a traditionally structured community. Women used the phones as a communal resource, addressing a variety of well-being needs and facilitating community problem-solving, advocacy, and communication. This reflects a core principle in CI, where technology becomes a mediator for broader community development goals and this is just as relevant to community-oriented action in the ICT4D context (Stillman & Denison, 2014).

Our findings resonate with the literature on CI, that technology's impact often reflects the social, cultural, and collective contexts in which it is introduced (Kirya & Lutaaya, 2024). CI also highlights the role of ICTs in fostering social capital and collective empowerment, particularly among marginalized groups (Markazi et al., 2024). This makes the achievements observed in our study especially significant albeit the existing social structure and gender bias in attitudes

towards women using information technology that often prevent young girls and women from accessing and using ICTs.

Despite these constraints, women in the Project built social capital and solidarity beyond their immediate communities, strengthening ties with institutions such as the Union Parishad. Technology served as a key enabler of these community-oriented interactions, even within complex social norms. This aligns with the findings of Kirya and Lutaaya (2024), who emphasize that CI initiatives foster external relationships, enhancing communities' access to information and services that promote development. The enhanced agency resulting from this connectivity not only empowers individual women but also catalyses broader community engagement.

However, as seen in the challenges related to privacy and security, the benefits of digital inclusion must be carefully balanced against the potential risks in online environments. This reflects broader concerns in CI, where socio-technical interventions must navigate the complex balance between empowerment and vulnerability.

Conclusion

While the CA perspectives take individuals as focus of development, it can be challenging in recognising the crucial role played by the collective orientation in developing countries settings, particularly family, kin and community values and structures in shaping and constituting their well-being and agency. The way the Choice Framework defines individual agency is measured by an individual's asset endowment or individual resources portfolio simplifies its operationalization. However, for individuals operating within a collective, then there is a need to closely consider the relationship between individual and collective agency holistically – that local interpretation of reality (Zamani & Díaz Andrade 2024) - in order to understand the ethic that binds individuals in collective action. Considering the sharing practice of smartphones where the ICT device as part of structure is collectively used within family, while still affecting individual resources (e.g. informational, educational, social), can be taken as increasing the group access to the ICT itself.

The acquired capabilities and sense of collective allow women to assist the villagers/community's information needs and at the same time position them as an information source. For example, they talked about being an “agent of knowledge”, someone to contact alternative to agricultural experts, veterinarians or others. Collectively, the women are altering the hierarchical structure of at least the information resources landscape at the village level where previously information sources were limited to government officers, NGOs and a handful of educated people. In the way, ICTs as a socio-technical system are not only part of but also affecting contextual structures. When individuals perceive advancement not only for themselves but the collective wellbeing of the community, then collective agency emerges. Agency as an explicit component of a person's capability set within the collective implies taking note of the motivations and constraints under which the collective exists.

While smartphones bring numerous benefits, they also introduce new challenges, particularly in terms of managing online interactions and maintaining privacy within tight-knit

communities. The communal use of smartphones, while fostering shared access to information, also necessitates careful consideration of online safety and privacy norms. Culturally sensitive approaches to ICT implementation can help mitigate these risks, ensuring that technology enhances rather than compromises individual and communal well-being.

In sum, this article contributes to the existing literature on ICT4D literature by offering an empirically grounded understanding of how rural women in Bangladesh navigate the interplay of technology, agency, and social norms within a collective setting. This is in line with the collective orientation of CI to understanding complex sociotechnical effects notwithstanding the possible negative or constraining effects of life in a collective environment (Markazi et al., 2024).

This paper extends Choice Framework to account for collective forms of agency in rural, collectivist contexts. Our findings show that individual engagement with digital technology can evolve into collective benefit through localised group learning, social mobilisation, and informal networks for information sharing. In these settings, agency is not exercised in isolation but through coordinated, peer-based practices that reflect the social fabric of rural communities.

By repositioning collective agency as a core analytical lens, this paper offers an important corrective to dominant models that centre individual autonomy. It affirms the role of ICTs in enabling not just personal development but also collective pathways of empowerment. This is evident when technology is co-used, knowledge is co-produced, and solutions are shaped by collective realities. Such a perspective is critical for designing inclusive ICT4D interventions that align with the values and aspirations of rural communities, which ultimately support both individual and communal well-being.

Finally, while this study provides valuable insights into how rural women in Bangladesh navigate agency and social norms through their interactions with technology, it is not without limitations. The findings are drawn from a specific intervention context and may not be generalisable to all rural ICT4D initiatives. Although the involvement of NGO-affiliated female researchers helped navigate gendered cultural sensitivities, the involvement of these researchers may introduce response bias, particularly given the gender and power dynamics at play. Moreover, while the paper highlights secondary outcomes, it does not longitudinally assess the sustainability of these changes beyond the project's timeline.

References

- Abdulrashid, I., Chidi, G. O., Muhammadou, M. O., & Ago, K. M. (2019). A systematic literature review of the application of the Capability Approach in the ICT4D studies. *MCIS 2019 Proceedings*. 16. <https://aisel.aisnet.org/mcis2019/16>
- Abubakar, N., Dasuki, S. I., & Quaye, A. (2017). The contribution of ICTs to women empowerment: A capability perspective. *AMCIS 2017 Proceedings*. 2.

- Abubakar, N. H., & Dasuki, S. I. (2018). Empowerment in their hands: Use of WhatsApp by women in Nigeria. *Gender, Technology and Development*, 22(2), 164–183.
- Abubakar, Naima; Kah, Muhammadou M.O.; and Dasuki, Salihu (2020), “How mobile phones contribute to the social inclusion of women in Africa: a Nigerian perspective.” In *Proceedings of the 28th European Conference on Information Systems (ECIS), An Online AIS Conference*, June 15-17, 2020.
- Agarwal, B., Humphries, J., & Robeyns, I. (2013). *Amartya Sen’s work and ideas: A gender perspective*. Routledge.
- Alkire, S. (2005). Why the Capability Approach? *Journal of Human Development*, 6(1), 115–135. <https://doi.org/10.1080/146498805200034275>
- Anwar, M. (2014). *The impact of mobile phones on the well-being of micro-entrepreneurs in Indonesia* (Doctoral dissertation, Monash University).
- Arens, A. M. J. (2011). *Women, land and power in Bangladesh: Jhagrapur revisited*.
- Biswas, M. (2022). *The role of mobile technologies in the sustainability of women-led micro-enterprises and women’s empowerment in rural Bangladesh* (Doctoral dissertation, Monash University).
- Buskens, I., & Webb, A. (eds) (2009). *African Women and ICTs: Investigation Technology, Gender and Empowerment*, London and New York: Zed Books
- Escobar, A. (1995). *Encountering development*. Princeton University Press.
- Frediani, A. A., Clark, D. A., & Biggeri, M. (2019). Human development and the capability approach: The role of empowerment and participation. *The Capability Approach, Empowerment and Participation: Concepts, Methods and Applications*, 3–36.
- Graf, V. (2020). Inclusiveness in a Digitizing World—Investigating ICT and Women’s Empowerment. In *Proceedings of the 28th European Conference on Information Systems (ECIS), An Online AIS Conference*, June 15-17, 2020.
- Geertz, C. (1973). *The interpretation of cultures: Selected essays*. Basic Books.
- Giddens, A. (1984). *The constitution of society: outline of the theory of structuration*. University of California Press.
- Giddens, A. (1996). *In defence of sociology essays, interpretations and rejoinders*. Polity Press.
- Gigler, B. S. (2004). Including the Excluded-Can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach. Paper for *4th International Conference on the Capability Approach*, 5-7 September, 2004 University of Pavia, Italy.
- Gigler, B. S. (2011). *Informational capabilities: The missing link for the impact of ICT on development*. E-Transform knowledge platform working paper; no. 1.

- GSMA. (2020). Connected women. The mobile gender gap report. <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf>
- Grunfeld, H., Hak, S., & Pin, T. (2011). Understanding benefits realisation of iREACH from a capability approach perspective. *Ethics and Information Technology*, 13, 151–172.
- Gurumurthy, A. (2014), Gender in community informatics: Guest editorial for the special issue on gender and community Informatics. *Journal of Community Informatics*, 5(3) (2009) & 6(1) (2010).
- Hoque, M. R. (2020). The impact of the ICT4D project on sustainable rural development using a capability approach: Evidence from Bangladesh. *Technology in Society*, 61, 101254.
- Ibrahim, S. S. (2006). From Individual to Collective Capabilities: The Capability Approach as a Conceptual Framework for Self-help. *Journal of Human Development*, 7(3), 397–416.
- Islam, M. K., & Slack, F. (2016, March). Women in rural Bangladesh: Empowered by access to mobile phones. In *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance* (pp. 75–84).
- Iversen, V. (2011). Intra-household inequality: A challenge for the capability approach? *Feminist Economics*, 9(2-3), 93–115.
- Jiménez, A., & Zheng, Y. (2017). A spatial perspective of innovation and development: Innovation hubs in Zambia and the UK. In *Information and Communication Technologies for Development: 14th IFIP WG 9.4 International Conference on Social Implications of Computers in Developing Countries, ICT4D 2017*, Yogyakarta, Indonesia, May 22-24, 2017, Proceedings 14 (pp. 171-181). Springer International Publishing.
- Jones, M.R. & Karsten, H. (2008). Giddens's structuration theory and information systems research. *MIS Quarterly*, 32(1), 127–157.
- Kabeer, N. (1997). Women, wages and intra-household power relations in urban Bangladesh. *Development and Change*, 28(2), 261–302.
- Kirya, K. E., & Lutaaya, C. N. (2024). The contribution of community informatics in rural communities to development. *The Journal of Community Informatics*, 20(1), 62–87.
- Kleine, D. (2010). ICT4WHAT?—Using the choice framework to operationalise the capability approach to development. *Journal of International Development*, 22(5), 674–692.
- Kleine, D. (2014). *Technologies of choice*. MIT Press.
- Markazi, D., Hossain, M. K., Stillman, L., Wolske, M., Anwar, M., Carbone, C., de Moor, A., Farinosi, M., Rega, I., Sarrica, M., & Zapata, C. B. (2024). A community informatics research network vision statement. *The Journal of Community Informatics*, 20(2).
- Moore, H. L. (2010). Subjectivity, sexuality and social inequalities. In S. Chant (Ed.), *The international handbook of gender and poverty* (pp. 35–40). Edward Elgar Publishing.

- Murzacheva, E., Sahasranamam, S., & Levie, J. (2019). Doubly disadvantaged: Gender, spatially concentrated deprivation and nascent entrepreneurial activity. *European Management Review*. <https://doi.org/10.1111/emre.12370>
- Nandi, A. K., & Duvander, A. Z. (2025). Mobile phone use and women's empowerment in Bangladesh: An analysis of the Bangladesh financial inclusion insights survey 2017. *Social Sciences*, 14(3), 139.
- Nussbaum, M. (2000). Women's capabilities and social justice. *Journal of Human Development*, 1(2), 219–247.
- Nussbaum, M. (2001). *Women and human development: The capabilities approach* (Vol. 3). Cambridge University Press.
- Pelenc, J., Lompo, M. K., Ballet, J., & Dubois, J.-L. (2013). Sustainable human development and the capability approach: Integrating environment, responsibility and collective agency. *Journal of Human Development and Capabilities*, 14(1), 77–94.
- Robeyns, I. (2005). The capability approach: A theoretical survey. *The Journal of Human Development*, 6(1), 93–117.
- Robeyns, I. (2006). *The capability approach in practice*. *Journal of Political Philosophy*, 14(3), 351–376.
- Rahman, M. M., & Huq, H. (2023). Implications of ICT for the livelihoods of women farmers: A study in the Teesta River Basin, Bangladesh. *Sustainability*, 15(19), 14432.
- Sassi, S., Ivanovic, M., Chbeir, R., Prasath, R., & Manolopoulos, Y. (2022). Collective intelligence and knowledge exploration: An introduction. *International Journal of Data Science and Analytics*, 14(2), 99–111.
- Shams, R. A., Shahin, M., Oliver, G., Whittle, J., Hussain, W., Perera, H., & Nurwidyantoro, A. (2021). Human values in mobile app development: An empirical study on Bangladeshi agriculture mobile apps. arXiv preprint arXiv:2110.05150.
- Sen. (1987). Gender and cooperative conflicts (family poverty). In *Working Papers - World Institute for Development Economics Research, Helsinki* (Vol. 18).
- Sen, A. (1999). *Development as freedom*. Oxford University Press.
- Snow, D. (2001). Collective identity and expressive forms. In *International Encyclopedia of the Social and Behavioral Sciences* (Vol. 4, pp. 2212–2219).
- Walsham, G. (2017). ICT4D research: reflections on history and future agenda. *Information Technology for Development*, 23(1).
- White, S. C. (2010). Analysing wellbeing: A framework for development practice. *Development in Practice*, 20(2), 158–172.
- Zamani, E. D., & Díaz Andrade, A. (2024). Understanding local social processes in ICT4D research. *Information Technology for Development*, 30(3), 351–353.

Zheng, Y. (2007). *Exploring the value of the capability approach for e-development*. LSE.

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