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# Impacts of Information and Communication Technology on Rural Livelihood in Bangladesh: Qualitative Investigation of Changes and Challenges

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## ABSTRACT

Information and communication technology has become a major driver of change in the agrarian way of life. Rural livelihoods in Bangladesh have increasingly adopted modern ICTs, even with some challenges. This paper examines the impact of ICT on rural livelihoods, focusing on changes and challenges, by employing a qualitative research approach and analyzing the themes and primary data collected through 28 in-depth interviews with farmers, fishermen, and entrepreneurs in the villages of Patukhali, Khulna, and Jashore districts of Bangladesh. The research findings indicate that ICT has enhanced rural communities' agribusiness by improving agricultural production, processing, and distribution. ICT has also enabled easy, efficient online and offline market access for entrepreneurs, agripreneurs, and small business owners, and facilitated financial inclusion in rural communities. Easy access to digital communication tools such as mobile apps, Online services, mobile banking, and online education has opened the door to new income generation opportunities. However, adoption remains constrained by limited digital literacy, socio-cultural barriers, weak infrastructure, and a persistent digital divide. For sustainable integration of ICT into rural livelihoods, the study recommends community-based ICT training, expansion of rural digital infrastructure and an inclusive policy framework that addresses the specific needs of disadvantaged groups.

## INTRODUCTION

Information and Communication Technology (ICT) has emerged as a significant force in shaping rural livelihoods in developing countries, and Bangladesh is no exception. In rural perspectives, livelihood refers to the ways through which individuals sustain their lives, drawing on assets, capabilities, and activities (Rakodi, 2002). With the rise of technological innovation, rural livelihoods in Bangladesh are undergoing a transformation, particularly in areas such as food production, fisheries, small businesses, and the service sector (Ellis, 2000; Ahmed *et al.,* 2015). ICT has facilitated access to information, improved agricultural practices, enhanced education, and provided better health services (Rahman & Huq, 2023). Moreover, it plays a crucial role in enhancing economic empowerment by ensuring rural people have access to financial services like mobile banking and microfinance that are significant for entrepreneurship and income generation (Rahman, 2007). Many rural communities are using ICTs due to access to digital devices and internet connections. They utilize ICTs to enhance productivity, market access, and financial inclusion (Islam & Rahman, 2010). While ICT has brought numerous benefits to rural livelihoods in Bangladesh, challenges remain. The digital divide, characterized by unequal access to ICT resources, continues to be a barrier for some rural communities. Additionally, the integration of ICT has sometimes led to the erosion of indigenous knowledge and traditional practices, which are vital for sustainable development. Addressing these challenges requires a balanced approach that incorporates local knowledge and ensures equitable access to ICT resource (Islam & Rahman, 2010; Rahman & Huq, 2023).

Several studies explore the diversification of income sources and the potential of ICTs to empower rural inhabitants (Kader *et al.,* 2020; Kapur, 2019). However, most research focuses on broad economic impacts, while the lived experiences of rural people adapting to new technologies remain underexplored. Moreover, there is a need to understand the challenges rural inhabitants face in adopting new technologies, especially given limited digital knowledge and infrastructure. Hence, this addresses these gaps by investigating the impacts of ICT on rural livelihood in Bangladesh through a qualitative lens, with a particular focus on identifying the significant changes brought by technology and the challenges faced by rural communities in adapting to these advancements. The analysis highlights how ICT reshapes livelihoods while also revealing the inequalities and obstacles that hinder the inclusive adoption of these technologies.

## LITERATURE REVIEW

Livelihood refers to the means by which individuals or households sustain their living conditions, encompassing capabilities, assets, and activities (Rakodi, 2002). Rural livelihoods are particularly diverse, with agriculture being a primary occupation alongside other activities such as handicrafts, small-scale industries, and wage labor

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(Ellis, 2000; Kapur, 2019). Four main ways of acquiring rural livelihoods include production-based, labor-based, exchange-based, and transfer-based entitlements (Acharya, 2006). The concept of sustainable livelihoods emphasizes the ability to cope with stress and shocks while maintaining or enhancing capabilities and assets without undermining the natural resource base (Rakodi, 2002). Factors affecting rural livelihoods include access to resources, environmental conditions, and socio-economic factors (Kapur, 2019). The livelihoods approach offers a more comprehensive understanding of the complexities of rural living in developing countries, recognizing that people engage in multiple activities to manage their lives (Ellis, 2000).

Understanding rural livelihoods is crucial for effective development strategies. The Sustainable Livelihoods Approach (SLA) provides a comprehensive framework for analyzing the complexities of rural households, considering various forms of capital, vulnerability, and livelihood strategies (Lusinga-Machikicho & Mutanana, 2022). This approach helps in understanding the challenges faced by smallholder farmers and the potential impacts of market-led rural development initiatives (Yanuartati, 2023). To effectively implement rural development policies and projects, it is recommended that governments and development partners incorporate the SLA into their strategies, considering the broader context of national policies, macroeconomic frameworks, and global factors (Lusinga-Machikicho & Mutanana, 2022).

Rural livelihoods in Bangladesh are increasingly diversified, encompassing both farm and non-farm activities. Studies show that remittances contribute the highest to household income, followed by business and rice farming (Ahmed *et al.,* 2015, 2018). The extent of livelihood diversification is generally medium to high, with small- and medium-sized landholding households more likely to diversify than functionally landless and large landholding households. Ahmed *et al.* (2018) maintain that, although Bangladesh is an agricultural country, occupations are gradually diversifying from agriculture to business, remittance, content creation, non-farm wage labor, agro-processing and cottage industries, construction and transportation operations, petty trade, and various services. The livelihoods in rural Bangladesh are diversifying from agriculture to other various occupations because rural people are not interested in agriculture, as they don't get their fair value and face various deprivations. Agriculture's share of rural household income dropped from about 60% in 1988 to 45% in 2008. The phenomena of farm households engaging in non-farm activities or relying on non-farm revenue transfers to raise their standard of living is known as rural livelihood diversification (Ellis, 2000). Factors affecting diversification include gender, household size, credit access, migration, dependency ratio, assets, education, and savings (Ahmed *et al.,* 2018). Land use changes have also impacted livelihood patterns, with small farmers adopting mixed land use strategies to increase output from limited land resources (Mondal, 2008). Recommendations include expanding non-farm employment opportunities and providing support to functionally landless households to increase and diversify their incomes (Ahmed *et al.,* 2015, 2018).

Technology is considered a complex tool for developing rural life by facilitating the flow of information. ICT is an effective tool for the development of the rural population, which provides conveniences in areas like E-commerce and trade, E-health care, supporting agriculture, employment and income generation, E-education and E-learning, promoting local entrepreneurship, building capacity and capability, empowering rural communities, promoting E-democracy, good E-governance (Islam & Rahman, 2010). Moreover, ICT helps to remove the state of poverty and to develop basic healthcare, education system, social rights, natural resources, employment, political participation, land, information, services, and infrastructure.

Kader *et al.* (2020) stated that digital communication is the most important element for rural development. A nation's development can be quickly accelerated by using communication technologies effectively. The most crucial and significant components of development include power, transportation, and communication technologies. The responsiveness of digital communication systems can increase rural residents' excitement. This can increase productivity, interact with the market and current information, and navigate the price of agricultural products. Productivity growth can support the country's robust financial development. Rural areas can be developed quickly and at a high rate by taking these intention issues into account. Digital communication systems can play a crucial role in the development of rural communities and environmentally friendly rural development.

Digital communication systems have made a significant contribution to Bangladesh's economic and social development, having a positive impact on villages. In a developing country like Bangladesh, maintaining the improvement of rural people's access to digital communication technology in typical rural areas is crucial to reducing the digital divide and empowering impoverished individuals, but there is very limited work on this particular issue. According to Basant & Subrahmamian (1990), agro-mechanical technology is a crucial component of agricultural technology, and its growth and spread are essential for rural development. With new criteria, such as cultivators, livestock distribution, and occupational distribution, technology alters economic characteristics. Regarding the utilization of technology, the market for agricultural implements is crucial. Moreover, Bangladeshi people are receiving many digital services related to agriculture and entrepreneurship online and offline from Union Digital Centers. These centers are now hubs for citizen-centric digital services with 16,500 entrepreneurs, including 5,200 women (Uddin, 2024).

While numerous studies have explored rural livelihoods (Ellis, 2000; Kapur, 2019) and the significance of

technology in development (Islam & Rahman, 2010; Kader *et al.,* 2020), limited research has addressed the challenges rural communities in Bangladesh face in adapting to rapid technological advancements. Existing literature mainly emphasizes diversification and general ICT potential (Ahmed *et al.,* 2018; Rakodi, 2002) but lacks in-depth analysis of sector-specific transformations and socio-cultural barriers in technology adoption. Moreover, issues such as the digital divide, loss of indigenous knowledge, and gendered disparities in access remain underexplored (Rahman & Huq, 2023; Biswas *et al.,* 2022). This study fills this gap by qualitatively exploring both the changes and challenges brought by technology across agribusiness, fisheries, local entrepreneurship, and businesses.

## MATERIALS AND METHODS

This study employed a qualitative research approach to investigate the impact of ICT on rural livelihoods in Bangladesh. A qualitative approach provides depth in understanding how rural people interpret and respond to ICT interventions, not just what changes occur, but also why and how. It allows for exploring the meanings, values, and power relations embedded in people's everyday ICT use, which surveys may miss (Mills & Birks, 2014), and enables a flexible study design suited to complex, context-dependent phenomena (Mey, 2022).

The primary data was gathered through in-depth interviews (IDIs) using semi-structured interview guidelines developed around the research objective. Respondents were drawn from Patuakhali, Khulna, and Jashore Districts of Bangladesh. These districts were selected due to their diverse rural settings in the country, including coastal, riverine, and agrarian contexts, where ICT adoption directly interconnects with farming, fishing, and small-scale entrepreneurship, making them highly pertinent for this study.

The study involved 28 respondents, comprising farmers, fishermen, and entrepreneurs (see Table 1). The sample size was determined by the principle of data saturation, ensuring that no new themes emerged after repeated interviews. Respondents were selected using a mixture of convenience and purposive sampling. This combination was appropriate as convenience sampling facilitated access to willing participants within rural settings, while purposive sampling ensured the inclusion of respondents with relevant experiences, thereby enhancing the depth and relevance of the findings (Etikan, 2016). This dual strategy helped capture both accessibility and relevance, though it also presents limitations by excluding those without ICT exposure.

Interviews were conducted between January and March 2025, each lasting 30–60 minutes and were recorded with participants' consent. Ethical considerations, including informed consent and confidentiality, were strictly maintained throughout the research process to ensure credibility and trustworthiness. These interviews provided rich, first-hand insights into how technology is reshaping their daily lives, economic activities, and coping strategies. Transcribed interviews were organized with corresponding interview questions. The data underwent analysis using the six phases of the thematic analysis process outlined by Braun & Clarke (2006). Thematic analysis was employed to identify, analyze, and interpret recurring patterns and themes from qualitative data. To strengthen credibility, the findings were triangulated with secondary sources, including scholarly journals, research articles, newspapers, television programs, policy documents and credible websites.

**Table 1:** Sampling Distribution

| SL | District | Respondents' Category | | | Total |
|---|---|---|---|---|---|
| | | Farming | Fishing | Entrepreneurship | |
| | Patuakhali | 3 | 2 | 3 | 8 |
| | Khulna | 3 | 4 | 2 | 9 |
| | Jashore | 2 | 4 | 5 | 11 |

## RESULTS AND DISCUSSION

ICT adoption leads to improved agricultural practices, diversified income sources, and increased entrepreneurial activities among rural populations (Matsuura *et al.,* 2024; Rana, 2023; Sarker *et al.,* 2025). ICT has had a significant impact on rural livelihoods in Bangladesh. The country is primarily an agrarian country where 68.5% of the population live in rural areas (BBS, 2024). The findings reveal that ICT is simultaneously enabling productivity gains, market access, and employment creation while also exposing inequalities in access and skills. Four thematic areas emerged from the data: agriculture, fisheries, rural entrepreneurship, and challenges of ICT adoption.

### Agriculture Sector

ICT plays a vital role in transforming Bangladesh's agricultural sector. The adoption of modern technologies has led to increased productivity, with a 1% rise in technology adoption resulting in a 0.22% increase in productivity (Khatun & Haider, 2016). Agri-tech companies have emerged as valuable resources for farmers, facilitating connections with buyers and improving access to agricultural services (Huda *et al.,* 2023). Moreover, ICTs are playing a crucial role in smart agriculture, enabling farmers to gather agricultural data and access market information through smartphones and

other devices (M. Ahmed, 2023). Many farmers now use mobile apps to check weather updates and market prices. One respondent (farmer) from Patuakhali mentioned- *"We use Fosholi App for getting advice related to crop cultivation. It is easy and helpful to decide what to do with our land"* (IDI-07). Technology has enabled the development of mobile apps and online platforms that have allowed farmers to access a range of services and agricultural information, including crop management advice, access to agricultural finance, and market news. Following is five best Mobile Apps for agricultural extension services in Bangladesh -

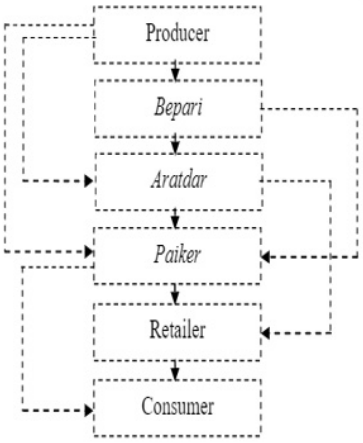
**Table 2:** Best five mobile apps for agriculture in Bangladesh

| |
|---|
| Crop Production |
| DAE Office Directory |
| Digi-cow |
| Weather Forecasting App |
| Fosholi App |

*Source: Rabab (2021)*

Figure 01 portrays the traditional distribution of agricultural products in Bangladesh. Following this traditional process, farmers are not receiving the fair value for their products (Rahman & Neena, 2019). But nowadays farmers are able to know the market price and sell their products directly to the consumers by the "Krishoker App".

Apps have enabled farmers to access timely and accurate




*Source: (Md. M. R. Rahman & Neena, 2019)*


*Source: Google Play, (2023)*

**Figure 1:** Traditional and Technology based mechanisms for Rice Marketing

weather forecasts, market prices, and information on new agricultural technologies and crop management techniques. This has improved production efficiency through increased access to better input. And these apps enabled farmers to increase their yields. ICTs have also enabled the development of online marketplaces, allowing farmers to access new markets and increase their incomes.

*"Before, we had to go to for selling crops and vegetables without knowing the price. Now I check the price on my mobile before selling. It is useful for getting better prices"* (Said respondent from Jashore, IDI-14).

In various ways, ICT is being used by the government to serve rural communities, such as providing access to credit facilities, subsidies, and insurance. It facilitates proper planning in rural communities, access to financial support, and direct connections with buyers. It also reduces dependency on middlemen, which is termed as Dalal. This study reveals a positive impact on agricultural production in rural Bangladesh.

This shift aligns with the Sustainable Livelihoods Approach (SLA), as it strengthens financial and human capital by expanding knowledge and increasing returns on agricultural activity. However, the benefits are not evenly distributed, with older farmers and those lacking literacy struggling to adapt.

**Fisheries Sector**

ICTs have had a significant impact on the fisheries sector in rural Bangladesh. Especially ICTs have enabled fishermen to access better information about marine resources, weather conditions, and markets, thus enabling them to make more informed decisions about their fishing activities (Tasnim, 2016). A fisherman from Patuakhali shared-

*"Now we can check weather updates on our phones. If there is any risk, we do not go to the river. It saves our lives"* (IDI-15).

Additionally, technologies have enabled real-time monitoring of fisheries resources, allowing for more effective and sustainable management of resources. Technology-generated information helps reduce overfishing, resulting in a plentiful and diversified array of fisheries resources. ICTs pave the way for incorporating new technology in the arena of e-payment, online marketing, and GPS-enabled fishing boats, contributing to the efficiency and productivity of this sector. Use

of ICTs eases access to credit, insurance and several financial services that lead to buying better equipment and contribute to good amount of yields. ICTs connect rural fishermen to global markets that facilitate them to sell products to the greatest atmosphere (Tasnim, 2016). Another respondent from Khulna said-

*"Earlier we had to wait for middlemen. Now we sell directly, getting help from modern technology like different mobile apps and websites"* (IDI-06).

This has increased their income and improved their livelihoods, enabling them to invest in better infrastructure and equipment, which in turn further enhances the sector.

**Rural Business/Entrepreneurship**

The continuous process of globalization in the developing world can be served through advanced technology as a powerful tool. This opportunity is inspiring various developing countries like Bangladesh to take part in the worldwide marketplace by exporting software, ICT-enabled services and e-business. Technology can help rural people gain access to the business sector by providing them with an array of tools and services, which include-

**Connectivity**

In rural Bangladesh, people gain access to the internet, remote communication and collaboration tools, such as video conferencing and VoIP, through ICT, which opens up new business opportunities. Rural entrepreneurs in Bangladesh utilise the internet as a trend for their business purposes, and they use social media platforms like Facebook, YouTube, and Instagram as a useful tool to create a business profile and market their products. They get the opportunity to make their products available to all the potential customers in the country through this platform (Latif & Adruce, 2020). One entrepreneur from Jashore expressed-

"I have a Facebook page for selling my products. People from all over the country can order from my online shop. It was not possible beforehand" (IDI-07).

**Access to Information**

In order to overcome some of the barriers in entrepreneurial activity, a possible opportunity can be provided by ICT adoption in the rural community as one of the strategies (Hollifield & Donnermeyer, 2003). Businessmen get timely and better updated issues about the consumer information and market prices through internet access, and the updated agricultural information can be provided by which the competencies of farmers are expanded at any place and time, and it involves farmers in agri-business (Hussan *et al.,* 2008). An entrepreneur from Jashore shared-

"Modern technology helps us to enhance financial literacy by providing access to diverse media and contemporary issues related to business and commerce" (IDI-17).

While conducting business, rural people can make their decisions properly as they can use technology to have all the latest market information. Nowadays, it is possible for rural people to be more knowledgeable businesspeople with the help of communication technology with better access to educational resources.

**Mode of Business Transaction**

In 2010, mobile financial services in Bangladesh received approval from the Bangladesh Bank to begin their journey, which started in 2011 with the launch of Dutch-Bangla Bank's mobile banking services. And now the market is dominated by bKash and Nagad, among which bKash was launched by Brac Bank. Recently, different kinds of mobile banking services like bKash, Rocket, UKash, MyCash and SureCash have been offered by 13 banks and various services, including toll payment, credit card bill payment, insurance premiums, sending money, cash-in, cash-out, donation for the poor, stipend disbursement, remittance, payments for different government services, salary disbursement, etc. have been provided by these mobile banking services. According to the latest Bangladesh Bank data, the number of MFS (Mobile Financial Services) account holders was 10.60 crores in the rural areas as of December last, significantly higher than the 8.50 crores in urban areas. The year-on-year growth in accountholders in rural areas was 9.13%, and in urban areas, it was 17.19% (Modak, 2023). These mobile financial services have revolutionized rural transactions.

"Now I send money from home or shop using mobile whereas we had to go to the town to pay bills before. It saves our time and travel costs as well. "Said a shopkeeper from Khulna (IDI-09).

Rural people can start and manage their businesses with the help of financial services, such as banking, and gain access not only to financial services but also to e-commerce tools like online payment systems, which can be utilized through ICT to increase their incomes. A study (Sharma *et al.,* 2022) finds that rural entrepreneurships and businesses are positively impacted by mobile banking services. Another women entrepreneur from Patuakhai added-

"Earlier sending and collecting money was a big problem. Now I receive payment from my customer through mobile transections which is so much helpful in business activities" (IDI-22).

New technology helps people benefit from their business because when mobile banking services were not available in rural areas, they had to go to the wholesaler to pay bills, which was a costly and time-consuming procedure. But nowadays they can pay and receive their bills easily with minimal delay (Sharma *et al.,* 2022).

**Employment Opportunities**

A study by (Sharma *et al.,* 2022) found that a group of unemployed youths in rural Bangladesh has used mobile banking as a tool to start their business. Most of them have started their businesses as agents and receive a commission from the bank with every transaction. A youth from Khulna mentioned-

"I was unemployed. Now I work as a mobile baking agent. I help people send money and earn some income. Besides, a computer helps me to earn in many ways. People come to me for taking different online services" (IDI-16).

The unemployed youths are being recruited as information managers, translators, tele centre managers, IT technicians and subject matter specialists, and ICT has created these employment opportunities by establishing rural information centers. Moreover, many rural youths are now doing business with new ideas based on ICT such as mobile to-up (Flexiload), mobile repairing shops and sales & servicing centers. Due to availability of broadband internet connections, many educated youths in rural areas are now engaged in freelancing instead of being involved in their ancestors' traditional occupations. A young man from Jashore expressed-

"A Few yeas ego I have graduated from national university. Being an educated person, I was hesitant to employ myself in the profession of my ancestors. So, on the advice of one of my seniors, I started freelancing. Now I can do this from the village. This has been possible due to the expansion of ICT at the village level." (IDI-27).

**Challenges in Adopting ICTs**

Advanced technology, particularly ICT, is significantly impacting rural livelihoods in Bangladesh, offering opportunities for improved access to information and services. However, adopting these technologies presents several challenges. These include limited digital literacy, gender norms, poverty, inadequate infrastructure, and geographic isolation. Rural women face barriers such as poverty, inequality, inadequate infrastructure, and patriarchal social norms (Biswas *et al.,* 2022). A woman from Jashore shared -

"I want to start an online wooden jewellery shop, but it needs a smartphone or laptop. It is not possible with my normal mobile phone. But I have not enough money to buy smartphone or Laptop. Moreover, my father doesn't allow me to do such online business"

Such accounts reveal the persistence of patriarchal constraints and economic barriers. Older farmers also expressed discomfort with digital tools, preferring traditional practices. The adoption of modern technologies is influenced by farmers' age, education level, and farming experience (Chakrobarty *et al.,* 2021). Challenges also include the potential loss of indigenous agro ecological knowledge and disruption of traditional farming practices (Rahman & Huq, 2023). This highlights the generational divide in ICT adoption. A farmer from Patuakhali expressed-

"I have seen some mobile apps, but I do not know how to use them. Probably these apps are good, but they are not easy for us. We are very comfortable with traditional means" (IDI-05).

Access and ownership of technology, imbalance in resource availability, and lack of technological skills are additional hurdles for the use of ICTs (Islam & Alawadhim, 2008). Additionally geographical location also hinders the potential use of ICTs in several rural areas of Bangladesh even after the significant expansion of ICT in last decades. A respondent from the remote areas of Khulna shared that-

"After completing my HSC exam, I wanted to start a shop for providing various online services such as online application for job, passport, visa and other utility services. But due to lack of broadband internet connection, it is now impossible" (IDI-07).

To address these challenges, integrating indigenous knowledge into ICT initiatives is recommended. Despite these obstacles, ICT has shown potential to improve rural livelihoods through comprehensive capital-building processes (Rahman & Huq, 2023).

## CONCLUSION

This study examines the multidimensional impacts of ICTs on rural livelihoods in Bangladesh, with a focus on agriculture, fisheries, and small businesses. Findings from in-depth interviews reveal that ICTs have significantly improved the livelihoods of rural people through increased productivity, easy access to markets, access to mobile banking, and the opening of new arenas of employment opportunities. A notable number of farmers, fishermen and entrepreneurs are using mobile apps and digital platforms to collect information, sell products, and manage transactions efficiently. By using ICTs, their day-to-day activities related to their occupation become easier and more comfortable, which leads to livelihood development. This study also highlighted associated challenges that arose from the use of ICTs by rural inhabitants. Mentionable are- lack of or limited digital literacy, incapability of using digital devices, gender inequality, infrastructural constraints, geographical location, as well as economic constraints. These challenges hinder inclusive technological adaptation. This study found difficulties in the accessibility and utilization of digital devices.

The integration of advanced technology in rural Bangladesh presents both opportunities and challenges for livelihoods. To effectively navigate these challenges, several recommendations can be implemented to enhance the adoption and impact of technology in rural areas. One of them is government investment in digital infrastructure. Enhancing internet connectivity and access to ICT tools is crucial. This includes expanding broadband services to remote areas (Amin, 2024).Increased government investment in ICT infrastructure can facilitate better access for rural communities, ensuring they are not left behind in the digital transformation (Hoque *et al.,* 2016). It is necessary to emphasize capacity building and community engagement through skills development programs. Implementing training initiatives focused on ICT skills can empower rural populations, enabling them to utilize technology effectively (Sikder, 2023). Involving local communities in the design and implementation of technology solutions can ensure that these tools meet their

specific needs and challenges (Ahmed & Lentz, 2008). Inclusive ICT policies and cybersecurity measures can become essential driving force behind rural development. Developing comprehensive ICT policies that prioritize rural development can help address existing gaps and promote equitable access to technology. Strengthening cybersecurity frameworks is essential to protect rural users from potential risks associated with increased digital engagement (Amin, 2024). While these recommendations focus on overcoming challenges, it is also important to recognize that the rapid pace of technological change can lead to disparities in access and skills, potentially widening the digital divide if not addressed comprehensively.

**Limitations And Future Research Directions**

This study was based on a relatively small sample of 28 respondents drawn from three districts, which may not fully capture the diversity of rural Bangladesh. The reliance on convenience and purposive sampling also limited the number of households included. In addition, the focus on agriculture, fisheries, and entrepreneurship excluded other livelihood sectors such as education, healthcare, and migrant remittances, where ICT might play important roles. Future research could expand the geographic scope to include other regions of Bangladesh with different socio-economic and infrastructural contexts. Larger mixed-methods studies combining survey data with qualitative insights would help to validate and compare findings.

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