



INFORMATION AND COMMUNICATIONS TECHNOLOGY AND
DISASTER RISK REDUCTION DIVISION

Critical Analysis of ICT Connectivity in Rural Bangladesh: Importance, constraints, and the way forward



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Abstract

The Economic and Social Commission for Asia and the Pacific (ESCAP) launched the project on Digital and Transport Connectivity for the Socioeconomic Resilience of Rural Communities during the post-COVID-19 Period in Asia-Pacific Countries, 2022–2025, to strengthen the capacity of government officials in three pilot countries – Bangladesh, the Lao People's Democratic Republic and Samoa – to develop innovative strategies for improving rural digital and transport connectivity for socioeconomic resilience. As one activity of the project, this paper aims to assist in developing strategies for promoting information and communications technology (ICT) connectivity in rural areas of Bangladesh.

The Government of Bangladesh has advanced the integration of ICT into its economy in the past decade. The ICT sector plays a crucial role in the ambitions outlined in Vision 2021 for Bangladesh to become a middle-income country by 2021. Until recently, ICT development focused on demand-side management, for example, computerizing office environments, digitalizing public services and financial systems, and enhancing Internet access. However, the draft version of the ICT Master Plan 2041 demonstrated that the Government of Bangladesh has started shifting its emphasis to supply-side ICT development. Vision 2041, which outlines the ambition for Bangladesh to become a

high-income country by 2041, includes four key pillars: smart citizens, smart government, smart society and smart economy, as outlined in the Perspective Plan (2021–2041) and transitional five-year strategic plans of Bangladesh. To further accelerate the growth process and realize Vision 2041, the Government must prioritize raising total factor productivity and enhancing intrasectoral linkages through increased application of digital technology, to minimize ICT-related rural/urban disparity.

Against this background, this paper aims to provide an overview of national ICT policies in Bangladesh and outline the rural and urban ICT dynamics. The paper maps stakeholders for a range of actions, including: i) increasing smartphone availability in rural areas; ii) developing a sector-wise, rural-specific ICT data set; iii) providing awareness and developing ICT literacy programmes for rural communities; iv) ensuring stable broadband connectivity in rural areas; v) involving direct beneficiaries in the planning process; vi) increasing the outreach of agent banking schemes in rural areas; and vii) developing community-based supply chain mechanisms through ICT. Lastly, the paper suggests a way forward for further developing ICT policies and acts for the rural sector and promoting regional collaboration and coordination to support rural ICT development.

Keywords: sustainable development, socioeconomic resilience, rural ICT connectivity, rural transport connectivity, Bangladesh.

List of abbreviations

4G	Fourth generation mobile technology
a2i	Aspire to Innovate
ATM	Automated teller machine
BTRC	Bangladesh Telecommunication Regulatory Commission
DFID	Department for International Development (United Kingdom)
DFS	Digital financial service
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
FYP	Five-Year Plan
GDP	Gross domestic product
ICT	Information and communications technology
ICTD	ICT Division of the Ministry of Posts, Telecommunications and Information Technology
ISP	Internet service provider
MFS	Mobile financial services
NGO	Non-governmental organizations
POS	Point of sale
PPPA	Public Private Partnership Authority
SDGs	Sustainable Development Goals

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1. Introduction

1.1. Background

Since its independence in 1971, Bangladesh has experienced significant economic growth, especially after 2009. While many critics presumed Bangladesh would not survive as an independent country, Bangladesh has undoubtedly exceeded their expectations. Available statistics of the World Bank shows that, in 1972, the foreign exchange reserve of Bangladesh was only \$270 million.¹ This critical condition of the country added up to be even worse when Henry Kissinger, then United States Secretary of State, dubbed Bangladesh a “bottomless basket” soon after its independence. However, the performance of Bangladesh over the past 50 years has been remarkable, as evidenced by the increase in the real gross domestic product (GDP) growth rate, accelerating from -13.97 per cent in 1972 to 5.47 per cent in 2021.

Moreover, in recent years, different socioeconomic indicators reflected speedy development, such as improved gross school enrolment, reduced child mortality rate, reduced fertility rate and increased life expectancy. All these achievements aid Bangladesh to eradicate poverty, which has been a perennial problem for the country since 1971. More than 80 per cent of the population was reported

living below the poverty line after independence, which decreased to 12.9 per cent in 2021, according to the Bangladesh Bureau of Statistics.²

Besides, over the past three decades, the country experienced a major structural transformation from an agricultural to an industry-based economy, which further strengthened the growth process. In the 1970s, the GDP share of agriculture was more than 55.29 per cent, while industry and service sectors accounted for only 13 per cent and 31 per cent, respectively. However, in the late 1980s, the agriculture sector was surpassed by the service sector followed by the industry sector in the late 1990s. In 2021, while the share of agriculture in GDP fell below 12 per cent, the combined contribution of the industry and service sectors to rose to around 88 per cent of GDP. Even though the share of agriculture in GDP has reduced over the past three decades, the sector has successfully ensured food security in Bangladesh through technological advancement in agricultural production and labour force efficiency.

Export composition shifted radically during this sectoral transition, with the percentage of conventional exports (mostly raw jute and jute items, tea,

¹ See <https://data.worldbank.org/indicator/FI.RES.TOTL.CD?locations=BD>

² BBS (2021). *Recent Statistics*. Government of Bangladesh.

leather and frozen fish) falling from more than 75 per cent to 10 per cent. The textile and readymade garment industries have become the lifeblood of the economy, as readymade garment exports now account for more than 80 per cent of total exports.

With over 100 million active users and 1.25 lakh workers, recently, the ICT sector has emerged as a critical determinant in the economic development of Bangladesh. For instance, the ICT sector exported \$1 billion in total in 2019, a 66 per cent rise over the previous two years. Domestic revenue was \$5 billion in the same time period. The ICT sector has the potential to grow much further if small and medium-sized enterprises in both urban and rural locations can adopt digital commerce systems and services.

The Government of Bangladesh has made great strides in integrating ICT into the economy in the past decade. However, when Bangladesh was subjected to the negative effects of the coronavirus disease (COVID-19) pandemic, the significance and economic impact of the ICT sector became abundantly clear. Multiple national ICT policies and supporting acts were developed and put into effect, covering different sectors to varying degrees.

Until recently, ICT development was systematically conducted through

demand-side management, including computerization of information processing, particularly within office environments, and recent progress in Internet access, digitalization of public services and financial systems. However, as evident in the draft version of the ICT Master Plan 2041,³ the Government has started to shift its focus to supply-side ICT development to accomplish the objective of Vision 2041. The four key pillars, as outlined in “Making Vision 2041 a Reality: Perspective Plan of Bangladesh 2021–2041” and the transitional five-year strategic plans of Bangladesh are smart citizens, smart government, smart society and smart economy.

An efficacious shift in communication modalities was observed when most work, school and social communications along with a variety of financial transactions could be conducted online. However, such a pattern only seemed to be more visible in the urban and semi-urban areas of Bangladesh. During the pandemic, many reports noted that, as schools, colleges, and universities shifted to online teaching platforms, students living in rural areas of Bangladesh suffered the most as they had less access to computers, smartphones and stable Internet connections. This difference between urban and rural areas is indicative of the existing disparity in terms of access to ICT.

1.2. Rationale and objectives

³ See <https://a2i.gov.bd/wp-content/uploads/2023/03/Smart-Bangladesh-ICT-Master-Plan-2041-Draft-PDF-1.pdf>.

Amid the pandemic-era global slowdowns, the recent economic performance of Bangladesh gives hope that with stronger policy implication, the country can expect to attain the status of an upper middle-income country by 2031 and a high-income country in 2041. The ICT sector has been at the front line of Vision 2021, which outlined the ambition for Bangladesh to become a middle-income country by 2021. Despite being a relatively minor sector in terms of size, the ICT sector has a lot to offer to the growth trajectory of the country in the coming years. To further accelerate the growth process and achieve Vision 2041 for Bangladesh to become a high-income country by 2041, priority needs to be given to

raising total factor productivity and enhancing forward and backward intrasectoral linkages through increased application of digital technology to minimize ICT-related rural/urban disparity.

Against this backdrop, the objective of this report is to provide the following:

- Overview of the National ICT policies in Bangladesh
- Analysis of rural and urban ICT dynamics in Bangladesh
- Mapping of stakeholders for rural action plan implementation in Bangladesh
- Way forward

1.3. Outline

The report has eight sections. Following this introduction (section one), **section two** contains a brief discussion of the methodology of the report. **Section three** contains a critical discussion of the national ICT policies and the associated documents for ICT development in Bangladesh. **Section four** reveals ICT data-related concerns and stylized facts of ICT-related developments in Bangladesh, both at

aggregated and disaggregated levels, followed by challenges and barriers of rural ICT connectivity in Bangladesh in **section five**. An analysis of strengths, weaknesses, opportunities and threats (SWOT) is contained in **section six**. **Section seven** portrays the proposed mapping of stakeholders given the ICT action plans. Lastly, **section eight** concludes the report.

2. Methodology

This report was formulated by gathering and critically analysing relevant information from various secondary data sources, such as publicly available government documents and data sets from multiple private and public sources. Existing literature, such as academic and technical papers, were also studied for this report. Furthermore, a number of experienced scholars in the field were selected for

key informant interviews to acquire in-depth knowledge. Qualitative and argumentative discussions informed the drafting of this report, and several tables and graphs have been generated to highlight the urban/rural disparity in the ICT sector. Proposed action plans and stakeholders based on the data sets, interviews and overall literature are contained in the text and tables of this report.

3. National ICT policies

3.1. Inception of ICT-driven economic development

During the past 20 years, the significance of ICT in achieving different socioeconomic development goals became apparent in Bangladesh. Accordingly, the Government formulated the first National ICT Policy

in 2002, followed by three additional policies during the past 12 years (2009, 2015 and 2018).⁴ Table 3.1 depicts the linkage between ICT policies and the Sustainable Development Goals (SDGs).

3.2. Overview of existing ICT policies/ acts/ strategies in Bangladesh

It is evident from the three latest national ICT policies that the ICT Division (ICTD) of the Ministry of Posts, Telecommunications and Information Technology (MoPTIT),⁵ in consultation with the other relevant ministries, has played the lead role in formulating policies for the integration of ICT into the economy of Bangladesh.

A number of complementary ICT acts and digital strategies were adopted (such as the National Blockchain Strategy 2020, the Digital Security Act 2018, the ICT Acts of 2009 and 2013, and the Bangladesh Hi-Tech Park Authority Act 2014) to implement the national ICT policies effectively.⁶ Table 3.2 contains the rationale, main objectives and linkage with ICT policies of the above-mentioned acts and

strategies. These ICT acts have mainly been formulated by the ICTD and, in a few cases, in collaboration with other supporting ministries of the Government. For instance, the National Digital Commerce Policy 2018 was developed by ICTD in partnership with the World Trade Organization (WTO) Cell of the Ministry of Commerce. The Digital Security Act 2018 was developed by ICTD along with the Legislative and Parliamentary Affairs Division of the Ministry of Law, Justice and Parliamentary Affairs. Some of the other notable recent acts are the Bangladesh Innovation Agency Act 2019, the National Core Data Interoperability Standard 2019 and the Innovation and Entrepreneurship Development Academy Act 2019.

⁴ See <https://ictd.portal.gov.bd/site/view/policies/Policy->.

⁵ The Ministry consists of two divisions: i) ICTD; and ii) Posts and Telecommunications Division.

⁶ See <https://ictd.portal.gov.bd/site/view/law/Acts->.

Table 3.1: National ICT policies and the Sustainable Development Goals

Policy	Main objective	Corresponding SDGs
National ICT Policy 2018	1. Digital government	SDG 1: <i>End poverty in all its forms everywhere</i> SDG 9: <i>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</i> SDG 16: <i>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</i> SDG 17: <i>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</i>
	2. Digital security	SDG 16: <i>as defined above</i>
	3. Social equity and universal access	SDG 5: <i>Achieve gender equality and empower all women and girls</i> SDG 10: <i>Reduce inequality within and among countries</i> SDG 11: <i>Make cities and human settlements inclusive, safe, resilient and sustainable</i> SDG 1, 9, 16: <i>as defined above</i>
	4. Education, research and innovation	SDG 4: <i>Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</i> SDG 8: <i>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</i> SDG 9, 17: <i>as defined above</i>
	5. Skill development and employment generation	SDG 4, 8, 10: <i>as defined above</i>
	6. Strengthening domestic capability	SDG 8, 9, 17: <i>as defined above</i>
	7. Environment, climate and disaster management	SDG 6: <i>Ensure availability and sustainable management of water and sanitation for all</i> SDG 13: <i>Take urgent action to combat climate change and its impacts</i> SDG 14: <i>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</i> SDG 15: <i>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</i>
	8. Enhancing productivity	SDG 2: <i>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</i> SDG 3: <i>Ensure healthy lives and promote well-being for all at all ages</i> SDG 8, 9, 17: <i>as defined above</i>

National ICT Policy 2009 and 2015	1. Integrity	SDG 4, 16: <i>as defined above</i>
	2. Strengthening exports	SDG 9, 17: <i>as defined above</i>
	3. Support to ICTs	SDG 7: <i>Ensure access to affordable, reliable, sustainable and modern energy for all</i> SDG 9, 17: <i>as defined above</i>
	4. Health care	SDG 3: <i>as defined above</i>
	<u>The remaining objectives are addressed in the National ICT Policy 2018:</u>	See National ICT Policy 2018.
	Social equity and universal access; Education and research; Employment generation; Environment, climate and disaster management; Productivity	

Source: Author's compilation.

Table 3.2: ICT acts and strategies at a glance

Acts and strategies	Rationale	Main objectives	Link with National ICT Policy (year)
National Blockchain Strategy 2020	- To explore different aspects of Blockchain technology, its advantages, limitations and misconceptions, and how it can help Bangladesh to achieve its development goals	- To gain expertise in Blockchain technology and increase efficiency in e-governance - To formulate plans to develop a Blockchain-integrated national information infrastructure and to integrate online services with a suitable Blockchain platform - To develop capacity by promoting research, innovation and training, and increasing awareness - To release funds to initiate and maintain the above-mentioned activities	2009, 2015, 2018
Digital Security Act 2018	- To strengthen digital security rules, laws and regulations for Bangladesh	- To identify different types of cybercrimes - To strengthen prevailing laws for cybercrime - To protect citizens of Bangladesh from cybercrime and other digital fraud	2018
ICT Act 2013	- To formalize digital security rules, laws and regulations for Bangladesh	- To identify different types of cybercrime - To protect citizens of Bangladesh from cybercrime and other digital fraud	2009, 2015, 2018
ICT Act 2009	- To formalize digital security rules, laws, and regulations for Bangladesh	- To identify different types of cybercrime - To protect citizens of Bangladesh from cybercrime and other digital fraud	2009, 2015, 2018
Bangladesh Hi-Tech Park Authority Act 2010 (Amendment: 2014)	- To make provisions for the establishment of high-tech parks in Bangladesh - To establish an authority to monitor proper management, operation, and development of the high-tech parks and industries	- To establish high-tech parks in order to set up and develop high-tech industries in different places in the country - To formulate policies for development, operation, management, and control of the parks, and to determine other relevant requirements - To establish the Bangladesh Hi-Tech Park Authority	2009, 2015, 2018

Source: Author's compilation.

In addition to the ministries, foreign donor agencies have recently been involved in developing certain Master Plans. For instance, although the Master Plan for ICT in Education in Bangladesh (2012–2021) was developed by the Ministry of Education alone, the e-Government Master Plan of 2019 was prepared by ICTD and the Korea International Cooperation Agency (KOICA), a foreign donor. The ICT policies were aligned with the Aspire to Innovate (a2i) programme (flagship public organization for inclusive digitization, widening access and decentralizing delivery);⁷ hence, the Government's objectives for ICT infrastructure development have been very robust in the past two decades.

The a2i programme has eight missions⁸ and supports the Government to achieve digitization and create smart policies. As evident from the government website, the a2i programme supports the strategic aims of Bangladesh to achieve SDGs by 2030 and become a high-income country by 2041. Three out of the eight missions are rural-centric and have been directly involved with reducing urban/rural disparity in terms ICT use. For instance, mission 2 (digital equity) is designed to provide subsidized government services to rural women and disabled people lacking ICT knowledge. Mission 4 (digital financial inclusion) brings rural, marginalized people under real-time banking

services, and mission 7 (future of digital economy) ensures fair market prices for rural producers through a rural e-commerce model.

The key objectives of the ICT policies include social equity, integrity, connectivity through digitalization, research and innovation, enhanced productivity and employment generation. These key objectives have been targeted in each of the national ICT policies starting from 2009 as they are significantly aligned with the development agendas of Bangladesh. It is worth pointing out that the National ICT Policy of 2002 did not emphasize the above-mentioned objectives because the vision at that time focused on developing an ICT sector that would work as a catalyst for socioeconomic development through different backward and forward dimensions. To do so, the National ICT Policy of 2002 primarily focused on developing legislative and regulatory frameworks coupled with infrastructure development, training, human resource development, foreign and domestic investments in the ICT sector, the process of budget allocation, and so on.

Considering the key objectives mentioned, the weight of these objectives in each national ICT policy can be better understood by focusing on the specific strategic themes and action items under each objective. Overall, they seem to be more or less

⁷ See <https://a2i.gov.bd/about-us/>.

⁸ **Mission 1:** South-South cooperation (to build a global platform for public service innovation); **Mission 2:** Digital equity (to digitalize public services); **Mission 3:** Civil service 2041 (a new operating system for 21st century governance); **Mission 4:** Digital financial inclusion (to make

DFS work for poor); **Mission 5:** Future of education (augmenting a blended education system); **Mission 6:** Future of work (a productive national system for jobs and work); **Mission 7:** Future of digital economy (to make e-commerce work for poor); and **Mission 8:** Data-driven policymaking (data insightful policy implication).

equally targeted in terms of strategic themes and action items in the National ICT Policy 2009 and 2015. Even though some new objectives have been introduced in the National ICT Policy 2018 (artificial intelligence, efficiency in domestic capability, digitalization of government services and ICT skill development), the weight of the objectives, for instance, social equity, integrity, connectivity through digitalization, research and innovation, enhanced productivity, and employment generation remain unchanged. Thus, the scope of the ICT policy has expanded to achieve development goals more efficiently.

Since 2009, ICT policies have been adopted and implemented under the motto “Digital Bangladesh” and “Smart Bangladesh”. These policies are reflected in Vision 2021, Vision 2041 and Five-Year Plans (FYPs), which are discussed below in brief.

Vision 2021: During the 2008 election campaign, the Awami League political party articulated a vision to digitalize the country by 2021, focusing on the adoption and development of information technology (e.g. e-governance and e-services solutions) with a focus on technology-driven talents for achieving the development goals in the economy. The four pillars of Vision 2021 are digital government, human resource development, information technology industry promotion, and connecting citizens.⁹

⁹ See <https://investindigitalbd.gov.bd/page/digital-bangladesh-vision-2021>.

Vision 2021 was of great significance as it was aligned with the objectives, strategic themes and action plans of the National ICT Policy 2009.

Vision 2041: Building a Smart Bangladesh is a continuation of Vision 2021 to foster the development process by mitigating poverty, sharing prosperity and ensuring social and economic justice. Vision 2041 was converted into a development strategy aligned with other policy documents and programmes and was launched as “Making Vision 2041 a Reality: Perspective Plan of Bangladesh 2021–2041”.¹⁰

Vision 2041 aims to achieve two targets by 2041. The first is to make Bangladesh a developed country with a per capita income of more than \$12,500, and the second is to reduce the poverty rate to below 3 per cent and the extreme poverty rate to below 1 per cent.¹¹ The ultimate goal of Vision 2041 is for Bangladesh to achieve the status of a high-income country by ensuring robust investment in economic policies, human capital development, the education sector and skill development programmes to make an innovation-driven knowledge-based Bangladesh for the future.

Vision 2041 was first discussed in the National ICT Policy 2018, where the objective of Bangladesh becoming a high-income country highlighted

¹⁰ See <http://oldweb.lged.gov.bd/uploadeddocument/unitpublication/1/1049/vision%202021-2041.pdf>.

¹¹ Ibid.

essential concepts such as social equity, integrity and connectivity through digitalization.

Five-Year Plans: The Five-Year Plans (FYPs)¹² are flagship documents of the Government of Bangladesh. They aim to explain the strategic policies and respective action plans for all types of activities at macro and micro levels every five years. All FYPs assess the achievements of the targets set by the previous plans and identify issues that need to be addressed in the upcoming FYPs for better policy implementation.

It is worth mentioning that ICT was an explicit focus in the 6th FYP (2011–2016) immediately after the Government adopted the National ICT Policy 2009, which discussed the idea of “Digital Bangladesh”. The 7th FYP and 8th FYP holistically discussed the

Government’s strategic aim to develop the ICT sector and ICT policies. The 6th, 7th and 8th FYPs each had a dedicated chapter for the ICT sector, aligned with the current ICT policy and acts, which prudently outlined the Government’s strategies to address ICT development agendas, budget allocations, existing issues and sectoral reform initiatives to improve efficiency and the upcoming FYP.

Under the 8th FYP (2021–2025), the Government prioritized a few areas for rural ICT development: universal access to digital devices and the Internet (2021–2022), interoperable and connected health management systems (2022), digital commodity exchange for agriculture (2022), universal coverage of digital financial services (2023) and access to affordable digital literacy (2025).

3.3. Observations

Despite the rigorous attempt of the Government to integrate ICT policies into mainstream economic development programmes, rural areas were seldom highlighted. Most of the action plans were inclined towards the urban industry and service sectors, with less emphasis on rural development. Even though there were discussions on enhancing ICT development outside urban areas, for example, the discussions did not lead to a distinct, concrete policy for rural ICT development in Bangladesh. Thus, the visible outcomes of the development

programmes are reflected more in urban than in rural areas.

The focus on urban areas as demonstrated by the urban-centric outcomes can be understood by analysing the strategic themes and action plans of each policy. It is evident from studying the action plans of the previous national ICT policies that only 15–20 per cent of the adopted initiatives were directly integrated with rural ICT development programmes. Additionally, 3–5 per cent of initiatives indirectly affected rural ICT

¹² To date, the Government of Bangladesh has adopted eight FYPs, and the first FYP was adopted in the year of 1972 for the subsequent five fiscal years (1973–1978). The

latest FYP (8th FYP 2021–2025) was adopted in 2020. It was preceded by the 7th FYP 2016–2020 and 6th FYP 2011–2015.

development programmes. The rest were urban-centric and mostly emphasized industry and service-related activities at public and private levels. Moreover, most of the national ICT policies (available in the public domain) are written in Bangla/Bengali and are a little difficult to be compared internationally.

Even though past policies and action plans had relatively little focus on rural areas, the recent road maps and draft

policies/acts show that the Government of Bangladesh is in the process of changing the focus of ICT development initiatives in favour of rural areas. The Government plans to implement sector-specific ICT development initiatives to accelerate rural ICT progress. For instance, an objective of the Agenda for Agriculture and Food Security draft road map is to augment ICT to strengthen the agriculture sector, which would also facilitate rural ICT connectivity.¹³

3.4. Smart Bangladesh ICT Master Plan 2041 (draft)

According to the Perspective Plan (2021–2041), Bangladesh needs to shift from “digital” to “smart”, putting more of an emphasis on data-centric design and human-centric experiences than on automation and digitization. The ICT sector will be crucial to achieving Vision 2041 as it will connect the four pillars: smart citizens, smart government, smart society and smart economy. The four pillars are briefly discussed below.

Smart citizens: Campaigns and digital literacy initiatives can help the nation's population become more digitally literate. Aspiring citizens will work with businesses and the government to develop policies and provide services jointly.

Smart government: Through paperless offices and highly customized service platforms in priority

sectors such as health care, education, agriculture, tax management and public security, smart government operates on the notion of “invisible governance”. It will participate in proactive, cooperative policymaking to accelerate the advancement of Bangladesh towards achieving modern technology.

Smart society: To ensure sustainable living and avoid hate-speech online, ethics and values will be entrenched in society. Interoperable cashless payment ecosystems, simple credit access and other features will facilitate a high degree of inclusion. In smart cities powered by integrated technological platforms and smart grids, life will be robust and sustainable.

Smart economy: It is necessary to build an innovative economy to place Bangladesh at the forefront of the rapidly changing industrial

¹³ See https://ictd.portal.gov.bd/sites/default/files/files/ictd.portal.gov.bd/page/6c9773a2_7556_4395_bbec_f132b9d819f0/ICT%20Roadmap_two-pager_Agriculture.pdf.

technological revolution, particularly in high-priority industries, such as light engineering, agriculture, readymade garments and textiles. When they are integrated, Bangladesh will be in a position to capitalize on its present industrial capabilities and lead the way in technology.

Moreover, three approaches were adopted in making the actual master plan. The first approach was to **map current progress and plans**, where ICT-related activities were assessed to exactly identify gaps and intervention strategies for further development, including issues of low-skill workforce, job losses, skill enhancement pathways and innovation value chain creation across priority industries. The second approach was to **listen to stakeholder's voices**, where opinions from different groups (citizens,

businesses and government agencies) were taken into the consideration for preparing the master plan. The third approach was to **learn from global benchmarks**, which has helped to select benchmarks for the four pillars and contextualize the programmes stated in the master plan. Table 3.3 provides a summary of the master plan.

The master plan is expected to release more than 40 major programmes to propel Bangladesh towards 2041. The milestones for each programme in 2025, 2031, and 2041 would help to achieve Vision 2041. Each programme would go through four developmental stages, namely launch, stabilize, scale and excel. Additionally, the sequence of the launch of those programmes has been designed based on three key factors: impact, readiness and control.

Table 3.3: Synopsis of the National ICT Master Plan 2041

Smart citizen	Smart government		Smart society	Smart economy
- Universal digital ID - Citizen upskilling - Digital curriculum - Digital skilling at all levels of the society - Smart device access - Digital collaboration platforms - Smart Bangla campaign - Nation-wide campaign to promote digital-first mindset	- Smart health care - Blended learning - Smart land management - Smart postal service - Smart agriculture - Smart judiciary - Smart borders - Smart transportation - Smart tax - ICT policies - Data privacy and cybersecurity, emerging technologies and other policies	- National procurement e-marketplace - Digital job platform - Smart social safety net - Smart public services and paperless administration - Police modernization - Smart planning - Digital leadership academy - Digital upskilling at all levels of the government and unlocking digital transformation capabilities in the private sector at the chief executive level	- Inclusive financial ecosystem - Interoperable payments ecosystem - Fintech accelerator - Green sustainable Bangla - Smart cities - Smart grid - Digital climate resilience - Digital tolerance and culture movement - Embedding digital hygiene among all citizens in all aspects of daily life - Smart Bangladesh stack	- Fourth industrial revolution industry accelerators - Readymade garments and textiles - Light engineering - Pharma - Logistics - ICT industry acceleration - Foreign direct investment attraction (Smart ICT Investment Promotion Agency) - Systemic ICT export promotion - Nation-wide stimulation of high-value projects for information technology/ information technology enabled services - Emerging technologies centre of excellence (artificial intelligence/ machine learning, cybersecurity, robotics etc.) - Emerging technologies centre of excellence - Smart Bangladesh global campaign - Startup Bangladesh - Start-up funding/ incubation support; venture capital/ private equity participation - Smart commerce - Technology and infrastructure backbone - Universal Internet access - Government cloud and data centre

Source: See <https://a2i.gov.bd/wp-content/uploads/2023/03/Smart-Bangladesh-ICT-Master-Plan-2041-Draft-PDF-1.pdf>.

3.5. Recent ICT policy developments

Despite several development initiatives in the past decade, Bangladesh has lost approximately \$1.3 billion in sales of software and ICT products in the ICT sector due to the pandemic outbreak. The Bangladesh Association of Software and Information Services (BASIS) estimated that \$800 million in international work orders and \$500 million in domestic work orders were turned down due to the impact of COVID-19.

To overcome this, ICTD in collaboration with donor agencies and other non-government organizations developed a

post-COVID-19 National ICT Roadmap 2021–2025 (available in English) with 16 action agendas. However, only 4 of the 16 action agendas highlighted rural development. Those four agendas are universal coverage of digital financial services, universal affordable access to digital devices, digital commodity exchange for agriculture produce to connect farmers, and bottom-up e-commerce platforms for local farmers. A detailed explanation of the four rural-centric agendas, with broad objectives aligned with their stakeholders and forecasted outcomes, is presented in table 3.4.

Table 3.4: Synopsis of the Post COVID-19 National ICT Roadmap

Action agendas	Alignment with ICT objectives (2018, 2015, 2009)	Stakeholders	Targeted outcomes
Universal coverage of digital financial services	1. Strengthening domestic capacity 2. Enhancing productivity 3. Digital government	Lead: Bank and Financial Institutions Division (BFID) Co-lead: ICTD/ Bangladesh Bank (BB)/ IRDA Partners: Mobile and digital financial services/ fintech start-ups; investors Coordination: ICTD Coordination Unit Financing: Public Private Partnership Authority (PPPA)/ foreign direct investment Implementation: a2i/ Bangladesh Computer Council	To incentivize digital financial transactions across the population.
Universal affordable access to digital device and Internet broadband connectivity	1. Enhancing productivity 2. Social equity and universal access 3. Strengthening domestic capacity 4. Digital government	Lead: Posts and Telecommunications Division Co-lead: ICTD Partners: Device manufacturing companies/Private-sector players in (base of the economic pyramid)/ non-governmental organizations/ (ISP Association of Bangladesh)/ Connectivity start-ups (base of the economic pyramid) Coordination: ICTD Coordination Unit Financing: Government of Bangladesh (e.g. Social Obligation Fund)/ World Bank/ PPPA/ development partners (e.g. European Union, Japan International Cooperation Agency, Department for International Development [DFID]) Implementation: Bangladesh Hi-Tech Park Authority/ Bangladesh Telecommunication Regulatory Commission (BTRC)/ Bangladesh Computer Council	To broaden and strengthen the internet services and to revise the TAX, VAT rates to lower internet prices to make it affordable and accessible.
Digital commodity exchange for agriculture produce connecting farmers at their doorsteps	1. Enhancing productivity 2. Strengthening domestic capacity 3. Skill development and employment generation 4. Digital government	Lead: Ministry of Agriculture Co-lead: Ministry of Commerce Partners: a2i/ Ministry of Agriculture/ Ministry of Fisheries and Livestock/ Ministry of Local Government, Rural Development and Co-operatives/ Palli Karma-Sahayak Foundation/ development partners (e.g. DFID, International Finance Corporation) Coordination: ICTD Coordination Unit Financing: PPPA/ World Bank/ foreign direct investment Implementation: Department of Agriculture and Marketing/ Directorate of National Consumer Rights Protection	It is aligned with quality standards for different agro-commodities and the agro-commodity exchange policy. This agenda is expected to ease the agricultural commodity transactions for farmers and to ensure that they get fair market prices.

Facilitating bottom-up e-commerce for livelihood of local producers and artisans	1. Strengthening domestic capacity 2. Skill development and employment Generation 3. Digital government	Lead: Ministry of Commerce Co-lead: Ministry of Cultural Affairs/ Ministry of Textile and Jute/ Ministry of Youth and Sports/ ICTD Partners: E-Commerce Association of Bangladesh Coordination: ICTD Coordination Unit Financing: PPPA/ World Bank/ Asian Development Bank/ Islamic Development Bank/ development partners (e.g. European Union, Japan International Cooperation Agency, DFID) Implementation: a2i	Upgrading National Broadband Policy 2009 by revising tax, VAT and surcharge to decrease Internet price. Upgrading National Digital Commerce Policy 2018 for exemption of taxes imposed on digital commerce and advertising.
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Source: Author's compilation.

4. Data availability and stylized facts on the ICT sector of Bangladesh

4.1. Data availability issues

For most ICT indicators (especially those which can capture rural, urban and sectoral dynamics), there is a lack of publicly available continuous data sets that could be used for comparison in the locality, gender and cross-country. The Household Income and Expenditure Survey covers only a few ICT indicators. Thus, there is a lack of a centralized data source from the Government with all the critical ICT indicators.

However, research institutions and think tanks, such as the Bangladesh Institute of Development Studies (BIDS) and the BRAC Institute of Governance and Development (BIGD), occasionally generate data from their surveys. BIDS had previously conducted a study on the implications of bKash as the country's largest provider of mobile financial services (MFS) and published the data collected in a field survey in 2019. Similarly, BIGD conducted a study in 2019 on digital literacy and access to public services. Nevertheless, these data sets cover one particular year (although the BIDS survey was compared with 2015 data); hence, there are few series from a range of years to analyse a trend.

Further insights on the data are available in table 4.1.

There is comparatively better data availability on digital financial inclusion, such as global financial inclusion and digital financial services (DFS). The global financial inclusion data mainly consist of variables regarding the thematic areas of financial inclusion and MFS on an aggregated level for 2011, 2014, 2017 and 2021. However, disaggregated data capturing the differences in urban and rural areas are available only for 2021. Without having another reference year to compare, it remains challenging to see a trend in the rural/urban divide.

Data on DFS are generated monthly and disaggregated (both by locality and gender) to capture the rural/urban divide. This data set consists of variables regarding the availability of mobile financial technologies such as automated teller machine (ATM), point of sale (POS), the number of MFS accounts and agent banking statistics. However, only a small portion of ICT-related banking activities are portrayed in DFS data.

Table 4.1: Data summary from BIDS Survey Report 2019

Criteria	June 2015	July 2019
Number of banks in the services	20	16
Number of agents	538 170	942 648
Number of registered clients (<i>millions</i>)	28.6	73.09
Number of active accounts (<i>millions</i>)	12.2	33.57
Number of total transaction (<i>millions</i>)	96.2	227.4
Total transaction in Bangladeshi taka (<i>crore</i>)	12 970	37 478
Number of daily average transaction in Bangladeshi taka (<i>crore</i>)	3.2	7.34
Volume of daily average transaction in Bangladeshi taka (<i>crore</i>)	4.32	12.9
Inwards Remittance	4 009	28 770
Cash-in transaction in Bangladeshi taka (<i>crore</i>)	5 462	13 460
Cash-out transaction in Bangladeshi taka (<i>crore</i>)	4 777	12 999
Peer-to-peer transaction	2 287 000	8 122 000
Salary disbursement (business-to-person)	101 000	943 000
Utility bill payment (person-to-business)	120 000	519 000
Merchant payment	0	371 000
Government payment	0	416 000
Others	219 000	616 000

Source: BIDS Survey Report 2019.

4.2. Stylized facts

The United Nations Committee for Development Policy has recommended Bangladesh for graduation from the category of least developed countries into the category of developing countries. To keep the development momentum, the Government of Bangladesh is looking forward to increasing socioeconomic resilience, focusing on rural socioeconomic

development by improving transport and communication infrastructure, among others. Since ICT is linked with many SDGs, the Government of Bangladesh emphasizes improving rural ICT connectivity. This section looks deeper at stylized facts on ICT sector development, focusing on rural and urban scenarios and the contrast pre- and post-pandemic.

4.2.1. Overall scenario

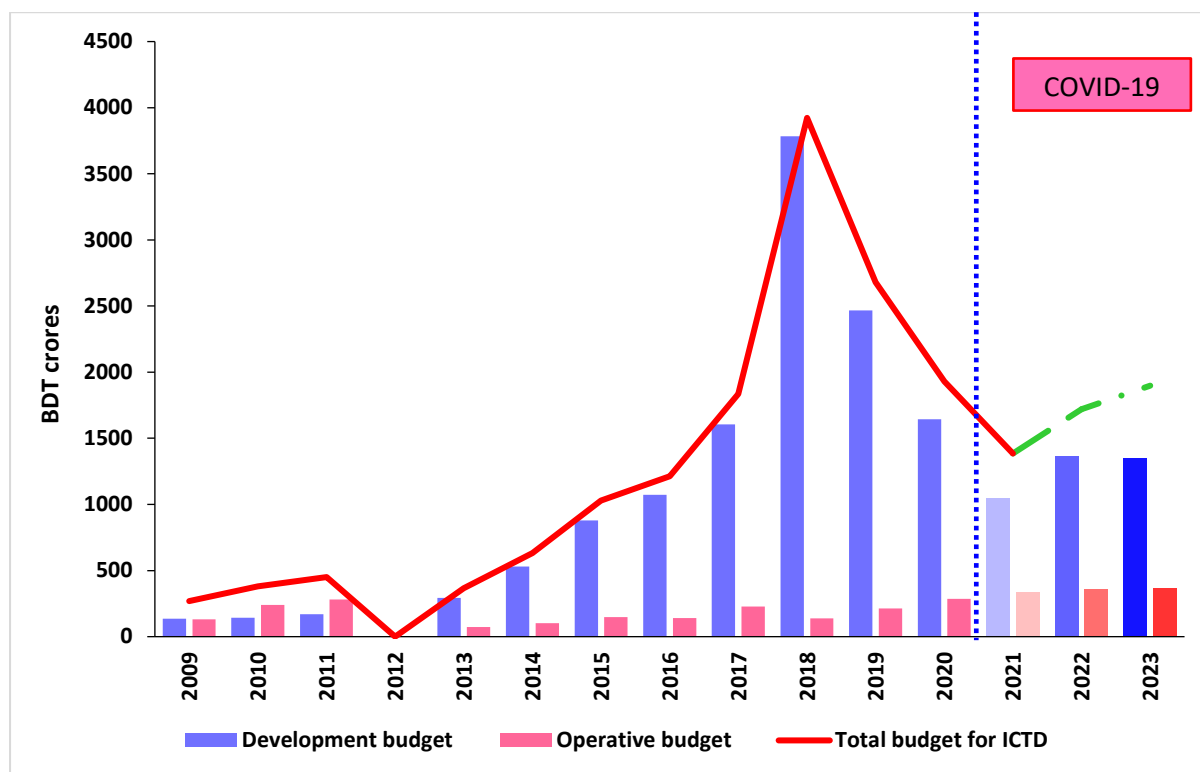
The Government of Bangladesh has been increased the budget to ICTD, as evidenced in different policy papers (figure 4.1). From 2009 to 2012, the operative budget was higher than the development budget, but from 2013, the development budget allocation was

higher. This is because the operative budget does not change much on average, but significant improvement in sustainable ICT infrastructure requires

a large development budget.¹⁴ The total budget increased significantly, from 269 BDT crores in 2009 to 3,923 BDT crores in 2018, with the

development budget itself increasing from 137 BDT crores to 3,748 BDT crores.

Figure 4.1: Total budget allocated to ICTD by the Government of Bangladesh



Source: Compiled by the author from various budget documents of the Finance Division, Government of Bangladesh. See <https://mof.gov.bd/site/page/f9aab5cd-f644-47bb-bb94-a70cb64c15ce> for the detailed data.

Since the ICT sector was well equipped to advance its momentum through innovation, the Government of Bangladesh prioritized the education sector and therefore diversified the budget from ICT towards the education sector in 2018, even though the total budget allocation in the education and technology tract increased.¹⁵ However, after the pandemic hit in March 2020, the Government of Bangladesh

identified the potential of digitization as a strategy to increase the socioeconomic resilience of its people. Therefore, the budget allocation increased from 1,385 BDT crores in 2021 to 1,720 BDT crores in 2022, which was an increase of 21.2 per cent, and continued in the upward trend to

¹⁴ The operative budget was 202.9 BDT crores on average from 2009 to 2023.

¹⁵ The Education and Technology tract consists of the Technical and Madrasa Education Division, Ministry to

Primary and Mass Education, Secondary and Higher Education Division, Information and Communication Technology Division, and Ministry of Science and Technology.

1,898 BDT crores in 2023,¹⁶ for a 10.4 per cent increase.

Moreover, from the Global Innovation Index ranking of ICTs, it is evident how Bangladesh has improved compared to other South Asian economies (table 4.2). The position of Bangladesh out of the 132 economies ranked in the Global Innovation Index ranking of ICTs has increased from 2013 to 2022. Bangladesh has been steadily ahead of Nepal and Pakistan for some years, while India and Sri Lanka have been a bit ahead of Bangladesh.

While Bangladesh rose in the rankings from 2013 to 2020 at a relatively steady rate, the ranking took a short dip in 2021 and rose again in 2022. This is due to COVID-19, which impacted the government budget for ICT in 2020. The budget for ICT decreased more than the expected amount due to the

introduction of large-scale stimulus packages. With the combination of fiscal and monetary policy measures, the Government of Bangladesh announced economic stimulus packages of 1.03 BDT trillion¹⁷ (3.7 per cent of GDP). It should be noted that the stimulus packages were substantially larger in terms of GDP than those of other South Asian and South-East Asian countries. The stimulus packages were designed to help the economy recover quickly in a “V” shape by focusing on four primary areas: export-oriented industries, agriculture, low-income people and affected enterprises. Furthermore, several ongoing action plans (such as online services efficiency enhancement) were removed, and resources were reallocated to facilitate quick reaction support to revive the economy, resulting in slow progress of ICT activities.

¹⁶ Only the upper bound of the Fiscal Years was taken. For instance, 2023 indicates the Fiscal Year of 2022-2023.

¹⁷ S. Raihan (2020). Anatomy of the Stimulus Package in Bangladesh. *The Indian Journal of Labour Economics*, vol. 63, No. 1, pp. 37–40.

Table 4.2: Selected South Asian countries Global Innovation Index ranking of ICTs, 2013–2022

Year	Bangladesh	Pakistan	Nepal	India	Sri Lanka
2013	114	109	132	96	103
2014	114	110	124	99	105
2015	112	114	121	86	72
2016	105	106	111	86	74
2017	95	109	101	80	83
2018	96	110	101	83	85
2019	90	109	89	75	94
2020	91	111	88	74	90
2021	97	104	118	86	88
2022	95	98	117	72	82

Source: 2022 Global Innovation Index. For more details, visit www.globalinnovationindex.org/analysis-indicator.

The Global Innovation Index ranking of ICTs is comprised of four sub-indices, namely ICT access, ICT use, government's online service and e-participation. From **table 4.3**, it is obvious that all sectors of ICT development have been developing in

Bangladesh, with government's online service being the dominant driver of ICT development. The improvement in all the areas indicates the development priority that the Government of Bangladesh gives in the ICT sector.

Table 4.3: Global Innovation Index ranking of Bangladesh on ICT sub-indices, 2013–2022

Year	ICT access		ICT use		Government's online service		E-participation	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
2013	19.1	122	1.3	130	44.4	85	7.9	99
2014	20.3	121	2.4	124	44.4	86	7.9	98
2015	25.7	124	2.7	128	34.7	92	39.2	82
2016	28.2	113	6.0	115	34.6	90	39.2	80
2017	30.6	109	10.6	113	62.3	60	52.5	82
2018	30.5	111	14.1	113	62.3	60	52.5	82
2019	35.7	109	18.7	111	78.5	51	80.3	51
2020	33.6	117	21.5	113	78.5	52	80.3	51
2021	42.1	103	24.7	108	61.2	86	57.1	91
2022	76.0	90	38.6	102	61.2	86	57.1	90

Note: All scores are out of 100, and the ranking is among 132 countries.

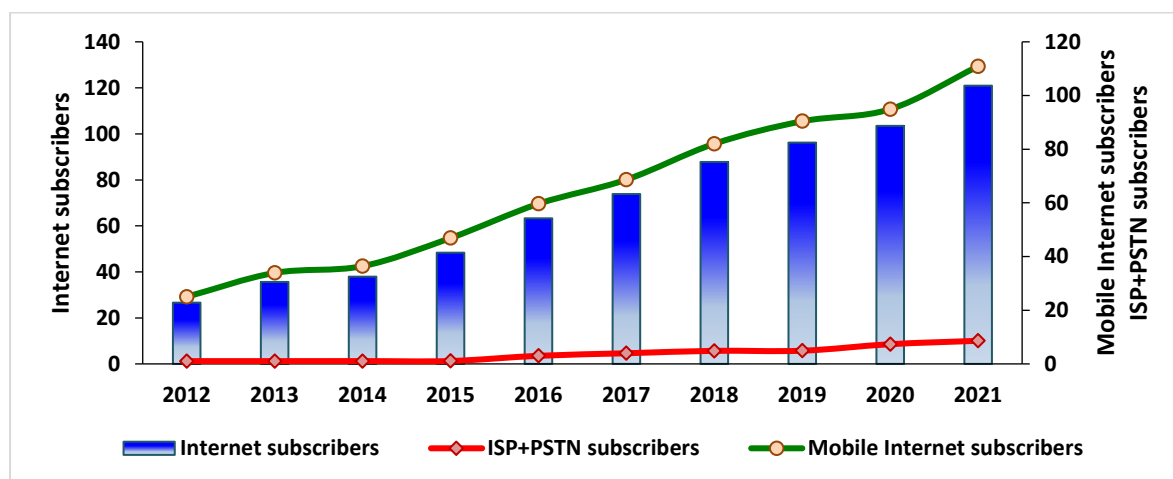
Source: 2022 Global Innovation Index

It is evident that the ranking of Bangladesh on government's online service and e-participation dropped due to the pandemic in 2020.¹⁸ The drop is the result of distortion in activities of the Government of Bangladesh to ensure a quick response for tackling the adverse effects of the pandemic. With well-structured relevant stimulus packages, detailed coordination mechanisms and good governance, the immediate effects of the pandemic were mitigated and the Government began to implement bounce-back strategies for achieving the targeted development path. Within the bounce-back strategies, ICT was one of the key sectors the Government wanted to focus on, given its high forward and backward linkages.¹⁹ As a result, the Government prepared the Post COVID-19 National ICT Roadmap, as detailed

above, to improve these two areas by enhancing domestic capacity for ICT and establishing a digital government across Bangladesh. In this regard, it is strongly advisable that a significant focus is given to preparing a blueprint, which should be followed for successfully implementing the road map along with other ICT policies and institutional reforms.

In Bangladesh, three major channels – mobile Internet, Internet service providers (ISP), and public switched telephone networks (PSTN) – are primarily used to obtain an Internet subscription.²⁰ Mobile Internet has been dominating the Internet subscription sphere of Bangladesh and has been increasing at a faster rate than ISP or PSTN from 2012 to 2021 (figure 4.2).

Figure 4.2: Internet subscription scenario in Bangladesh (millions)



Note: Each year is measured June-May.

Source: Bangladesh Telecommunication Regulatory Commission (BTRC), 2021.

¹⁸ E-participation is highly linked with government online services as this indicator shows online tools to promote interaction between government and citizens, as well as between citizens, to optimize public services.

¹⁹ Backward linkage is a phenomenon in which enhanced production by a downstream industry provides positive pecuniary externalities to an upstream industry. Forward linkage is the opposite scenario of backward linkage, where

improvement in a particular industry has some positive effect on downstream industries.

²⁰ S.B. Amin, F. Taghizadeh-Hesary, J. Jannat, K.M. Khandaker and F. Khan (2022). Institutional and regulatory requirements for innovative Fintech market in Bangladesh: Why do they matter? In *Innovative Finance for Technological Progress*. Routledge.

Mobile Internet has boosted at a higher rate than the others due to the increase in coverage of the fourth generation mobile technology (4G) by the mobile subscription companies in Bangladesh. Some of the notable companies are Grameenphone, Banglalink, Robi and Teletalk. According to GSMA Intelligence, the coverage of the 4G network in Bangladesh increased from 79 per cent in 2018 to 95 per cent in 2020.²¹ Nevertheless, mobile Internet prices are still somewhat high and resonate with the number of days a person uses it. For example, Grameenphone offers 1 Gigabyte (GB) of internet with 3 days' validity at the cost of around 43 BDT.²² In contrast, Banglalink provides the same Internet package at about 30–40 BDT. If monthly packages are used, then per GB cost reduces; however, payment is higher in total, at around 250–1,000 BDT, depending on package types. Therefore, Internet affordability for the poor and semi-poor populations is quite difficult. In fact, according to GSMA Intelligence (2020), 18 per cent of the rural population report affordability problems. Lack of affordable Internet access is one of the prime reasons that rural education was affected during the pandemic.

The Government of Bangladesh is attempting to increase coverage provided by the ISP to increase rural connectivity. Currently, most ISPs

operate in the urban and semi-urban areas of Bangladesh. However, according to the recent guidelines of the Bangladesh Telecommunication Regulatory Commission (BTRC), ISPs can obtain four types of licenses, namely nationwide, divisional, district, and upazila/thana. The nationwide ISPs can give access to the Internet at a larger scale across the country. In contrast, the others tend to provide Internet services to dedicated areas if costs and other locality-specific issues are resolved (such as electricity). Nevertheless, upazila/thana level licenses are comparatively low in Bangladesh. Some of the notable ISPs in Bangladesh are Aamra Networks Limited, Link3 Technologies, KS Network, and BRACNet Limited.²³

The WSIS (Ek Desh Ek Rate – 'One Country One Rate') initiative aimed to increase uniform access to affordable broadband Internet.²⁴ However, with clear predictions and foresighted decisions, the Government of Bangladesh has now brought the price of Internet access to an affordable range. According to the new regulations, customers will pay a maximum of 500 BDT for a shared 5 megabytes per second (MBPS) Internet connection, a maximum of 800 BDT for a shared 10 MBPS Internet connection, and a maximum of 1,200 BDT for a shared 20 MBPS Internet connection.

²¹ GSMA Intelligence (2020). *Annual Report*.

²² Including value-added tax (VAT)

²³ I. Faruquee (2022). ISP Industry of Bangladesh: Challenges and Future Prospects. Business Inspection. Available at <https://businessinspection.com.bd/isp-industry-of-bangladesh/>.

²⁴ See: <http://btrc.portal.gov.bd/site/page/69c51354-a92d-46fb-8c34-321b354f3330?fbclid=IwAR3FASf1zYeywpFghsQix818g9O5HQ1OmRHbkbAlSAU5Kb1-wO0HyvJYQgU>.

4.2.2. Rural/urban scenario

To better understand the rural ICT development of Bangladesh, it is crucial to scrutinize some of the rural indicators of ICT development. Table 4.4 shows the accessibility and knowledge of digital devices in the rural areas of Bangladesh. The percentage of people owning smartphones is less than feature phones that cannot use Internet services such as paying bills online. This is because feature phones have fewer options than smartphones to access the Internet. By ownership, it means a person buys a phone with their income or with an income that is not

labelled as a 'loan'. Moreover, only a small percentage of rural households have computer access, and a large portion of people cannot operate a computer (i.e. minimum computer literacy). Similarly, a large part of the rural population does not have Internet access, indicated by the vast majority of the population without Internet connectivity. Internet connectivity shows the percentage of the rural population that can connect to the internet using either mobile phones, broadband connection, at a shop or someone else.

Table 4.4: BIGD Rural Digital Literacy Survey statistics (percentage of the rural population)

Ownership of mobile phones	
Smartphone	28.85
Feature phone	53.88
Both feature and smartphone	9.63
Total	92.36
Do not own mobile phones	7.64
Computer use	
Use computer available at home	2.4
Use computer from other sources	5.94
Total	8.34
Do not need a computer	14.12
Cannot operate a computer	77.54
Familiarity with the Internet	
Only heard about the term 'Internet', but do not know much about it	36.04
Know the term Internet and a little about it	35.63
Know the term Internet and a lot about what it is	10.65
Total	82.32
Do not know the term	17.68
Internet connectivity	
Connects to the Internet through a computer shop or other's phone	2.34
Connects to the Internet through broadband or mobile data	34.66
Total	37
No Internet connectivity	63

Source: BIGD Digital Literacy in Rural Bangladesh, Survey 2019. For detailed survey data see <https://bigd.bracu.ac.bd/publications/digital-literacy-in-rural-bangladesh/>.

Since digital literacy and access in rural households are still developing, there is a distinct disparity in the rural and urban ICT landscape. Table 4.5 highlights the key indicators capturing the rural/urban contrast in financial inclusion. It is evident that even if the percentage of households having an account at a bank or another type of financial institution or a mobile money account is almost similar, the proportion of rural households with financial institution accounts is lower, and the percentage of rural households with mobile money accounts is higher when compared to their urban counterparts. This is because operating mobile money accounts using feature phones is more accessible than digital features of

financial institution accounts. Moreover, there is less access to digital services from non-state financial institutions in rural areas.

Urban households are more inclined to pay utility bills than rural households because of higher smartphone access. However, the percentage of rural households receiving remittances or government transfers and pensions was higher than in urban areas. This shows that the rural population has the potential to embrace digital financial transaction methods and the introduction of training and education, and more exposure to digital services will help ICT connectivity to grow further.

Table 4.5: Financial inclusion in Bangladesh, 2021 (percentage age 15+)

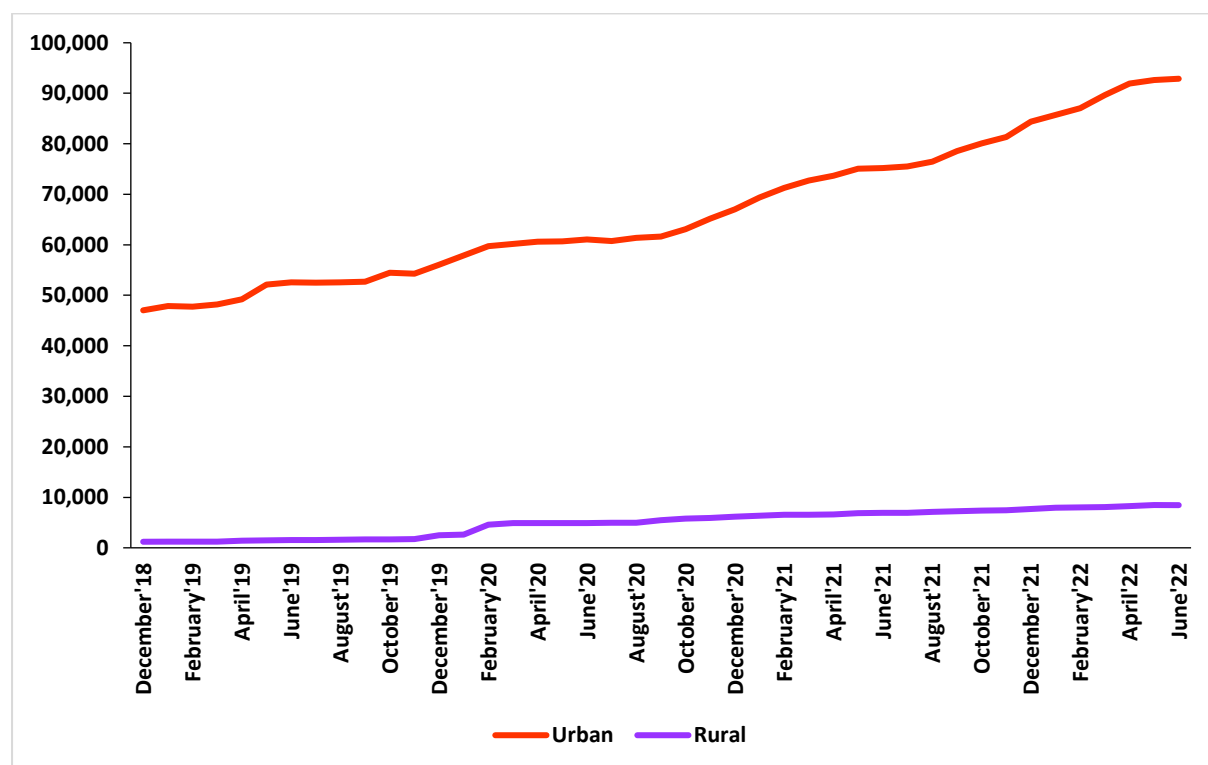
Global financial inclusion series, 2021	Rural	Urban	Total
Account	49.99	53.70	52.80
Financial institution account	30.10	40.08	37.70
Mobile money account	34.06	27.41	29.00
Made a utility payment	32.49	40.25	38.40
Made or received a digital payment	44.70	45.44	45.30
Received government transfer or pension	13.15	9.74	10.60
Received wages	18.33	19.28	19.10
Sent or received domestic remittances	33.46	31.98	32.30
Used a mobile phone or the Internet to pay bills	8.75	11.08	10.50
Used a mobile phone or the Internet to send money	19.96	16.83	17.60
Owns a debit or credit card	3.96	5.24	4.90

Source: World Bank (2022). For further details see <https://databank.worldbank.org/source/global-financial-inclusion#>.

Figure 4.3 indicates that the acceptability and prevalence of digital devices such as point of sale (POS) is higher in urban than rural areas and is accelerating faster in urban than in rural

areas. This is because technologies such as POS require a certain degree of education and training, which is not yet prevalent in the rural areas of Bangladesh.

Figure 4.3: Number of points of sale, rural and urban

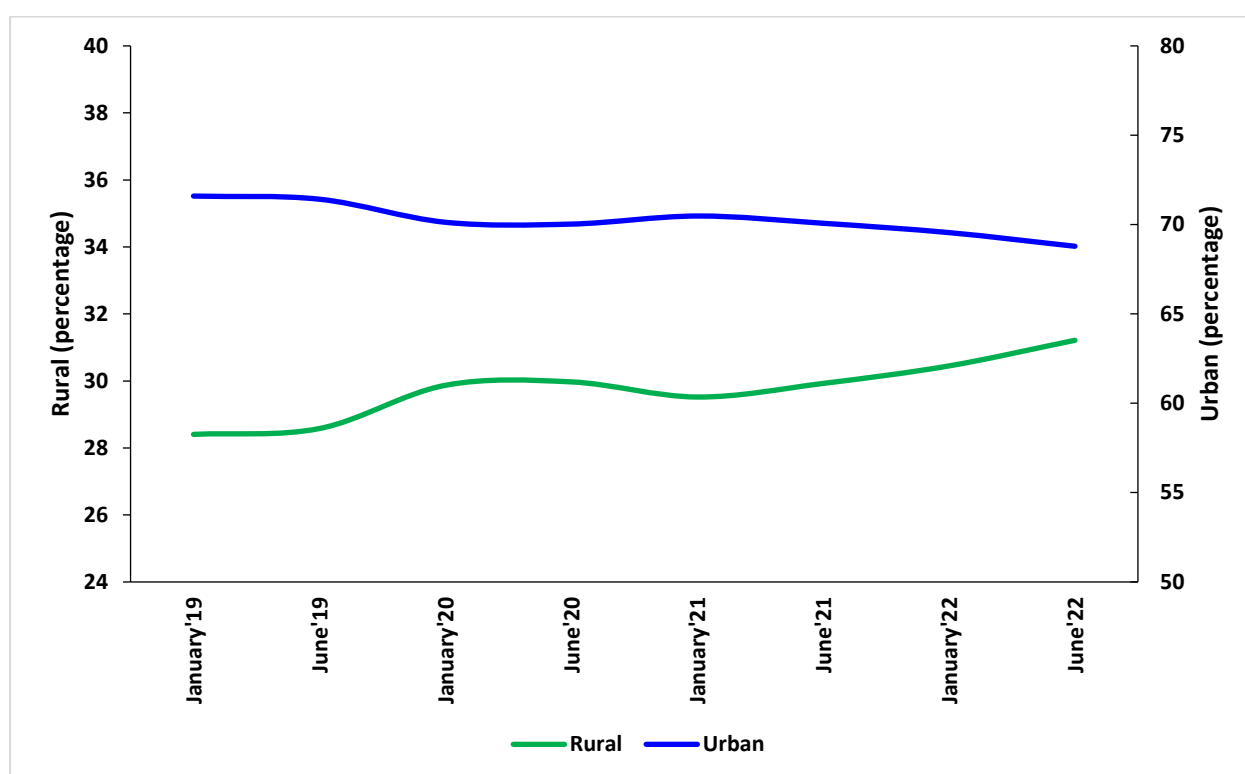


Source: Bangladesh Bank Digital Financial Inclusion Statistics (2022).

From figure 4.4, it is evident that the availability of technologies such as ATMs is similar to POS, with a higher percentage of ATMs in urban areas. However, with increased access to various financial institutions in rural

areas, the number of ATMs is growing proportionally, while the number of ATMs in urban areas is decreasing. This means that the diffusion of such technologies in rural areas will undoubtedly occur in the long run.

Figure 4.4: Percentage of ATMs, rural and urban

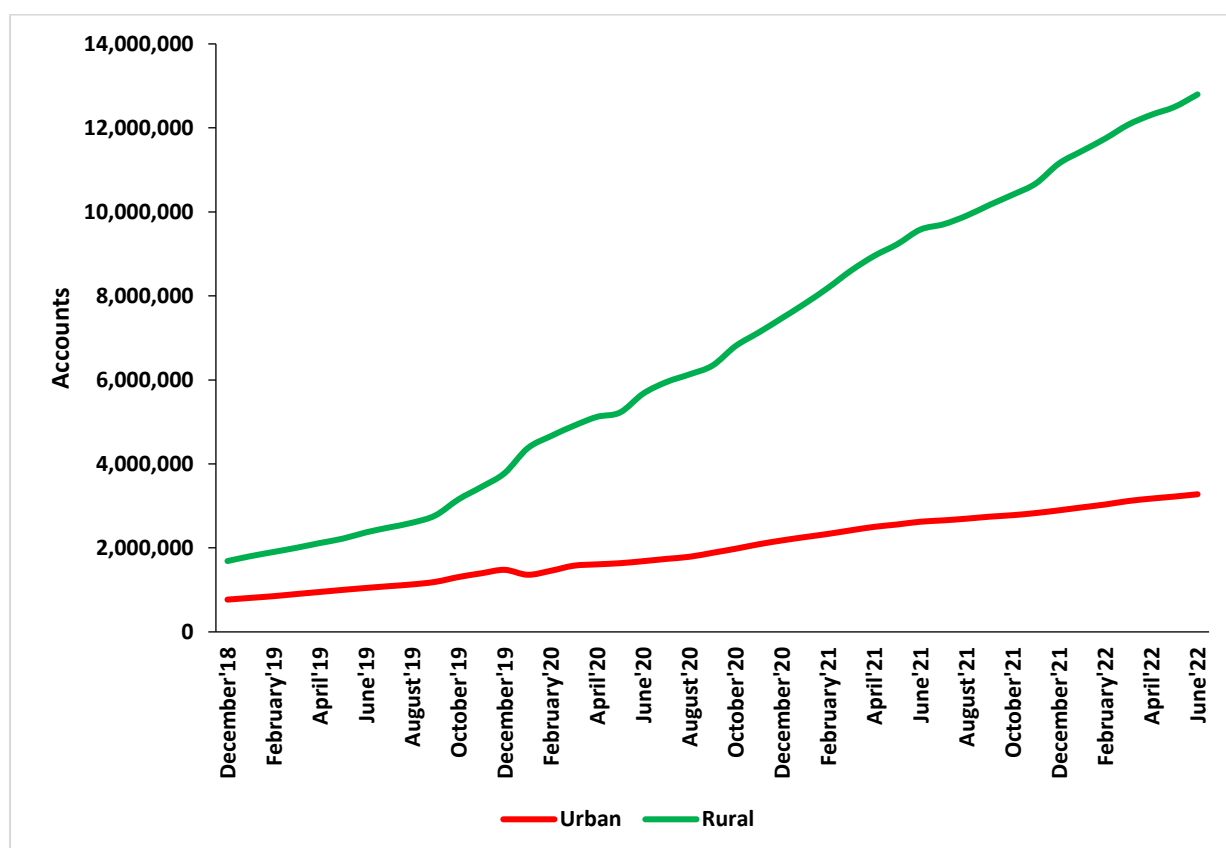


Source: Bangladesh Bank Digital Financial Statistics (2022). For details see www.bb.org.bd/en/index.php/econdata/index.

Moreover, multiple agent banking schemes are operational in rural areas to enable more of the rural population to access financial services, as shown in figure 4.5. It is evident that the number of agent banking accounts in rural areas is significantly higher and

accelerating faster than the number of agent banking accounts in urban areas. This means that even though rural areas are not yet dependant on these technologies, there are other ways in which the rural population is satisfying the need for financial services.

Figure 4.5: Number of accounts, agent banking, rural and urban



Source: Bangladesh Bank Digital Financial Statistics (2022).

4.3. Preparedness

Since it began transforming into a knowledge-based economy in 2009, Bangladesh has progressed in its journey with commendable achievements. This is because the Government fostered the expansion of the ICT revolution. This section

illustrates some of the preparedness initiatives over the past 15 years for rural ICT connectivity, in terms of objectives mentioned in ICT policies/acts as well as national policy documents such as, Vision 2021, Vision 2041 and FYPs.

4.3.1. Enchaining e-commerce and e-finance

4.3.1.1. Access to digital commerce

Since the adoption of the National ICT Policy 2009, the Government has helped to enable ICT use in e-

transactions, e-commerce and e-procurement. For instance, through the implementation of BanglaGovNet and

InfoSarkar, the Bangladesh Computer Council, a statutory government organization under ICTD, has begun expanding the government-wide network to all offices at the district and upazila level. Initiatives have expanded broadband Internet infrastructure and 5,400 unions were connected to broadband Internet to improve government efficiency and promote interaction between ministries/divisions, departments, districts and upazilas.

Bangladesh is actively developing specialized infrastructure to fulfil the specific needs of the ICT industry. Initiatives include establishing Kaliakoir Hi-Tech Park, Janata Tower Software Technology Park and Jessore Software Technology Park, which are intended to serve as specialized economic zones that are vital to the country's ICT economy. Additionally, three private software technology parks have been approved by the Bangladesh Hi-Tech Park Authority, and plans are underway for proposed projects, such as Mohakhali IT Village, Silicon City Rajshahi and Electronic City Sylhet.

The comprehensive approach includes the Twelve IT Park Project, which features unique designs in several districts such as Barisal, Dhaka, Cumilla, Chattogram, Cox's Bazar, Gopalganj, Jamalpur, Khulna, Mymensingh, Nator, Rangpur and Sylhet. Simultaneously, an information technology training incubation centre has been proposed for various sites. Currently, 28 public high-tech and software technology parks, as well as 12 commercial software technology

parks, are in various phases of development, with some already functioning.

The Government has been promoting innovation by offering funds, mentorships, networking opportunities and investment readiness assistance to innovative startups at various phases of development throughout Bangladesh. To foster innovation and entrepreneurship, the government established the Innovation Design and Entrepreneurship Academy (iDEA) within ICTD to provide incubator space, finance and mentorship services. Janata Tower Software Technology Park, the country's first information technology incubator, provides companies with free office space, dedicated mentorship and other accelerator services for up to one year.

To boost e-commerce activity in the country, Bangladesh Bank has launched a national payment switch to ensure the interoperability of various payment channels. Commercial banks with an ATM/POS/e-payment switch or those connected to another shared switch network can send inter-bank or inter-switch payment instructions to the national payment switch for clearing and settlement purposes. There has also been success in organizing annual fairs, exhibitions and focused training for local businesses, as well as road shows and other interactive events such as seminars.

To create an efficient ecosystem for the e-commerce industry, the Government has established an integrated and supported e-commerce platform,

“ekShop”, as the world’s first complete, aided rural e-commerce platform. Entrepreneurs can already reach customers in 10 nations using the ekShop platform, and the platform may soon reach another 18 nations. The serves as the logistical backbone of the country’s e-commerce industry, and aims to empower marginalized producers and disadvantaged entrepreneurs across Bangladesh so that they have the opportunity to sell directly to their customers. To date, 5 million transactions valuing \$10 million have taken place.

The Ministry of Commerce founded the Digital Commerce Cell to regulate and facilitate the digital commerce sector.

4.3.1.2. Access to digital finance

Bangladesh has launched online payments for internal and international transactions, which will benefit freelancers who make a small, fixed income from ICT services. Online payment gateway service providers support cost-effective remittances through authorized dealer banks. The Investment Promotion and Financing Facility (IPFF) project, which is co-sponsored by the Government and Bangladesh Bank, now includes ICT infrastructure projects among its eligible sectors. This policy update resulted in a \$20 million fund approval for a national telecommunications transmission network operator to enhance fibre optics infrastructure, demonstrating the Government’s commitment to expanding the ICT sector.

This dedicated body is responsible for developing digital commerce regulations, policies, norms and guidelines, educating entrepreneurs, advocating for policies and carrying out awareness and outreach programmes. To further promote e-commerce and provide job possibilities, the Ministry of Commerce has established the “I will do e-commerce, build my own business” project. This initiative intends to train 5,000 new e-commerce entrepreneurs, focusing on rural areas. Lastly, the Bangladesh Regional Connectivity Project empowers women entrepreneurs by providing training in cut-flower production, agroprocessing and ICT skills.

Bangladesh has seen extraordinary expansion in digital financial account access, particularly in rural regions, with broad adoption of branchless banking and MFS, resulting in a client base of over 100 million. Bangladesh Bank has installed agent banking software to automate overall banking procedures, ensuring that most government financial transactions are settled automatically and that government accounts are balanced on a regular basis. Financial inclusion has grown dramatically due to the quick rise of mobile banking and agent banking in rural regions, with the latter increasing by 6.47 times over the past five years. Women’s participation in rural agent banking has increased by an average of 6 per cent, resulting in 6.6 billion

consumers. In addition, MFS accounts in rural areas have grown by an average of 3 per cent during the past five years. The Real-Time Gross Settlement system attempts to speed up financial operations by allowing for rapid transfers of substantial funds from urban to rural locations.

The DFS Lab at a2i in Bangladesh supports the Government's attempts to digitize government-to-person and person-to-government transactions. It focuses on accelerating innovation, developing business models, increasing biometric identification use, improving service interoperability, and democratizing data for financial inclusion. The DFS Lab helps shape the architecture of an integrated digital service delivery system by building capacity across sectors and lobbying for legislation that promotes innovative digital financial services for the poor while protecting consumer interests. The Sathi network, established by a2i, is a dedicated women-led agent network to promote digital and financial literacy among rural women.

The Government of Bangladesh, with the assistance of a2i, has implemented a citizen-centric digital payments infrastructure to enable leakage-free disbursement of social safety net payments and the establishment of inclusive digital financial services. The approach includes agent banking through 3,958 digital centres, which allows more than 1 million citizens to obtain allowances through the digital government-to-person payment system. The Citizen's Choice Architecture permits allowances to be

disbursed at accessible cash-out locations at the union level or at the homes of older people and people with disabilities. The system reduces travel and costs for beneficiaries, requiring only an active mobile data connection.

Digital platforms have been implemented to help provide person-to-government services. For example, EkPay, a digital platform launched by DFS Lab, provides a one-stop bill payment solution for various bills in Bangladesh. Since its inception, it has benefited 3.9 million citizens and collected \$75 million in bill and fee payments. EkPay operates throughout Bangladesh, allowing users to pay bills anytime and from anywhere. Users can access the platform online through integrated financial service providers or a network of more than 250,000 agents. Users benefit from the platform's interoperability, which provides accessibility, reliability and security.

Rural branchless banking has been developed in Bangladesh to assist the poor and illiterate, who are currently unbanked. Mainstream banks may now provide real-time, full-service banking services by connecting to an existing agent network, such as the more than 4,500 digital centres and establishing instant presence nationwide in rural areas. Rural branchless banking points enable customers to open bank accounts, pay utility bills, make regular deposits and withdrawals, obtain loans, and acquire insurance. The route has facilitated the payment of government social safety net allowances, subsidies, and international remittances. The campaign has opened accounts with

balances totalling \$3.1 million, saved \$2.39 billion for rural residents and issued \$372 million in loans.

4.3.2. Reshaping tomorrow's education for all (access to skills)

The ICT development of the country so far has painted a promising future, one that is set to propel it towards achieving Vision 2041. Premised on an ecosystem of comprehensive twenty-first century learning, the Blended Education Accelerator (BEA) is a public-private collaboration that aims to reform the education approach of Bangladesh, bearing accessibility, equity, and socioeconomic advancement as the foremost priorities. The BEA sprouts from a cross-institutional effort that engages the Ministry of Education, ICTD, UNDP Bangladesh and the a2i programme. BEA outlines the methodology towards empowering educators, equitable educational practices with varying technological resources, and innovation that cultivates a human-centred approach to educational infrastructure. BEA aligns with the World Economic Forum's Closing the Education Gap Accelerators global learning network, connecting the country's education system to the global transformation of primary and secondary education.

Also, the a2i programme has more than 250 projects and has accelerated more than 60 prototypes from grassroots innovators with a view to scaling up for upazila and village level education with the help of private and public sectors. The Bangladesh Computer Council has

set up computer labs in 3,544 educational institutions in order to expand ICT education at the grassroots level. The digital innovation fair (district and sub-district level) has also been introduced to encourage students to engage with innovative learnings and projects.

Empowering the front line of education in Bangladesh has been of the utmost importance towards realizing digital learning goals and eventual smart education goals. In light of the need for a scalable and accessible training platform for educators countrywide, Teacher's Portal, established in 2011, has connected more than 600,000 teachers. The platform serves as a tool for teachers to better engage in discourse regarding educational content, practices and tailor-made assessment tools for enhanced learning. Teacher's Portal has led to the transformation of the education system towards a teacher-driven and learner-focused outcome that will advance the nation towards the smart goals of Vision 2041.

Launched in 2018, Konnect is a milestone in the technology education revolution in Bangladesh powered by a2i. Konnect aims to empower 36 million adolescents in Bangladesh with an alternative online social platform to nurture talents. Konnect, in its five-year

journey, has connected more than 3 million students across the nation with more than 35,000 “edutainment” materials on topics ranging from life skills to painting and photography. Moreover, Sheikh Russel Digital Labs initiative has established some 4,176 labs across the country.

MuktoPaath is another technology education platform that broadens the expanse of education in the country, offering professional development courses at affordable costs. Offering more than 200 such courses, MuktoPaath has served 1.98 million learners from all backgrounds since 2016.

The Government has planned to launch an information technology business incubator at Chittagong University of Engineering and Technology (CUET) to bridge education and broader economic mechanisms. The incubator aims to effectively connect academia with the fast-growing manufacturing industries of the country. The establishment of this incubator proposes a narrative of technology-driven growth for the economy, as seen in the recent establishment of high-tech information technology parks and resources. With a link between academia and industry, educational advancement in Bangladesh will reap benefits that will contribute to achieving the Smart Bangladesh Vision 2041.

4.3.3. Reaching citizens’ doorsteps (access to consumer)

Vision 2041 demands the engagement of the country’s citizenry in all regards. The attainment of that goal begins with the provision of ICT infrastructure in the context of public services. Establishing digital centres at the union level has played a vital role in laying the foundation for this movement. With a network of over 4,500 centres overseen by the a2i initiative, an estimated 500 million citizens have received public and private services. The network of union level digital centres merges with 46,500 government offices, creating a national gateway essential for the engagement of all stakeholders in a smart Bangladesh.

Through 4,571 digital centres at the union level people from remote villages are able to access various services

online. The a2i programme has introduced e-Mutation, a service to provide citizen responsive, hassle-free land service with the use of ICT in improving the operation of land administration. Around 1.5 million citizens have been benefited from obtaining services through e-Mutation from 485 upazilas and more than 4,560 offices.

Beyond services such as birth registration and banking, the network of digital centres has supplemented digital entrepreneurship, with almost \$40 million earned by the entrepreneurs engaged. The wave of the e-commerce revolution has been made accessible to those who lack computers or technological resources. These services have paved alternate avenues

of growth and commercialization for a smart Bangladesh.

Embracing the movement towards a smart Bangladesh, the post-office network has been revitalized as digital centres offering information technology training and development to the underprivileged. The network of 8,500 post office digital centres now provide for the engagement of the masses with information technology, fostering the smart citizen goals.

E-government initiatives, specifically those focused on citizen-centric services such as health services at the upazila level, and disseminating agricultural and livelihood information through grassroots outlets, have garnered commendation on the international stage for their positive impact and responsiveness to the needs and well-being of citizens. The acclaim is a testament to the success and effectiveness of these programmes in enhancing public services and contributing to the community's overall welfare. The e-initiatives propel the

nation towards inclusive and citizen-centric growth towards a smart Bangladesh.

Smart goals stem from empirical insights. In an agricultural context, a2i has established a multifaceted dashboard that tracks and monitors data for more practical decision-making concerning the allocation of inputs such as seeds, fertilizers and the management of other agricultural resources. Designing policy to align with real-time movements is vital to attaining smart industrialization.

Marginalized and remote communities benefit significantly from the digital movement of connectivity. A successful example of smart integration is Moheshkhali Digital Island, which has served the community greatly by providing access to the nationwide gateway of services. As these networks expand across the country, the compounding benefits promise a swifter and more efficient progression towards Vision 2041.

4.3.4. Integrating market communication (access to market)

Programmes to establish high-tech parks have provided integrated solutions for innovative tech startups. Even though the number is modest, many private sector entrepreneurs have been working directly with local agricultural producers to enhance the commodity market and their lifestyles. More than 10,000 farmers have profited from iFarmer's innovative supply chain

system, which has completed BDT 385 million in farm financing.

Smart goals stem from empirical insights. In an agricultural context, a2i has established a multifaceted dashboard to track and monitor data for more practical decision-making concerning the allocation of inputs, such as seeds and fertilizers, and the management of other agricultural resources. Designing policy to align

with real-time movements is vital to attaining smart industrialization.

5. Identifying challenges and barriers

The integration of ICT into the Bangladesh economy has proved to be successful in many sectors, such as education and financial inclusivity. Usage of the Internet and digital devices, such as mobile phones, computers and laptops, has significantly increased and their functionality has been integrated into various sectors of the economy. However, even with limited data availability, it is evident that rural areas lag behind urban areas, and they cannot exploit ICT services to their full extent.

Lack of availability of digital devices and affordability: Most online activities, such as online banking, telemedicine and online purchasing, can be done using smartphones or computers, but smartphones are easier to use and have more functionality. However, ownership of smartphones in rural areas was less than 30 per cent in 2019, because digital devices were not affordable. Compared to India, smartphone ownership in Bangladesh is 6.5 per cent lower, as 36.5 per cent of rural households in India have access to smartphones. The high price of digital devices relative to the income of rural residents prevents them from purchasing smartphones and

computers. This means that a large portion of the population are unable to integrate ICT into their daily lives regardless of digital literacy. Any ICT-related project for the rural economy is likely to be hampered until smartphones and computers are used by the vast majority of the rural population. While computers can be set up in rural schools to extend ICT coverage, there is a lack of funding for the required maintenance. It is imperative that other relevant supporting technical devices also receive monetary support from both public and private sources to achieve proper implementation and results of expanded digital coverage.

Lack of data availability: As described in section 4, despite the efforts of several research institutions in initiating the collection of data for ICT, data are insufficient to analyse trends. Relevant and substantial data must be available on ICT usage, especially in rural areas, without which it would be nearly impossible to observe the current scenario of rural ICT connectivity and detect new challenges.

Inadequate digital literacy and consumer awareness: Existing data show that a large portion of the rural

population lacks digital literacy: more than 77 per cent of the rural population are unable to operate a computer. The percentage is slightly higher than in rural India, where 74 per cent of population are unable to operate a computer. Similarly, computer accessibility is low in rural Bangladesh (2.4 per cent) compared to rural India (4.4 per cent), which further intensifies the gap in digital literacy. Education and training on technological devices in rural regions has fallen behind urban regions, possibly because the focus in rural regions was given to traditional primary education and enhancement in other sectors. Without knowledge and training in computer literacy, and without increased consumer awareness, online services will remain unused. While ICT coverage has reached rural areas to some extent, as evidenced by mobile money accounts, residents of rural regions have yet to take advantage of financial institution accounts, telemedicine and other online services. Rural economic growth is hampered as a result.

Lack of skilled labour and employment: In terms of skills, a gap exists between urban and rural areas. According to the latest labour force survey of Bangladesh, only 8.2 per cent of high-skilled labourers work in rural areas, with all others employed in urban areas. The distribution of the sectoral labour force is skewed such that 75 per cent of the labour force of the ICT sector is from urban areas. Evidently, the skills of the rural counterpart of the labour force, especially in ICT, have been relatively overlooked. It should be noted that rapid structural changes in

Bangladesh in the 1990s boosted economic growth; however, the country could not meet the demand for new skills. While a range of programmes aim to integrate ICT knowledge and skills into the skillset of the workforce, these education and training programmes reached urban areas first, resulting in the current skills gap between urban and rural areas. As a result, employment in the ICT industry from the rural sector has also fallen behind and the industry continues to suffer from the inability to retain skilled employees in rural areas.

Absence of rural-centric policies: The FYPs and National ICT Policies of Bangladesh have looked integrating ICT into various sectors of the economy and the rural sector has been addressed to some extent, such as in the case of agriculture. Nevertheless, there is still no document that solely focuses on rural ICT connectivity or issues that need to be addressed to expand ICT coverage in rural areas, which differ vastly from issues in urban areas. Amendments or new policies may be required for the complete integration of ICT in rural areas.

Insufficient interdisciplinary research and development: Research and development in the ICT sector needs more funding to cover sectoral requirements. Interdisciplinary focus is needed, such as that between ICT and health care or ICT and DFS. For example, in Nigeria, utilization of ICT in teaching and learning of agricultural education had not been quite as effective as expected due to multiple challenges, such as

inadequate ICT devices and literacy, lack of needed skills for effective utilization of ICT in universities for agriculture education, etc.²⁵ This is a relatively new observation concerning ICT usage in different sectors that had not previously been considered. The progress of innovation without

interdisciplinary research will likely be hindered significantly. Lack of innovative financial approaches in the case of rural Bangladesh may be a reason why more people from rural regions are not convinced to access digital financial services.

²⁵ A.O. Jannet and M.N. Modebelu (2013). Academic staff challenges to effective utilization of information and communication technology (ICT) in teaching/learning of

agricultural education. *Academic Journal of Interdisciplinary Studies*, vol. 2, No. 7, pp. 77–77.

6. Analysis of strengths, weaknesses, opportunities and threats

Based on the earlier discussion, the following is an analysis of strengths, weaknesses, opportunities and threats (SWOT).

Strengths

- Presence of adequate organizations which can facilitate potentials for enhancing ICT connectivity
- Policies are adopted and revised in a continuous manner
- Political will to accelerate ICT momentum after the COVID-19 pandemic
- Bangladesh has a growing emphasis on digital technology, cybersecurity, artificial intelligence, robotics, health care and information technology, which is driving the growth of the ICT sector

Weaknesses

- Lack of data availability to measure the digital divide as well as the degree of rural ICT connectivity
- The labour force of the ICT sector must progress from low- and medium-skilled to high-skilled
- Digital literacy is far lower in rural areas than in urban areas

Opportunities

- Proper implementation of action strategies with different time frame can increase digital literacy in rural areas
- Within the existing setup, policy can push ICT integration in other sectors, which in turn will eventually lead to reduce digital inequality
- Bangladesh can foster ICT innovation by strengthening think tanks, universities and non-governmental organizations (NGOs)
- Learning from successful cases
- Bangladesh has a thriving start up ecosystem with a foreign venture fund of more than \$750 million creating more than 1.5 million jobs

Threats

- Stakeholder misallocation
- Institutional loopholes that delay regulations, policies and market efficacy due to the decentralized institutional structure within a centralized system, which is common in South Asian and South-East Asian countries

7. Key stakeholder mapping on rural ICT connectivity

Based on the overall discussion of rural ICT policies and stylized facts in the previous sections, we propose action plans and relevant stakeholders to

further integrate the ICT sector into the Bangladesh economy. Table 7.1 shows the proposed action plans and stakeholders for rural ICT development.

Table 7.1: Proposed action plans and stakeholders for rural ICT development

Action plans	Targeted goals	Stakeholders	Expected outcome
Increase smartphone availability in rural areas	-Investment in government-subsidized projects or private-public collaboration projects to provide low-cost smartphones -Serve SDG 4 as it will ensure rural inclusion and advocate learning opportunities for the backward communities through use of smartphones and access to ICT	Planners/observers - ICTD - Ministry of Posts, Telecommunications, and Information Technology (MoPTIT) - Ministry of Local Government - Ministry of Social Welfare - Ministry of Planning - a2i Implementers - ICTD and supporting wings - All associate divisions of the respective ministries - a2i - Public-private partnerships and donor agencies for funding	To increase rural inclusion in ICT services and to achieve SDGs
Develop a sector-wise, rural-specific ICT data set	-Disaggregated, division and district wise men-women data set on the use of ICT and digital footprints -Useful database to depict rural/urban disparity and cross-country ICT comparison	Planners/observers - ICTD - MoPTIT - Ministry of Planning - Ministry of Local Government Implementers - ICTD and supporting wings - a2i - Bangladesh Bureau of Statistics - Think tanks - IMED - Startups	To establish data archive for analysis

Provide awareness and develop ICT literacy programmes for the rural community	-Proper ICT usage among the rural public to gain access to the market for e-commerce, online financial services (MFS and DFS), telemedicine, direct remittance, social protection benefits, etc.	Planners/observers - ICTD - MoPTIT - Ministry of Planning - Ministry of Commerce - Ministry of Education - Ministry of Social Welfare - Ministry of Finance - Ministry of Health and Family Welfare - Central Procurement Unit Implementers - ICTD and supporting wings - a2i - All associate divisions of the respective ministries - Public-private partnerships - All affiliated bureaus, NGOs and fintech investors	To enable the rural community to gain access to and effectively use digital financial services, telemedicine, etc.
Ensure stable broadband connectivity in rural areas	-Provide affordable and reliable broadband internet connection to rural communities that will assist them to avail ICT services -Access to more knowledge and information to the rural community, reducing the digital divide between themselves and their urban counterparts	Planners/observers - ICTD - MoPTIT - Ministry of Planning - Ministry of Education - Donor agencies Implementers - ICTD and supporting wings - Posts and Telecommunications Division and supporting wings - a2i - All associate divisions of the respective ministries - Connectivity start-ups for the bottom of the pyramid	To heighten the use of ICT services and facilities by ensuring stable internet connection for the rural people which is pre-existent in the urban counterparts
Involve direct beneficiaries in the planning process	-Involve direct stakeholders or beneficiaries into the rural action plans to achieve the optimal output	Planners/observers - ICTD - Ministry of Planning - Cabinet Division - a2i Implementers - ICTD - a2i - All associate divisions of the respective ministries - Elected local representatives	To achieve optimal results of implemented policies

Increase the outreach of agent banking schemes in rural areas	-Increase outreach of the agent banking system to extend the financial services for the unbanked population in the rural areas	Planners/observers - ICTD - Ministry of Planning - Ministry of Commerce - Ministry of Finance - Ministry of Industries - Ministry of Social Welfare - Donor agencies - a2i Implementers - ICTD and supporting wings - a2i - Bangladesh Bank - All associate divisions of the respective ministries - Local government division - Startups and technology education companies	To increase the outreach of the financial service to the unbanked rural population
Develop community-based supply chain mechanisms through ICT	-Develop community-based supply chain mechanisms to help producers learn about demand patterns and prices (both at national and community level) effectively, which would eventually help them to forecast production volume	Planners/observers - ICTD - Ministry of Planning - Ministry of Agriculture - Ministry of Textiles and Jute - Ministry of Commerce - a2i - Startups Implementers - ICTD and supporting wings - a2i - Local government division - Palli Karma-Sahayak Foundation - E-commerce Association of Bangladesh	To forecast production volume and prices effectively

Source: Author's compilation.

8. Conclusion and the way forward

The Government of Bangladesh has made great strides in integrating ICT into the economy in the past decade. The realization of the importance of ICT led to the formulation and implementation of multiple national ICT policies and supporting acts, covering most sectors to varying extents. While these acts and policies have made considerable improvements in a large portion of the economy, especially in urban areas, the rural areas have not experienced comparable growth and have less ICT coverage.

The analysis of available ICT-related documents, including policies, acts and strategies, has identified the areas of the economy that have received less attention and where ICT coverage can be extended. All available ICT-related data have been consulted to show the current situation of rural ICT connectivity. Moreover, challenges in expanding ICT coverage and implementation in rural Bangladesh have been discussed along with specific proposed action plans and potential stakeholders for the Government to consider in the near future.

In most Asian countries, institutional fragmentations within a centralized system can be observed. Institutional loopholes in the broad ICT sector in many Asian developing countries result in the slow progress of ICT

development. Therefore, urgency should be given to reforming institutions engaged with the financial system, technology and infrastructure development, planning and dissemination, and decision-making processes in various timeframes.

The importance of regional collaboration and coordination for improving rural ICT connectivity in Bangladesh is immense. Knowledge generation and transformation in Bangladesh and other South Asian and South-East Asian countries is crucial for the success of the rural ICT development strategies recommended above. Hence, Bangladesh can collaborate with neighbouring countries and work together to address critical challenges to facilitate rural ICT development. For instance, with the help of international think tanks and NGOs, workshops and seminars can be held for representatives of each country to freely share their ideas, information and experiences (such as institutional loopholes and socioeconomic misalignments), which can be utilized effectively for rural ICT development across the region. Besides, government and private organizations of different Asian countries can come together under one forum and develop committees, frameworks and projects to improve access to rural ICT connectivity across peer countries. Collaboration projects

and mutual funding can create opportunities for learning from countries with better rural ICT connectivity and implementation of such strategies in Bangladesh.

To initiate regional collaboration, Bangladesh can focus on the Asia-Pacific Information Superhighway initiative (APIS), which has been promoted by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) since 2016. This region-wide intergovernmental platform aims to bridge the digital divide and accelerate digital transformation in the Asia-Pacific

region by promoting digital connectivity, digital technology and data use. It should be noted that this platform promotes regional policy dialogues and consultations, mobilizes cooperation and partnerships, conducts analytical research and surveys, shares knowledge and good practices, and supports capacity-building, among other similar activities. With this platform, the Government of Bangladesh can present its ideas and objectives and collaborate through intergovernmental mechanisms on actions to minimize the digital divide and revive digital transformation that halted during the pandemic.

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