THE FUTURE OF DIGITAL IN BANGLADESH

DIGITAL READINESS ASSESSMENT

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brac institute of governance & development

Pathways for Prosperity Commission
Technology & Inclusive Development

BLAVATNIK SCHOOL OF GOVERNMENT

UNIVERSITY OF OXFORD

THE FUTURE OF DIGITAL IN BANGLADESH

DIGITAL READINESS ASSESSMENT

A report by
BRAC Institute of Governance and Development (BIGD) in partnership with
the Digital Pathways at Oxford

Digital Readiness Assessment: The Future of Digital in Bangladesh

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Currently, in Bangladesh, we have been experiencing that the different pockets of production are being revolutionized by new technology – we are anticipating progress, but certainly not overnight. The challenges being there, we believe that the overall impact of new technologies will be determined by how they are adopted, the extent to which they are adopted profitably, and how indirect impacts filter through the rest of the economy. Partnering with the University of Oxford's Digital Pathways Initiative, BRAC Institute of Governance and Development (BIGD) intends to chart a pathway for Bangladesh to decide holistic strategies to accelerate its inclusive growth in the digital age through this project. This work involves assessing the country's current digital readiness, deciding priorities through dialogue with high-level stakeholders, and finally crafting a strategy primer. This report is the first major deliverable of the project.

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LIST OF ACRONYMS

AI	Artificial Intelligence
A2i	Access to Information
BASIS	Bangladesh Association of Software and Information Services
BIDA	Bangladesh Investment Development Authority
BIN	Business Identification Number
BEZA	Bangladesh Economic Zones Authority
BMET	Bureau of Manpower, Employment, and Training
BPO	Business Process Outsourcing
BSEC	Bangladesh Securities and Exchange Commission
BTCL	Bangladesh Telecommunications Company Limited
BTEB	Bangladesh Technical Education Board
BTRC	Bangladesh Telecommunication Regulatory Commission
BUET	Bangladesh University of Engineering and Technology
e-CAB	e-Commerce Association of Bangladesh (e-CAB)
ECNEC	Executive Committee of the National Economic Council
ERG	Economic Research Group
ERP	Enterprise Resource Planning
e-TIN	e-Tax Identification Number
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
4IR	Fourth Industrial Revolution
HEQEP	Higher Education Quality Enhancement Project
ICT	Information and Communication Technology Center
IFC	International Finance Corporation
ILO	International Labor Organization
IoT	Internet of Things
IP	Intellectual Property
ISP	Internet service provider
IT	Information Technology
ITES	Information Technology enabled Services
LEDP	Learning and Earning Development Project
LICT	Leveraging ICT for Growth, Employment, and Governance
MFI	Micro Finance Institutions
MFS	Mobile Financial Services
MoF	Ministry of Finance
M/SME	Micro/Small and Medium Enterprise
NAPE	National Academy for Primary Education
NBFI	Non-Banking Financial Institutions
NID	National Identity
NFAP	National Frequency Allocation Plan
NSDA	National Skill Development Authority
NTVQF	National Training and Vocational Qualification Framework
PO	Producers' Organisation
PPP	Public-Private Partnership
SBCL	Startup Bangladesh Company Ltd
SFSA	Syngenta Foundation for Sustainable Agriculture
STEM	Science, Technology, Engineering, and Mathematics
STEP	Skills and Training Enhancement Project
TVET	Technical and Vocational Education and Training
UDC	Union Digital Center
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
VAT	Value Added Tax

GLOSSARY

Business Process Outsourcing (BPO)	The contracting of specific business processes to a third-party service provider
E-commerce	Commercial transactions conducted electronically on the internet
Freelancing	Working independently or using professional associations or websites to get work
IT/ITES Industry	The Information Technology (IT)/ The Information Technology-Enabled Services (ITES) industry provides services that are delivered over telecom or data network to a range of external business areas
Mobile Financial Services (MFS)	A service provided by a bank or other financial institution that allows its customers to conduct financial transactions remotely using a mobile device such as a smartphone or tablet
Offshore Services	The practice of partially basing a company's processes or services overseas to take advantage of lower costs
Startup	A startup is a company in the first stage of its operations, often being financed by its entrepreneurial founders during the initial starting period

ABOUT THIS REPORT

The contribution of this report is two-fold. First, it offers a systematic discussion of the current state of digital readiness in Bangladesh. Second, the report explores some opportunities that are critical for the country in shaping its digital future.

Today's accurate assessments are the blueprint for tomorrow. The digital readiness assessment report, therefore, analyses the readiness conditions across the four pillars of the digital economy in Bangladesh—infrastructure, human capital, finance, and policies. It diagnoses the current state of those conditions, identifying some potential challenges within the underlying context of readiness. According to the toolkit developed by the Pathways Commission, Oxford, these four interconnected pillars help us better understand the challenges of technology adoption for inclusive growth in the digital age. The assessment report, therefore, creates a baseline of knowledge of Bangladesh's current capacity in terms of these pillars to leverage the economic opportunities in the future.

Next, the opportunity assessment report identifies three economic opportunities that Bangladesh has the potential to take advantage of in the next 10 years. They include: a) Scaling up BPO and IT/Software industry in Bangladesh, b) Connecting the informal sector to the formal one in Bangladesh through the help of digital technologies, and c) Expanding the start-up scene in Bangladesh. For this section, we initially developed an opportunity matrix tool considering GDP contribution of the sectors, government and development partners' priority, adequate investment flow, forecasted long-term rising, and value addition in general development strategy. We had a further series of formal and informal consultations with the relevant government, private sector, and civil society stakeholders to finally identify the opportunities that would be realistic. These two assessments tell a story of hope: what is working well, what the existing challenges are, and how the vision of Digital Bangladesh ties into its goal for improvement.

CONTENTS

THE READINESS ASSESSMENT

This report analyses the current state of play of the pillars of the digital economy that include infrastructure, human capital, finance, and policies through an opportunity-oriented lens.

We find out some readiness conditions for the first three pillars, and group them under two broad dimensions: a) Inclusiveness and b) Appropriateness. The readiness conditions for each of the three pillars grouped under these two dimensions have been assessed with up-to-date data and compared with the relevant regional and international standards. Considering the implications, if the current state of any condition is found satisfactory, we assign a green light with a well on track status for it. If we find a moderate gap, but with visible efforts to improve the condition, we say it needs improvement and assign an amber light. If we find a significant gap and low or no effort to improve, we conclude with a red traffic light and the least ready status for that specific condition.

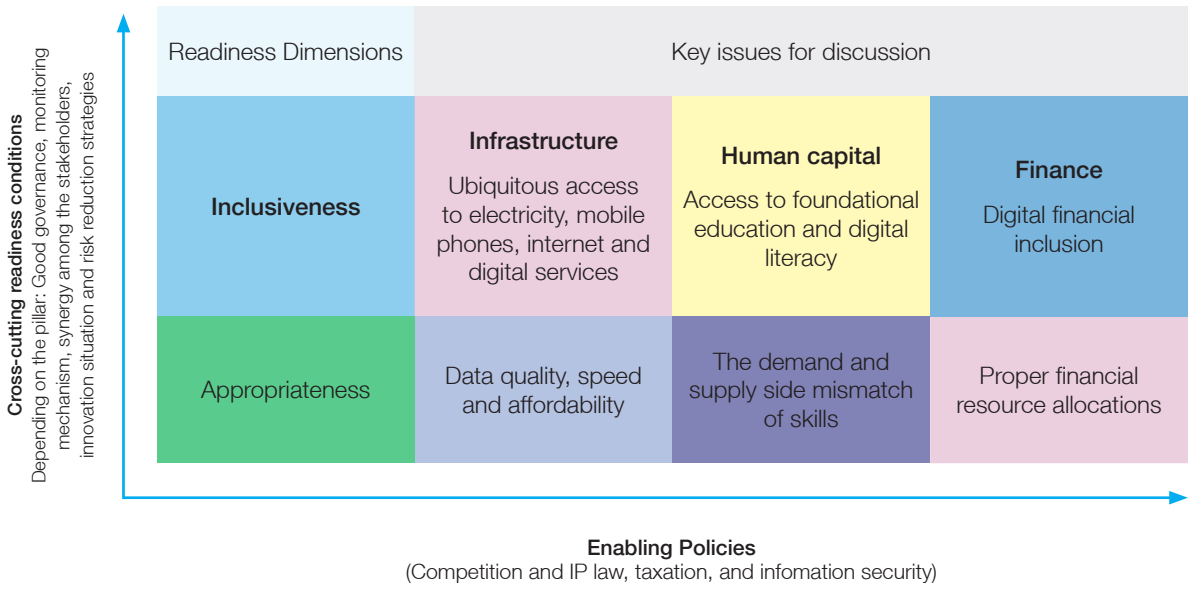
For both the dimensions, considering the well on track status as a benchmark, we eventually form a radar diagram to visualise the state of readiness of the pillars. It helps to identify where we need to put in more effort to be digital-ready. We assign a score of 1, 2, and 3 respectively for the least ready, needs improvement, and well on-track status for each condition to draw the diagram.

There is a separate discussion around some cross-cutting issues such as good governance, monitoring mechanisms, synergy among the stakeholders, innovation situation, and risk reduction strategies, depending on the pillars' requirements. We identify that these additional readiness issues of the pillars intersect with the conditions discussed under the previous two dimensions, and are important to maintain a constantly upward direction of development over time, in an integrated way.

Finally, we discuss some relevant ICT policies and regulations such as competition and IP law, taxation, and information security issues in a separate chapter, and explain how they contribute to creating an enabling environment within the nexus of overall digital readiness. There are numerous ICT related policies in Bangladesh, however, we consider only those by which the readiness conditions of our other three pillars can essentially be benefitted.

Therefore, the assessment framework in this report is as follows:

Digital Readiness Assessment



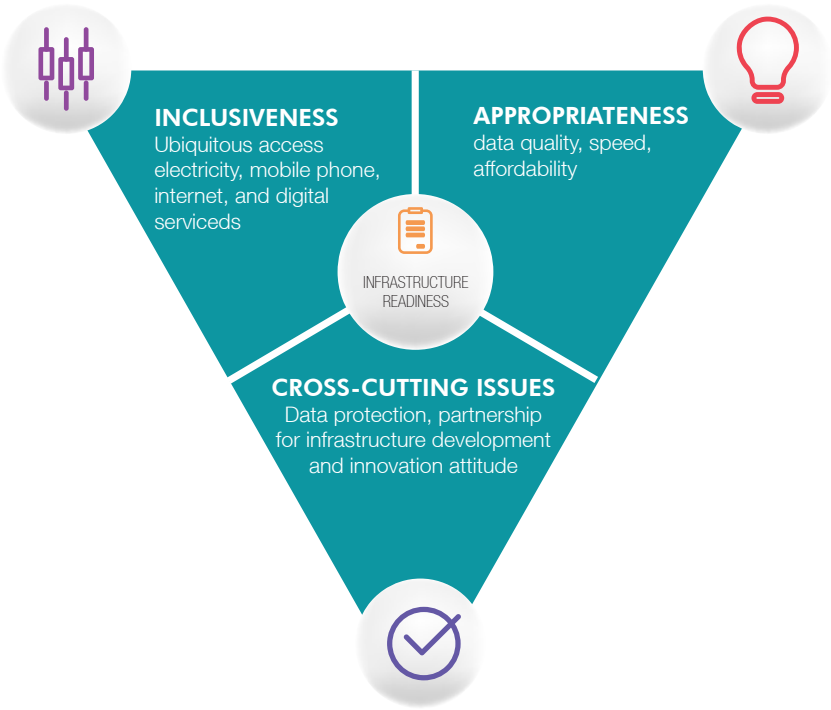
INFRASTRUCTURE READINESS

Electricity and digital devices have already become essential to our daily lives and are gradually turning into important tools for the delivery of services in Bangladesh. The most popular component of digital infrastructure nowadays is a reliable and fit-for-purpose mobile and internet connection. However, the digital divide, in terms of access to and use of infrastructure has been creating, as well as intensifying social, economic, gender, and regional inequalities in Bangladesh.[1]

To build a digital future based on shared prosperity and universal access to digital infrastructure is critical. We, therefore, consider the notions of equity, and ubiquitous access to the infrastructure across various geographies and demographics under the inclusiveness dimension for this pillar. Four necessary readiness conditions under this dimension are: a) access to energy, b) mobile network coverage, c) access to internet connections, and d) access to digital services and e-Governance.

Next, we discuss the dimension of appropriateness, because technology should have in-built relevance, be economically viable, and bring advantages and positive benefits to the community and individuals. Under this dimension, issues related to a) data quality and speed, and b) affordability will be considered.

Even if people are included in the digital nexus with appropriate technologies, the sustainability of the overall structure will still be a challenge without ensuring data protection and security, synergy among the government and other actors in the market who provide access, and finally, without innovations in overall infrastructure design. At the end of this chapter, we will briefly discuss these cross-cutting issues.



[1] BIGD, Findings of Digital Literacy Survey, 2020

KEY FACTS AND FIGURES

1. Bangladesh is well on track in terms of access to electricity
2. Current mobile network coverage is 97%, but 4G users are only 4%
3. A significant gender gap exists in terms of access to the internet
4. Union Digital Centres have been providing assisted digital access to people
5. Poor internet quality results in poor service provision and often hampers businesses
6. Students face challenges due to the problem of high internet price
7. In terms of innovations in ICT infrastructure, Bangladesh stands at the 90th position among 141 countries

INCLUSIVENESS DIMENSION

A. ACCESS TO ELECTRICITY

According to the Global competitive Index 2018, Bangladesh ranked 68th among 141 countries in terms of electricity supply quality.[2] During that period, 85.2% of the overall population of Bangladesh had access to electricity. For the rural population, access was 78.3%.[3] Problems in Bangladesh's electric power sector still include high system losses, delays in completion of new plants, low plant efficiency, erratic power supply, electricity theft, blackouts, and shortages of funds for power plant maintenance. The country's generation plants had been unable to meet system demand over the past decades.

However, there has been substantial progress in electricity generation in recent times. Currently, the utility electricity sector in Bangladesh has one national grid with an installed Generation Capacity (MW) of 20,383 MW. Including Captive Power & Renewable Energy, the total installed capacity stands at 23,548 MW as per June 2020. At present 97% of the people have access to electricity and per capita generation is 510 kWh (including captive and renewable energy).[4] The Government of Bangladesh is also looking for various options for source diversification of electricity supply, preferably renewable energy resources. Although under the existing generation scenario of Bangladesh, renewable energy has a very small share of the total generation, efforts towards improvement are visible. The Renewable Energy Policy 2009 envisioned that 5% of total energy production will be renewable by 2015 and 10% by 2020. The government is facilitating both public and private sector investments in renewable energy projects to substitute indigenous non-renewable energy supplies and scale up contributions of existing renewable energy based electricity productions. Bangladesh is well on track in terms of the development of electrical infrastructure, which is the basic necessity for the further development of digital networks. However, while things are on track, it is important to note that access requirements for those in rural areas should be prioritised while designing interventions.

B. MOBILE NETWORK COVERAGE

In terms of coverage and mobile phone penetration, Bangladesh is in a good state from a readiness standpoint and increasingly bringing more people under mobile network coverage, with the help of four mobile companies: Grameenphone, Banglalink, Robi, and Teletalk. Among these, the last one is government-owned. According to the Global System for Mobile Communication assessment, Bangladesh is the ninth largest mobile market[5]. The total number of mobile phone subscribers is 161.3 million, with a 5.8 million rise from 2019 to 2020[6]. The country currently has a cellular signal coverage of 97% of the area and 99% of the population.[7]

A report by the United Nations Conference on Trade and Development listed out the gains of the country's digital connectivity thoroughly[8]. It was noted that nationwide

[2] Global Competitive Index, World Economic Forum, 2018

[3] World Bank, 2018

[4] Bangladesh Power Development Board BPDB, 2020

[5] GSMA 2017

[6] BTRC, June, 2020

[7] Hernandez 2019

[8] UNCTAD, 2019

coverage of 2G network was 100%, 3G network rose from 90% to 93% from 2017 to 2018, 4G ranged from 65% to nearly 80%, depending on the operators, while 5G services were in the process of being tested as a growth mechanism for the medium-term. This is to mention that among smartphone users, only 4% owned 4G capable devices. In terms of mobile network coverage, therefore, Bangladesh is *well on track*.

C. ACCESS TO INTERNET CONNECTIONS

As for internet connection, Bangladesh still has room for improvement. According to a GSMA report in 2018, Bangladesh, along with Pakistan has had the lowest level of mobile internet penetration in the Asia Pacific region. In 2017, even with 3G coverage of 90% of the population, the country had only one in five people subscribed to mobile internet services. Among neighbouring countries, Nepal and Myanmar had even higher mobile internet penetration, although their GDP per capita is lower than Bangladesh. Then again, Bangladesh's ICT adoption appeared to be in the lower tier, with an overall rank of 108th among 141 countries on the Global Competitiveness Report 2019.[9] This index mainly consists of mobile and broadband internet subscriptions and internet users in the country. However, progress has slowly been made. The most recent data says the total number of internet subscribers has reached 103.5 million at the end of June 2020[10]. This rise is due to the increase in the country's GDP per capita, low median age and expansion of the telecom sector, and various initiatives from the government, such as the a2i project, government offices with internet access, reduced bandwidth price, etc.[11]

The infrastructure should cope with the upsurge of demand for internet consumption. Bangladesh Submarine

Cable Company Ltd (BSCCL) allows the end-users to enjoy broadband services. The basic job of BSCCL is to provide bandwidth to the relevant telecom companies, as well as to corporate users who need international private leased circuits (IPLC) and IP Transit to IIG and ISP. The bandwidth is distributed on a first come first serve basis without any discriminations. Currently, two submarine cables are landing in Bangladesh: SEA-ME-WE 4 (SMW4) and SEA-ME-WE 5 (SMW5), at Cox's Bazar cable landing station and Kuakata cable landing station respectively. Both SMW4 and SMW5 are built and owned by Bangladesh Submarine Cable Company (BSCCL). However, Bangladesh is looking for a third submarine connection.[12] In the last few years, the demand for internet bandwidth skyrocketed, and with the first submarine cable's lifespan of 20 years nearing, the need for a third was raised. The Telecom and ICT Ministries have expressed their interest in getting higher bandwidth and are sharing plans on exporting bandwidths to neighbouring landlocked countries as well.

A significant gender gap exists in terms of access to the internet in the country. A recent study by BIGD says a male individual has 18% more access to the internet than a female.[13] The lack of broadband internet bandwidth across geographies is also working as a systemic infrastructural challenge. In terms of access to the internet, therefore, a moderate gap exists in the infrastructure. However, as there are visible efforts from the government to improve this condition, we assign needs improvement status for this component.

[9]World Economic Forum, 2019

[10]BTRC, July, 2020

[11]Access to Information, A2i

[12]The Daily Star, 2019

[13]BIGD Digital Literacy Survey, 2019

D. E-GOVERNANCE AND ACCESS TO DIGITAL SERVICES

Leveraging ICT for Growth, Employment, and Governance (LICT) project works to improve Bangladesh's position in the e-Government Development Index, published every two years by the UN Department of Economic and Social Affairs.[14] Bangladesh wanted to increase its position on the index by five notches from 150 in 2012 to 145 in 2019, but it has secured 115th position in 2018—ahead of the targeted time. Bangladesh's annual revenue from information technology and IT Enabled Services (ITES) increased by $280 million in the last seven years, following the implementation of LICT project, creating 47,000 jobs in IT and ITES sectors, which was only 12,000 in 2013. Bangladesh has also received very high scores in the e-participation index (16th among 193 countries), according to the UN E-government Survey 2018. Nonetheless, Bangladesh primarily uses government websites to provide information. The use of online services to encourage citizens' deliberation on public policies and engagement in decision-making processes is not active yet. The government has already adopted the e-Nothi initiative to ensure transparency and accountability for internal processes and is going to set up electronic dashboards with administrative alerts across all ministries, directorates, districts, upazilas and union parishads, to monitor the speed and quality of service delivery.

Bangladesh is divided into eight major regions called divisions. There are 64 districts which include 491 upazilas, 12 metropolitan cities, and 326 municipalities. At the bottom of all administrative work, there are 4,553 Union Councils. The Bangladesh Government has been trying to strengthen the local government of districts and sub-districts with access to many public services. Due to the low Internet penetration rate, it took much time and effort for the majority of citizens across the country to benefit from these services, and sometimes, the quality of services was questionable. Citizens had to travel a long distance to reach government offices in rural areas.[15] To tackle this problem, the government has built a Union Digital Centre (UDC) per union council to provide citizens with better access to the public services. Currently, there are 4,550 Union Digital Centres across the country.

Bangladesh, therefore, is *well on track* in terms of access to e-Governance infrastructure.

READINESS SPECTRUM

The discussion implies that Bangladesh is performing well, regarding ensuring access for people to the digital infrastructure. We assign a green traffic light for Bangladesh's access to electricity, mobile network connection and e-Governance, and access to digital services, as all these components are well on track. However, providing more people with access to internet connections is critical for the country to thrive in a digital economy. We conclude by assigning an amber light for this particular readiness condition.

Readiness conditions	Access to electricity	Mobile network coverage	Access to internet connections	e-Governance and access to digital services
Readiness spectrum	Well on track	Well on track	Needs improvement	Well on track
Traffic light				

[14] Access to Information, A2i

[15] Access to Information, A2i

APPROPRIATENESS DIMENSION

A. INTERNET QUALITY AND SPEED

According to The State of Mobile Signal Experience report by the open signal in 2019, Bangladesh lies at the bottom of 88 countries in the world. It has 5.7 Mbps download speed and 1.7 Mbps upload speed, 80.4-millisecond latency experience, 65.8% 4G availability, and scores 40.5 out of 100 in terms of video experience. For a country branding itself as 'Digital Bangladesh', being ranked among the bottom 10 in the world in terms of digital experiences shows the lack of efforts for improving internet quality and speed. The weakness in the internet quality also raises valid questions about the quality of digital services reaching the people and improving the business communication atmosphere for the industries.

The recent pandemic in 2020 saw a surge in internet usage across the country. To be precise, Bangladesh Submarine Cable Company (BSCCL) reported that the bandwidth consumption rose to 10%, where the country consumes about 1600 Gbps bandwidth currently; which was 970 Gbps a year ago, and 300 Gbps in 2016.[16] The evident rise in demand created a difficult situation for users. Slow internet has negatively impacted online businesses in recent times.[17]

Open Signal also measures different quality indices for different mobile companies in Bangladesh. For example, among the mobile internet providers, Grameenphone scores highest in 4G coverage as per July 2020 data. According to the speed test global index, June 2020, Bangladesh ranks 134th in terms of mobile internet quality and 104th in terms of fixed broadband connection among 179 countries in the world.

In terms of internet quality and speed, therefore, Bangladesh is least ready, compared to global standards. Immediate effort in increasing data speed would be a major required condition for the country to maximise opportunities through service provision and business communication in a digital economy.

B. AFFORDABILITY OF MOBILE DEVICES AND INTERNET

The mismatch of access and people's affordability hampers the efficiency of the entire digital infrastructure. The type of devices people use is an important factor because not all functionalities work on basic phones. Studies show that among 74% of mobile owners (aged 15 - 65 years), only 18% own a smartphone. Cost acts as a strong barrier for the marginalised populations. Eighty-nine per cent of people with above-average income, while 73% of those with below-average income owned mobile phones.[18]. Then again, compared to countries like India, the taxes on the use of mobile service in the country have a 22% high share of tariff costs.[19] However, to address this issue, the government has already decided to observe the marketplace dynamics before making any policy reforms to avoid leaving any inordinate burdens on the telecommunication firms.

Internet price works as another challenge in the infrastructure. To the population with low income (bottom 20% of the income distribution), the average consumption of 1 GB data costs 11% of their monthly

[16] O'Grady, 2020

[17] Rahman, 2020

[18] Kevin Hernandez, 2019

[19] The Daily Star, 2018

earnings.[20] In the context of the current situation of a global pandemic, students have faced challenges due to high internet price and poor connection. The data from a survey held by the University Grants Commission (UGC) found that 87% of public university students have smartphones but no internet connection, or cannot afford to buy mobile data. The report exhibited in-depth statistics of the leading tech-based university, Bangladesh University of Engineering and Technology (BUET). Out of 5000 regular students, 1000 were facing connection problems, 250 owned no devices, and 1,125 were unable to afford internet packages.[21]

A high level of taxation on mobile phones and the internet directly impacts the total cost of mobile ownership of the consumers and subsequently creates a barrier to digital inclusion. According to the National Board of Revenue (NBR), mobile phones and SIM cards were the third biggest sources of VAT, generating BDT 4,800 crore in the fiscal year of 2017-18. The government looks to chase a bigger revenue target, riding on this essential services sector by imposing higher taxes in the next fiscal year too. The existing 10% supplementary duty on phone calls, data use, texting, and other services may rise to 15% in the fiscal year of 2020-21.

The discussion indicates that this component is least ready, with a significant gap in efforts to make mobile phones, especially the smart ones, and internet connections affordable for people of all economic classes.

READINESS SPECTRUM

Bangladesh needs to significantly improve its efforts to address the lack of appropriateness in its digital infrastructure, specifically, in terms of improving data quality and affordability. We, therefore, assign red traffic lights for both the conditions under this dimension. The infrastructure will start to work efficiently if these secondary barriers, even beyond the challenges of ensuring access, are removed.

Readiness conditions	Internet quality and speed	Affordability of mobile devices and internet
Readiness spectrum	Least ready	Least Ready
Traffic light		

[20] Kevin Hernandez, 2019

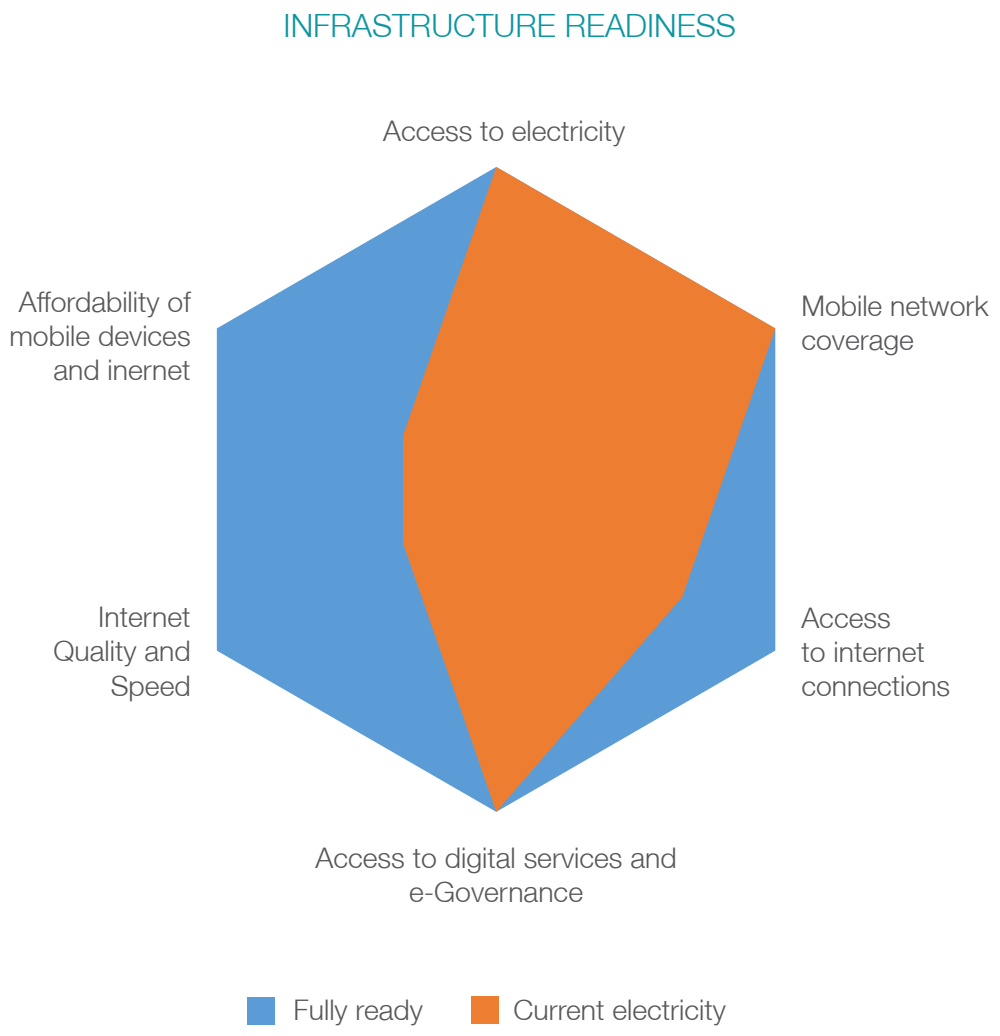
[21] The Business Standard, 2020

READINESS DIAGRAM

Bangladesh is doing well in providing people with access to electricity, mobile networks, and e-Governance infrastructure. The Internet is not easily accessible to people of lower-income groups and the gender gap is also present. However, even after access is ensured, internet quality, speed and affordability work as barriers against seamless digital experiences for people. These two readiness conditions are the least ready among the six discussed for the infrastructure pillar.

Considering well on track as a benchmark for each readiness condition, we assign a full score of 3 for this status, and, 2 and 1 respectively for needs improvement and least ready status to visualise our assessment through a radar diagram Following this scoring framework, access to electricity, mobile network coverage, and access to digital services and e-Governance receive a full score. Access to internet connections receives 2 out of 3, however, both the readiness conditions under the appropriateness dimension (internet quality and affordability) receive 1 out of 3.

The readiness of the infrastructure for the digital economy in Bangladesh might be presented in this way:



CROSS-CUTTING ISSUES

DATA PROTECTION, SYNERGY AMONG THE STAKEHOLDERS, AND INNOVATION IN INFRASTRUCTURE DEVELOPMENT

Inclusiveness and appropriateness are necessary for Bangladesh to enter the digital economy, but some important areas need attention for the overall infrastructure readiness. Data protection and cyber security, synergy among the stakeholders who provide access, and overall innovation in the infrastructure are some of those important factors that intersect with the previous two dimensions.

Unprotected data and insecure cyberspaces are major threats to the digital infrastructure in Bangladesh. Establishing clear command and control for all cyber security incidents is necessary for the government to enable more trusted transactions online, as that can cripple extensive online activities both in the public and private sectors. Bangladesh's security threat index, however, stood at 7.6 points in 2019, while the current world average, based on 176 countries is 5.52 index points. Over the years, the country did make improvements in decreasing the threats. Bangladesh still ranks 73 among 100 nations in the global cyber security index measured by the UK-based National Cyber Security Index (NCSI). The index was measured based on the countries' preparations to prevent cyber threats and readiness to manage cyber-crimes, incidents, and major crises. Nonetheless, Bangladesh is ranked higher in comparison to a few South Asian countries, like Sri Lanka, Indonesia, Nepal and Bhutan. According to Bangladesh Government's e-Government Computer Incident Response Team (BGD e-Gov CIRT),

69.55% unique users are at the highest risk of local virus infection, and 80% of users are the victims of spam attacks. Financial institutions are a prime target of attacks too. Bangladesh Bank also faced a major crisis of hackers stealing USD 81 million in 2016, which portrays the weak cyber security scenario of the country.

The presence of public and private sector actors in digital infrastructure development will reduce cost, and enable the ICT sector to be more competitive, eventually making it more sustainable. Bangladesh had USD 6,785 million investments from the private sector from the period of 1990-2019 in overall infrastructure.[22] Among them, the electricity sector had the largest investment share. The electricity sector had 54 projects reaching financial closure with USD 5,136 million, while the ICT sector stands in the 2nd position with six projects and USD 130 million investments. These projects include energy infrastructures, fibre-optic cables (land-based/submarine cables), mobile towers, base stations, and other hard assets. They have the government's involvement as a contracting authority as the full or part-owner of the assets, and thereby ensure public stake before private sectors' profit incentive. The government's 'Procurement Guidelines for Public Private Partnership (PPP Projects) 2018' also focused chiefly on financial incentives to uphold the interests of the private investors in the infrastructure sector.[23] The Union Digital Centres (UDC) in Bangladesh are another entrepreneurship-based unique PPP model that has been successfully taking centralised services to the local level and reducing citizens' cost of access services.

The efficiency of the digital services and the level of awareness among the rural population for utilising them depend on access to internet services, affordability of devices, and the level of digital literacy of the people.[24] There are gaps regarding policy support, financing, and capacity building to kick-off and prototype innovations to address these critical issues, as well as nurture the UDC model to make it financially sustainable in the long run. For example, in Estonia, government and private companies formed a partnership to provide broadband connection in the sparsely populated and remote areas of the country, while in Egypt PPP projects are being carried out to create smart villages.[25]

We consider innovation to be one of the major elements of the sustainability of infrastructure. According to the Global Innovation Index 2019, Bangladesh stands at the 90th position among 141 countries in terms of innovation in ICT infrastructure. This index considers ICT infrastructure as a composite category that measures innovation in the government's online services, e-participation, gross capital formation, GDP/unit of energy use, and environmental performances. This helps place innovation firmly on the map for countries, for low and middle-income economies in particular. Even among the lower-middle-income countries, Bangladesh lies below expectations for the level of development for overall innovation (116 among 141 countries). Bangladesh, therefore, needs to make a significant effort in an integrated way to address these cross-cutting issues for overall infrastructural readiness.

[22] World Bank, 2020

[23] Ibid, 2020

[24] Digital Literacy Survey, 2019

[25] infoDev & ITU, 2012

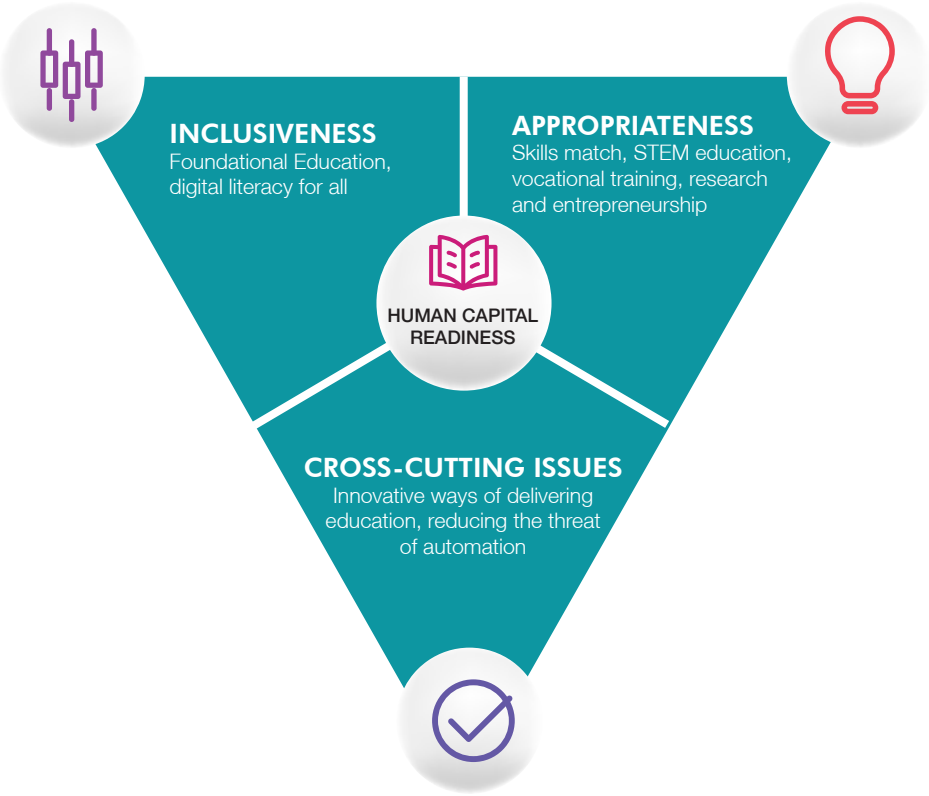
HUMAN CAPITAL READINESS

People's capacity to make the best use of the technical arrangements to engage in economic and social practices can make the digital transformation meaningful. Starting from the basic integration of technology into societies, a well-performing digital economy will require re-sketching the human skill spectrum for addressing the upcoming challenges, and then effective re-skilling and re-deploying of the workforce.

We frame our discussion of human capital readiness in this chapter around the inclusion aspects first. We highlight the current state of foundational education and digital literacy in Bangladesh. We discuss the challenges in increasing the ability of people to access, adapt, and create values by using technologies under this inclusiveness dimension.

Next, we focus on the provision of appropriate knowledge and skills for the future of the youth. Bangladesh will eventually see a rise in new professions and massive changes in traditional work. Industry 4.0 will need newer skills and attitudes; consequently, comprehensive planning is required to respond to the challenges and impact of the Fourth Industrial Revolution (4IR) on human capital development. In the appropriateness dimension, we discuss the government's effort in addressing skills mismatch, promoting STEM and vocational training, and integrating research and entrepreneurship in the tertiary level education.

Human capital development for the digital economy is inherently a complex challenge. Bringing innovative ways of delivering education and undertaking strategies to reduce the threat of automation are some of the conditions that are connected in an integrated way with the inclusiveness and appropriateness dimensions of this pillar. At the end of the chapter, we, therefore, shed light on these important cross-cutting readiness issues.



KEY FACTS AND FIGURES

1. The enrolment rate in primary education is satisfactory, but the rate of retention to the tertiary level is lower
2. Students perform poorly in major subjects like Maths and English
3. Digital literacy works as a barrier against access to digital services and information
4. Skills of graduates in Bangladesh are not sufficient for the job market
5. The country's STEM enrolment rate of higher education stands at 21% of overall graduates
6. Vocational training based education providers need to standardise curriculum and ensure institutional coordination
7. Universities in Bangladesh substantially lack R&D lab facilities and funding
8. Updating curriculum based on required skills in the market has become imperative
9. Distant learning platforms are on the surge, government patronage has accelerated the penetration of these platforms

INCLUSIVENESS DIMENSION

A. FOUNDATIONAL EDUCATION FOR ALL

The literacy rate of youths aged 15 and above in Bangladesh is 73.9%.[26] To meet the target of ensuring 100% literacy, set by The National Education Policy 2010, Bangladesh has been progressing gradually. The dedication has been evident from the 90% net enrolment rate in elementary-level education.[27] However, the completion rate of primary education is 82.6%, but at the upper secondary level, it significantly decreases to 29.4%.[28]

Performance of primary and secondary level students in Bangladesh is not satisfactory in major subjects like Mathematics and English. National learning assessments conducted by the Government of Bangladesh show poor literacy and numeracy skills among students—only 25 to 44 % of the students in Grades 5 through 8 excel in English and maths, and performance on these subjects is especially low among poor students. To popularise mathematics for school and college-going students and prepare them for International Mathematical Olympiad (IMO), Bangladesh Mathematical Olympiad Committee, with support from Dutch Bangla Bank & Prothom Alo arranges regional and national Math Olympiads and extends its cooperation to arrange Local Math Olympiads, Parallel Math Schools and Math Clubs across the country. However, the total number of males who participated in the IMO is 32, in contrast to the four females who participated in the competition over 14 years.

A 2018 report on 'Identifying the Reading Ability of Class Four Students of English

[26] Bangladesh Bureau of Statistics, 2018

[27] UNESCO, 2017

[28] Bangladesh Bureau of Statistics, 2019

in Government Primary Schools in Bangladesh' found that less than 40% of students of all divisions could read textbook sentences intelligibly.[29] Education First, a Switzerland-based international organization, has found that among 100 countries, Bangladesh ranked 71st (India and Nepal secured 34th and 66th positions respectively) in the 2019 'EF English Proficiency Index'. In general, students have weak reading skills, and curriculum, teaching approaches, and examination systems at all levels focus more on rote learning than on competencies, critical thinking, and analytical skills.[30] Girls consistently underperform compared to boys, in terms of both passing rates and the share of top students in the Secondary School Certificate (SSC) examination.[31]

In terms of primary and secondary level education in Bangladesh, we, therefore, assign needs improvement status. This foundational schooling is necessary for all to secure further higher education and gain more complex digital functional skills.

B. DIGITAL LITERACY IN SOCIETY

The rise in mobile phone usage in Bangladesh has helped to boost various digital service platforms. However, a huge portion of the population of Bangladesh is still unaware of the usage of phones, the internet, and digital services. Digital literacy across the population is not satisfactory at all. 30% of the population cannot make and receive phone calls on a mobile phone, 51% cannot send and receive text messages, 37% do not know how to properly use the phone menu, and 84% are unable to use the internet.[32] According to a recent study that methodically evaluates the level of overall digital literacy in rural areas of Bangladesh, 50% households scored 0.25 or below, while the perfect score of 1.0 indicates the presence of elementary digital literacy only.[33] The research also finds that digital skills increase in the households with higher income, giving them an advantage of access to digital services with sufficient abilities to allow them to control and learn the ever-evolving technologies and digital systems.[34] Hence, even with the internet providing the same information to all, access to all remains only in theory and differences are created due to lack of capacity and abilities.[35]

Another source of digital inequality is gender. Evidence shows that twice as many households agreed that a male member, as opposed to a female, as the most digitally able person in their home, in a recent survey.[36] This is partly explained by access. 61% of women own a mobile phone, compared to 86% of men in the country and only 16% of women use mobile internet against 33% of men.[37]

The government is strategically focusing on digital inclusion by the uptake of mobile money and other digital payment platforms. Currently, 15 local banks approved by the Bangladesh Bank are running the operation of mobile financial services through National Payment Switch Bangladesh (NPSB).[38] However, 41% of the population has no idea about mobile money and how it can be used.[39] The Mobile Financial Service agents have made distinctive contributions in the ecosystem, by facilitating access to people through direct communication,

[29] National Academy for Primary Education
[30] World Bank, 2016
[31] ADB, 2019
[32] Hernandez, 2019
[33] Digital Literacy Survey, BIGD, 2019
[34] Digital Literacy Survey, BIGD, 2019
[35] McKinsey Global Institute, 2015
[36] Digital Literacy Survey, BIGD, 2019
[37] Mobile Gender Gap Report, GSMA, 2020
[38] Bangladesh Bank, September 2020
[39] Hernandez, 2019

while operating in the field to manage cash deposits and withdrawals. 60% of MFS account holders cannot operate accounts without the help of agents due to their lack of digital literacy.[40]

Language Literacy also acts as a huge barrier to information accessibility. Since there is a lack of Bangla content in the digital spaces, a good amount of the population can't properly use their devices to retrieve important information. In addition to literacy, awareness is required too, as not knowing how to use the internet was the reason behind 67% of the population being offline.[41]

The discussion indicates that there is a significant gap in efforts to ensure equitable digital literacy in society, which is an essential condition to enter into the digital economy. We may assign the least ready status for this component.

READINESS SPECTRUM

Bangladesh needs to accelerate its endeavour to include its people into the digital realm with minimum skills at the very least, as it is one of the basic requirements to thrive in a digital economy with inclusive growth. In terms of ensuring foundational education for all, we assign an amber traffic light. However, to advance digital literacy, significant improvement is needed, and we, therefore, assign a red traffic light to this component.

Readiness conditions	Foundational education for all	Digital literacy in society
Readiness spectrum	Needs improvement	Least ready
Traffic light		

[40] Digital Inclusion Series, Episode 3, BIGD, 2020

[41] Hernandez, 2019

APPROPRIATENESS DIMENSION

A. ADDRESSING SKILL MISMATCH

Almost 65% of the population of Bangladesh is under the age of 25, which creates a scope of leveraging the demographic dividend in the upcoming digital age.[42] However, these vast young human resources lack the knowledge and skills necessary to thrive in the competitive and globalised market. The rate of educated unemployment (4.37% in 2019) in the country is increasing every year.[43] There are narratives that the uses of technology will substitute some activities humans currently perform—particularly displacing the labour in traditional jobs. While some of these jobs will be lost in the future, and many others created, almost all will change— the only way to thrive in an ever-changing technology-driven world is prepare accordingly. Unfortunately, quality assurance is a problem in tertiary-level education in Bangladesh.

In a World Bank study on tertiary education sector review, both the employers and graduates agreed that the skills of tertiary graduates are not sufficient. People with postgraduate degrees have 1.06% unemployment rates in Vietnam and 14.2% in India, but the unemployment rate among the university graduates in Bangladesh is almost 39%.[44] Graduates who are employed also lack the necessary educational competencies in the workforce. As per a study cited in ADB's brief on Skills Development, it was noted that 67% of university graduates showed interest in receiving further training on computer skills, critical thinking, analytical skills, and such, to make up for what was lacking in university education.[45]

These outcomes show that the academic programmes in the universities do little to improve the job-demanded skills, by understanding the skill gap among the graduates. There is an absence of a quality assurance framework for higher education in Bangladesh, with poor internal and external systems for reviewing academic programmes. Among the public higher education institutions, the National University-affiliated colleges generally have an unsatisfactory quality of instruction and poor facilities. A recent study of the aspects of educational standards (i.e., faculty credentials, academic calendars, campus facilities, research facilities, and the cost of education) also concluded that private higher education in Bangladesh had not yet achieved the desired level of quality.[46] We assign the least ready status for this readiness condition. The growing IT industries and development efforts of the government towards digitisation will be ineffective if this prominent skill gap among the young population exists.

B. PROMOTING STEM EDUCATION IN TERTIARY LEVEL

The country's STEM (Science, Technology, Engineering, and Mathematics) enrolment rate for higher education stands at 21%, while it is 40% in India and 28% in Sri Lanka.[47] In the year 2016-17, Bangladesh had around 543,000 tertiary graduates, among which only 16,000 graduated with IT-related degrees.[48] The key complaint of the IT industry in Bangladesh is the lack of

[42] World Economic Forum, 2019
[43] Bangladesh Bureau of Statistics, 2019
[44] Bangladesh Institute of Development Studies (BIDS), 2019
[45] World Bank, 2019
[46] ADB, 2015
[47] World Bank, 2019
[48] 'Skills gap in the IT sector: Utilizing the power of youth', ICT Division, 2019

educational competencies in the workforce, as 62% of the youth of Bangladesh are undereducated for the work they do.[49] However, to enhance the quality of this skilled workforce for the IT industry, the government had trained 65,000 entry and mid-level IT/ ITES talents till 2018.[50] Around 25% of female students enrol for Computer Science (CS) or Information Communication Technology (ICT) related subjects at the tertiary level in Bangladesh. Yet, only 13% of them continue as ICT professionals.[51]

However, the government is concerned about this issue and has already made computer education compulsory for secondary and higher secondary/equivalent levels, to encourage information technology ICT based education at the tertiary level. In Bangladesh's 7th Five Year Plan in FY2016-FY2020 the government's ICT development goals included providing one multimedia classroom to all primary schools and three multimedia classrooms to all secondary schools with appropriate ICT labs. To ensure at least 30% participation of girls in the ICT industry of Bangladesh, The Leveraging ICT for Growth, Employment and Governance (LICT) and the 'She Power' projects trained 20,000 women altogether till 2019 to increase their freelancing skills, IT service provision and call centre operations. These trainings might help generate income but are not comparable to formal university degrees. Therefore, Bangladesh still needs improvement in terms of proper implementation of the plans regarding the promotion of STEM education for its youth.

C. STRENGTHENING VOCATIONAL TRAINING BASED EDUCATION AND SKILL DEVELOPMENT PROGRAMMES

The Government of Bangladesh has been working towards improving Technical and Vocational Education and Training (TVET), delivered by various institutions belonging to 23 ministries; however, the share of the population with formal TVET qualifications in Bangladesh is very small.

In 2013, only 1.8 % secondary school students enrolled in skills development programmes in Bangladesh, which is very low compared to the global average of 11% in 2010.[52] The Grade 8 entry requirement blocks disadvantaged students (only 60% of students complete Grade 5, including those from disadvantaged groups), as do lengthy training programs (two-four years) and the absence of short-term or flexible training that does not interfere with work.[53] Out of one million enrolled students in 6,865 public TVET institutes, about 25% of students were girls, and out of the total of 51,000 teachers, only 20% were female.[54] Like general secondary education, this vocational education struggles with continuity problems. Only about 2.85% of students enrol in secondary-level vocational programmes.[55] Private providers account for about 95% of all TVET institutions and about three-fourths of all enrolments, but ensuring proper coordination among these institutions and maintaining equal standards of the curriculum are difficult. TVET absorbs about 2.6% of the education budget in Bangladesh, including allocations for the Bureau of Manpower, Employment and Training (BMET) and monthly payment orders (MPOs) for 1,600 accredited private training institutions.[56] In 2020,

[49] ADB Brief, 2016

[50] Betting on the Future – The Bangladesh IT-ITeS Industry is poised for Growth, Everest Group Research, 2017

[51] Bangladesh Open Source Network (BdOSN), 2017

[52] UNESCO, 2013

[53] ADB, 2015

[54] Skills21 Study: Situation Analysis of Bangladesh TVET Sector, 2019

[55] ADB, 2015

[56] ADB, 2015

the Executive Committee of the National Economic Council (ECNEC) approved a budget to establish 329 TVET programmes at the upazilla level, with the intention to reach disadvantaged people in the rural areas.[57] Despite growing investments in TVET, there exist serious skill mismatches with the current industry. In the context of the Fourth Industrial Revolution, it would be a more complex challenge as the workplace will be transformed from task-based characteristics to human-centred characteristics. Because of the convergence of man and machine, it will reduce the subject distance between humanities and social science, as well as science and technology. Currently, interdisciplinary teaching, research and innovation are almost absent in TVET in Bangladesh.

Beyond the formal TVET education, there are currently some innovations regarding methods and targeting of the skill development programmes, in both public and private spheres. For example, Access to Information (a2i) has some programmes such as Skills Development through Apprenticeship, Skills Development through Stipend, Imam Portal, Skills for Employment Programme on RMG, and Skills for Qawmi Madrasha Youth. A private initiative named Sudokkho aims to ensure increased income for 65,000 poor people, which includes women and disadvantaged populations, after successful completion of training through its partnerships with privately owned training service providers (PTPs), and industry-based training (IBT) initiatives. In addition to vocational skills training, there are a few private organisations that are working specifically on digital skills as well. One of them is an organisation named 'Coders Trust', which is working to provide women with the necessary skills to enter the freelancing market.

In terms of vocational training based education and skill development programmes, therefore, Bangladesh needs improvement.

D. EMPHASISING ON RESEARCH AND ENTREPRENEURSHIP AT THE TERTIARY LEVEL

Global Competitive Index 2018 of the World Economic Forum ranks Bangladesh as 82nd among 141 countries, in terms of research and development. Government expenditure on tertiary education was reported 0.5% of GDP in Bangladesh in 2016, of which an insignificant portion is spent on promoting research.[58] The University Grants Commission (UGC) observes the number of quality research—especially in fundamental or innovative fields—has decreased tremendously at the university level. While there are 53 public, 90 private, and two international registered universities in the country, only around 6,000 articles were published by Bangladesh-based researchers in global journals with impact factor, according to a recent count.[59] In comparison, Indian researchers published more than 175,000 and Pakistani researchers published more than 22,000 articles among peers. Yearly patent applications in Bangladesh are also low; resident Bangladeshis submitted only 69 patent applications in 2018, whereas for Indians, the figure was 6,289.[60] Bangladesh does not have a national strategy for research, and the role of universities in undertaking basic and applied research is affected by many constraints, such as the lack of funding, low or lack of motivation for research, in terms of financial incentives and recognition, and meagre logistical support.[61] According to UGC's latest report, 12 public and 11 private universities in Bangladesh did not spend any money on research in 2019.[62]

[57] Why technical education is imperative', The Financial Express, 2020

[58] World Bank, 2016

[59] Dhaka Tribune, 2020

[60] WIPO

[61] ADB, 2015

[62] The Independent, 2020

The universities in Bangladesh also do not focus on developing entrepreneurial talent; therefore, an absence of student guidance, in terms of a risk-taking mindset, is existent in society. There is a risk that start-up culture here may shift towards being more of a trend rather than sticking to its problem-solving and innovation goals. This is to mention, Bangladesh ranks 114th among 141 countries, based on the entrepreneurial culture practised here, according to the Global competitive Index 2018. Industry-academia linkage is imminent to set up the right kind of infrastructure to nurture innovation and entrepreneurship at school/college/university levels. Such synergy, resources, and experience sharing are currently almost absent. Without turning research and entrepreneurship into a culture, it will be difficult for Bangladesh to thrive in the digital age, as the country currently ranks 116th out of 126 economies in the Global Innovation Index.[63]

We assign the least ready status for this readiness condition, as more emphasis is needed on research and entrepreneurship promotion in tertiary level education in Bangladesh.

READINESS SPECTRUM

Bangladesh needs significant improvement in addressing the lack of appropriateness, while enhancing the skills of its human capital, specifically, addressing the issues related to skill mismatch, and promoting research and entrepreneurial mind-sets among students at the tertiary level. We assign red traffic lights for each of these conditions. However, vocational training based education and tertiary level STEM education receive amber traffic lights, as both the conditions need improvement from our analysis.

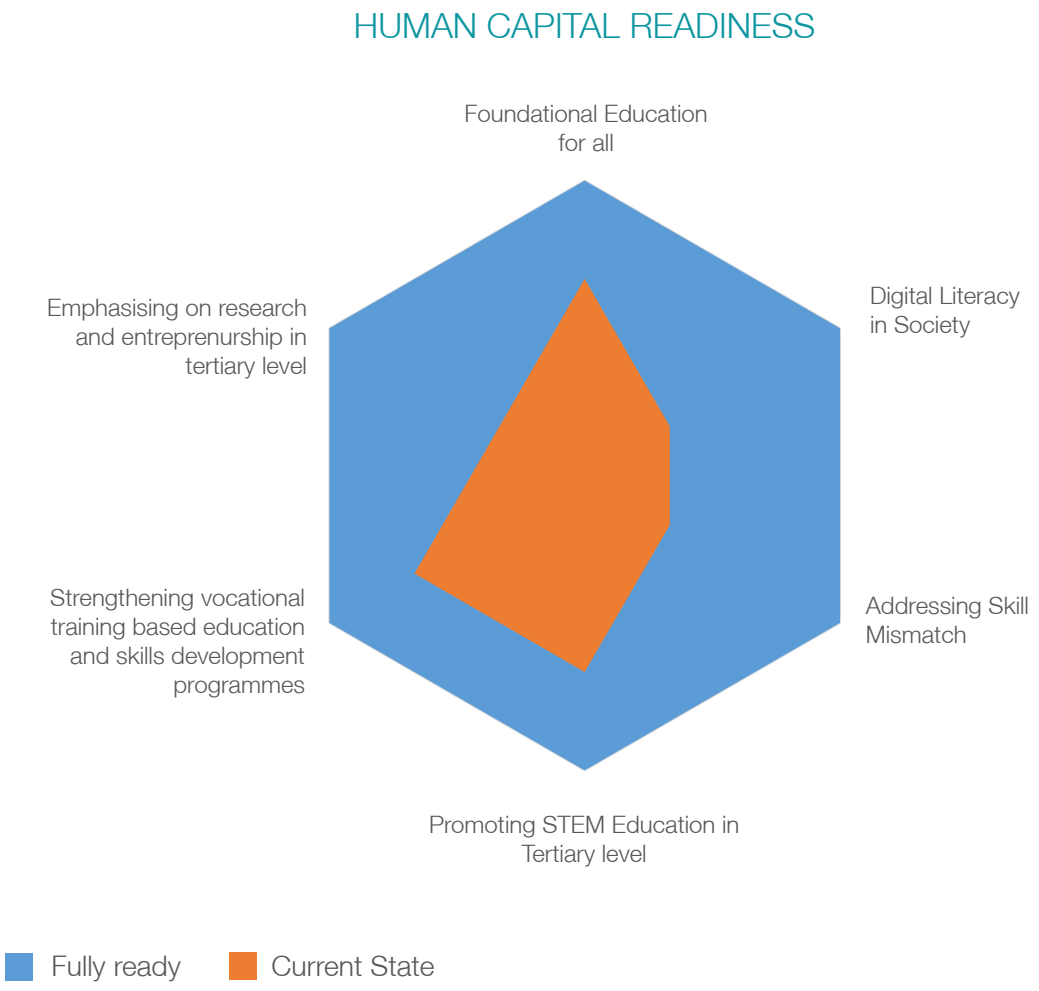
Readiness conditions	Addressing skill mismatch	Promoting STEM education in tertiary level	Strengthening Vocational training based education	Emphasising on research and entrepreneurship in tertiary level
Readiness spectrum	Least ready	Needs improvement	Needs improvement	Least ready
Traffic light				

[63] Global Innovation Index, 2019

READINESS DIAGRAM

Bangladesh must make a substantial effort to increase people's basic digital literacy. Improvement is also needed for ensuring foundational education for all of its people. However, these are only the basic tools to prepare for the digital economy, and more barriers need to be addressed. The government and its partners need to put more effort into providing vocational training to produce a semi-skilled workforce, as the industry 4.0 will require much more than what we refer to as high-level skills. Emphasis on STEM education, research, and entrepreneurship development should also be an immediate concern at this moment. Addressing skill mismatch and emphasising on research and entrepreneurship in tertiary level education are essential conditions to thrive in the digital age, yet they are carrying red lights.

Following the same scoring framework as the infrastructure pillar, we assign a score of 1 for the readiness conditions with the least ready status that include digital literacy, skills match, and research and entrepreneurship promotion aspects. Ensuring foundational education, promoting STEM education and vocational training based education in tertiary level—all three of these conditions need improvement, and, therefore, each receives a score of 2 out of 3.



CROSS-CUTTING ISSUES

FOSTERING INNOVATION IN LEARNING METHODS AND DECIDING STRATEGIES FOR REDUCING THE THREAT OF AUTOMATION IN THE DIGITAL AGE

To ensure quality outcomes from the existing education system, it is important to find innovative ways of teaching and learning, including the promotion of e-learning platforms. At the same time, to reduce risk of automation, it is necessary to find out what the new skills in demand are, assess which professions are under threat and to which degree, and finally identify what steps should be taken thereby.

Most educational institutions in Bangladesh lack a standard formal system for supervising and monitoring classroom teaching and do not invest in innovative methods of instruction to improve academic standards. They provide education using mainly traditional methods, such as lectures and the evaluation of students through written examinations, instead of modern methods like case analyses, presentations, group work, simulations, business games, term paper writing, and formative assessments. The use of digital technologies in education can reduce barriers and make learning more accessible, but there are challenges of poor infrastructure and affordability. Sporadically, some online distance learning platforms have slowly started gaining popularity in Bangladesh, benefitting the students, teachers, and professionals. For example, 10 Minutes School is the largest online educational platform, which claims to help 1.5 million students in Bangladesh to access digital learning through their website, app, and social media. MuktoPaath is a government initiative, which provides a similar e-learning platform in Bangla for professional and skills development, over multiple sectors at the lowest affordable costs. Providing education through a digital platform may reduce the gap among learners, learning materials, and tutors, but there are questions regarding tangible outcomes of these learning platforms. There is no certified course offered from the recognised universities or other educational institutions and no standard guidelines are in place regarding quality control, approval and acceptance of certification provided from these platforms.

While technological innovations can advance specific sectors and industries, new technologies can be deeply disruptive in various contexts. Automation has the real possibility to take over the jobs of low skilled workers, create major skill gaps in mid and upper management levels, and give rise to challenges regarding access to finance for capital investment in technology, and training for improved skill sets.[64] Due to the nature of low-wage jobs and workers with low educational attainment, garment, and textile and footwear production are, however, major sub-sectors in Bangladesh facing threats of automation. There is a lack of deeper sector-based understanding and internal assessments which will enable the government, training providers and enterprises to prepare for automation impacts. Though the adoption of technology in the RMG sector is still slow, the impact is already visible in Bangladesh. The number of female workers in readymade garments (RMG) sector has declined by 10.68% in four years, though the number of factories and workers are on the rise.[65] Lack of modern skills and proper knowledge of technology have been identified as two of the main reasons behind this.

[64] Access to Information, a2i, 2019

[65] Bangladesh Bureau of Statistics (BBS), 2018

Each year, more than two million young people enter the workforce in Bangladesh and on an average, 0.6 million workers go abroad for employment.[66] Remittances from these migrant workers were 6.1% of the gross domestic product in 2019.[67] 56% of Bangladeshi migrant workers were classified as either unskilled or semi-skilled in 2016. The share of skilled workers among expatriates has been consistently low over the past decade, despite the various efforts to raise skill attainment of Bangladeshi migrant workers.[68] It is important to mention that Bangladesh TVET qualification is not recognised outside the country, and, therefore, migrant workers can hardly benefit from them. It has been predicted that 14% of jobs across the OECD face a high likelihood of automation, and another 32% are likely to experience significant changes over the next 10 to 20 years.[69] The demand for unskilled migrant workers will therefore decrease and the demand for skilled manpower will rise. To date, no survey on changing foreign demand for the digital age has been conducted by Bangladesh Technical Education Board (BTEB).[70] There is no regulatory body that can work towards ensuring skill development and recognition for expatriate workers during the pre-departure and post-return periods.[71] Many unregulated private training providers offer short courses on Information Technology (IT) and foreign languages, in addition to pre-departure training for migrant workers; however, most of the private operators are not affiliated with BTEB.[72]

Bangladesh, thus, needs to make a concerted effort to address these cross-cutting issues of human capital readiness, as well as inclusiveness and appropriateness dimensions of this pillar.

[66] LFS-BBS and BMET

[67] MDPI

[68] World Bank, 2018

[69] The Organisation for Economic Co-operation and Development (OECD)

[70] ILO, 2015

[71] ILO, 2015

[72] ILO, 2015

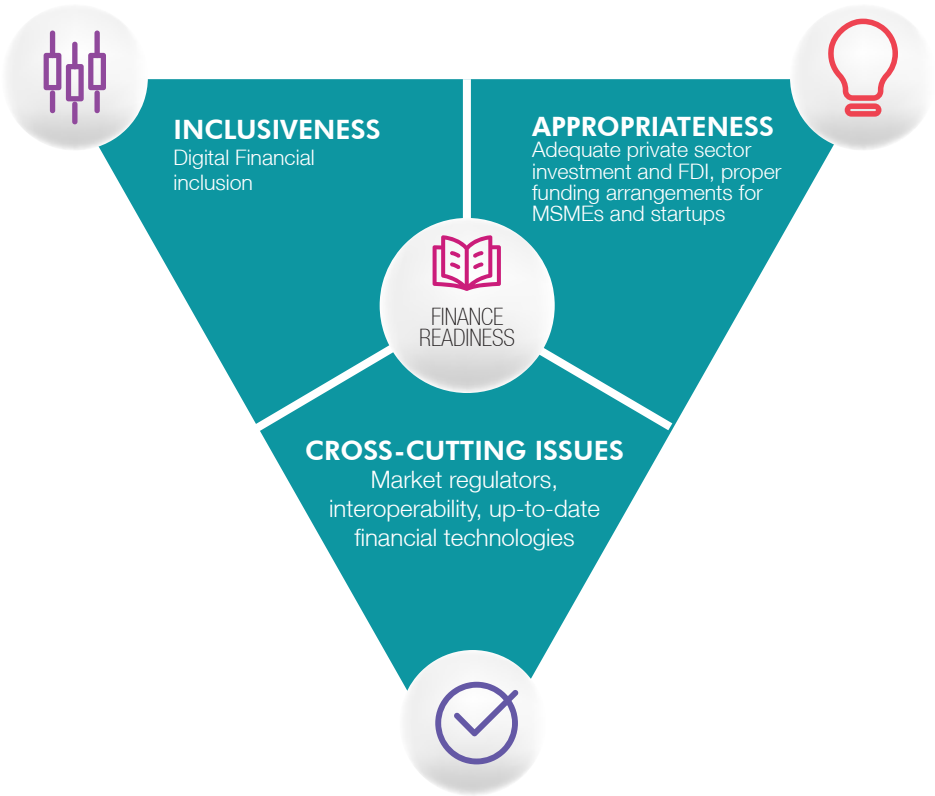
FINANCE READINESS

Financing is one of the most important pillars in a digital economy, which enables seamless infrastructure and human capital development. In this chapter, we measure the current state of finance readiness in Bangladesh from two broad readiness dimensions: inclusiveness and appropriateness. In the end, we discuss some cross-cutting issues such as market regulations, interoperability, and disruptive technologies in the financial sector that are connected to the other two dimensions.

Under the inclusiveness dimension, we consider digital financial inclusion for the excluded and underserved populations, and effective usage of this tool for alleviating poverty as readiness conditions. An inclusive financing ecosystem should be suited to peoples' needs, and designed responsibly, at a cost both affordable to customers and sustainable for the providers.

Under the appropriateness dimension, we highlight that there should be mechanisms to support emerging digital businesses through adequate and continuous financial resource allocations. Identifying proper funding mechanisms for all levels of entrepreneurs for their digital ventures is necessary to thrive in a digital economy.

Then again, technological tools and processes in the finance sector should be properly maintained and operationally controlled. At the end of the chapter, we discuss these regulatory issues. We shed light on the interoperability of the market actors, and the frontier technology adoption challenges in the financial sector.



Key facts and figures

1. Mobile Financial Services (MFS) in Bangladesh is penetrating at a very fast rate with 38.6 million active clients currently
2. Effective usage of MFS may have a positive impact on the social protection of the poor and on formalising small businesses
3. The ICT sector has been securing its place in top five clubs of budget allocation consecutively
4. A lower level of ease of doing business, lack of enabling environment for investment and business competitiveness affect private sector investment and FDI
5. Availability of adequate funds is very important for the SMEs and startups, the higher rate of interest is another major hindrance
6. The transactions through MFS are still out of real-time monitoring
7. Business models and interoperability are major partnership challenges in digital financial transactions in Bangladesh
8. Latest financial technologies are slowly taking places in Bangladesh

INCLUSIVENESS DIMENSION

A. PROMOTING DIGITAL FINANCIAL INCLUSION

The Bangladesh Government has been promoting the uptake of mobile money and other digital payment platforms as an effective digital inclusion strategy. From the bottom of the pyramid of the demography to the top, MFS has been gradually unfolding a narrative that has a huge potential for promoting socio-economic dynamism, mobility, and growth. MFS is an approach to offering financial services that combines banking with mobile wireless networks, which enable users to make deposits, withdraw, and to send or receive funds from a mobile account.[73] The concept of MFS has brought a huge unbanked segment of the population under its fold, especially in rural Bangladesh, within nine years, after its launch in 2011. BKash, Bangladesh's leading mobile banking service provider has a distinct goal of making digital financial services more accessible and available to poor and rural Bangladesh with its inexpensive service. Although the proportion of MFS account holders in the population was only 3.0% in 2014, it rose to around 38% in 2019. This is higher than the South Asian average of 33%, and the global lower-middle-income country average of 27%.[74] According to the latest figures, the number of banks currently providing MFS services is 15, registered clients are 88.8 million, while the number of active accounts is 38.6 million. The average value of the daily transactions was over BDT 1494.36 crore (USD 176 Million).[75] Apart from cash-in, cash-out, and person-to-person transactions, the MFS services are also being used for utility bill payments, salary disbursements, merchant payments, government payments, and inward remittances. The majority of the people

[73] Bangladesh Bank, 2012

[74] Hernandez, 2019

[75] Bangladesh Bank, June 2020

among the mobile money users utilise it for only basic purposes, such as transferring, depositing, and withdrawing money. People living below the poverty line were found less likely to use it. The reasons were narrowed down to two. Forty-one per cent of the non-mobile money users expressed that they do not have enough money to transact, to begin with, and others were unaware of the service.

Almost 70% of Bangladesh farmers are smallholders and unbanked.[76] Access to finance is often costly, making farming an unviable business case in rural areas. This is because of the risk associated with financing smallholder farmers. Peer-to-Peer lending platforms and crowdfunding platforms can offer low-cost financing opportunities for farmers. Recently, mobile financial services (MFS) have brought a huge unbanked segment of the population in rural Bangladesh under its fold. However, a recent study shows that 60% of MFS account holders cannot operate accounts without the help of agents due to their lack of digital literacy.[77] The gap between the abilities to control and learn the ever-evolving technologies and digital systems stands in the way of rural businesses prospering.

Seventy-five per cent of Bangladeshi small businesses are currently unserved by the formal financial sector.[78] Small businesses within the informal ecosystem can be included in the formal financial sector if the MFS provides them with flexible and suited services according to their business needs. Although, at times, the actors of MFS are discouraged from getting involved with these businesses due to capital constraints, high service cost, challenging regulatory environment and lack of creditworthiness.[79] The Fintech platforms could enable online businesses to create a merchant account that will help facilitate the payment mechanism. This is currently not possible because they require a physical store or a 'signboard' for proof of business.[80] The recent flourish of the e-commerce sector is a combined result of improvement in banking, logistics communications and payment methods. The banking sector is now using the internet payment system. As consumers can avail credit, debit card services and digital wallet, the cash-on-delivery system is now more accessible. At present, there are approximately 2000 e-commerce sites and 50,000 Facebook-based outlets delivering almost 30,000 products a day, which takes up just less than 1% of the entire retail sector in Bangladesh.[81] Again, 80% of the online sales are only taking place in Dhaka, Chattogram and Gazipur.[82] In terms of payment methods for e-commerce, focus on cash on delivery is gradually being shifted away to MFS, and will fully rely on the MFS and payment service providers eventually. Currently, only 4% of MFS account holders use these platforms for advanced purposes like online shopping, apart from cash-in, cash-out, and person-to-person transactions.[83] Data collected from mobile money services has further potential to provide insight on spending and saving habits, establish credit records, provide individuals with the ability to access loans and other credit-based financial services. However, no institutionalised effort is visible at present, to leverage the data generated from the emerging Fintech industry.

This readiness condition, therefore, needs improvement to contribute effectively to the digital economy.

[76] iFarmer, 2020
[77] BIGD, 2020
[78] Nathan, 2018
[79] Nathan, 2018
[80] IDLC, 2018
[81] IDLC, 2018
[82] SANEM, 2020
[83] Hernandez, 2019

B. ACCELERATING SOCIAL SAFETY NET PROGRAMMES USING MFS

While the spread of technology might threaten digital divides in a few cases, it can assist in the growth of social inclusion essentially. The Government of Bangladesh has used the latter to its advantage. The Employment Generation Programme for the Poorest (EGPP) was introduced in 2008 to provide short-term employment to poor and vulnerable households during the off-seasons of agriculture. It has been the largest social safety net programme in Bangladesh and has experienced several challenges regarding payment mismanagement, misappropriation in record keeping, and such. Hence, to address the problem, two options were introduced: a card-based solution and a mobile-based solution. This digitisation not only aided the beneficiaries but also reduced the operational costs for the government. It also reduced the scope for leakage at the systematic level. Studies find that digitising government to people (G2P) payments through MFS could potentially save the government up to USD 15 million annually and could equally save millions of hours, costs, and visits for the beneficiaries.[84]

The social welfare ministry has, therefore, already implemented the G2P payments on limited scales, and are confident of actualising the project throughout the country by 2021. Only 13% of people were under the coverage of the social safety net programme in 2009, but now it stands at around 58%. [85] Increasing evidence confirms that digital financial transactions save time and expenses of social safety net programme beneficiaries across the country, and ensure transparency of transactions from the supply side. The issue of middlemen using MFS to provide cash support to the people has been resolved; poor and pregnant women, widows, and the elderly now get their allowances directly. However, we find extensive agent dependency of people in the overall cash transfer ecosystem through MFS.[86] Hacking PINs is considered a 'teething problem' in this regard that can be overcome by mobile literacy. Digital security awareness is also important, as well as a difficult task in the current context to address the problem.

To streamline the overall process, this readiness condition, therefore, needs improvement.

READINESS SPECTRUM

Bangladesh needs to improve the promotion of digital financial inclusion and uses of these platforms for social welfare. We assign amber traffic lights for both these conditions. Digital finan ce cannot accelerate without effectively including all the members of a society into it.

Readiness conditions	Promoting digital financial inclusion	Accelerating Social Safety net programmes using MFS
Readiness spectrum	Needs improvement	Needs improvement
Traffic light		

[84] PRI

[85] Ministry of Social Welfare

[86] Digital Inclusion Series: Episode 3, BIGD

APPROPRIATENESS DIMENSION

A. PRIORITISING ICT FINANCING IN ECONOMIC PLANS

Information and communications technology (ICT) has received appropriate financing significance in the 7th five-year economic plan of Bangladesh and is expected to have the same results in the upcoming 8th Five Year Plan. There was a separate chapter focusing on the importance of ICT in the plan. Whereas the previous five year plans mainly focused on creating R&D environment for harnessing appropriate technologies to ensure basic human needs, the 7th Five Year Plan had focused more on harnessing science and technology for improved economic performance in accelerating growth, so that the country may turn into a middle income one by the year 2021, in line with the Vision 2021.

There is an increasing trend in budget allocation for the current and forthcoming development projects led by the ICT Division, with funding opportunities for start-ups and new entrepreneurs. This particular sector has secured its place in the top-five club of national budget allocations in FY21, for the second time, with 50 projects and a 9% share of the Annual Development Programme. This is to note that 70.3% of this total allocation for the sector accounted for a mega infrastructure project named Rooppur Power Plant.[87]

However, simply planning doesn't ensure full implementation of perceived goals. For example, a major obstacle for the smooth expansion of the IT business sector is VAT imposition on digital services. The latest budget has imposed 7.5% VAT on Social Media and Virtual Businesses and 5% VAT on Information Technology Enabled Services (ITES). We may assign needs improvement status for this component, considering the appropriateness in the vision of financing.

B. INCREASING PRIVATE SECTOR AND FOREIGN DIRECT INVESTMENT FOR THE IT INDUSTRY

For the next five-year plan, the private sector in Bangladesh is supposed to contribute 75% of an overall investment of BDT 77,418 billion during the plan period, while the rest will be covered by the public sector.[88] Private sector investment is the deciding factor for a planned double-digit growth of GDP in Bangladesh, but it fell behind the public investment for consecutive years, which eventually affected the overall investment. The reason working here includes a lower level of ease of doing business, lack of enabling environment for investment, and business competitiveness.

Bangladesh received USD 16.4 billion in 2019 as Foreign Direct Investment (FDI), with the majority of investments coming from China, South Korea, India, Egypt, the United Kingdom, the United Arab Emirates, and Malaysia.[89] Bangladesh Bank informs that FDI flows rose by 5.36% in the year to USD 1.65 billion in July-October 2019, which helped the country rise eight spots, compared to 2019, in the World Bank's 2020 Doing Business ranking at the 168th position out of 190 economies. Bangladesh has some advantages like being in a strategic geographical position between South and Southeast Asia, the domestic consumption potential, and the wealth of its natural resources, however, there is still lack of effort from the government to make Bangladesh appropriately investment-ready. A business environment here is obstructed

[87] CPD

[88] CPD

[89] UNCTD

by weak infrastructure, burdensome bureaucracy, rampant corruption, lack of transparency, the slow pace of the judicial system, and vulnerability to natural disasters that result in substantial income losses.[90] According to USAID, Bangladeshi IT and ITES firms generate almost 35% of its export revenue from US buyers, 15% from the UK, followed by some EU countries such as Denmark and the Netherlands. Many local enterprises also export IT-ITES services to UAE, Saudi Arabia, South Africa, Malaysia, and Singapore. The government had set an export target of a total of USD 5 billion by 2021.[91] Although, according to A.T. Kearney's Global Services Location Index, Bangladesh fell from its place at 21st in 2017 to 32nd in 2019.[92] The index considers four conditions: financial attractiveness, people skills availability, business environment, and digital resonance. Bangladesh poorly performed in the digital resonance category that incorporates metrics in four areas: digital skills, legal adaptability, corporate activity and outputs.

We may assign the least ready status for this readiness condition, as the government still has a huge scope of undertaking a collaborative approach for creating a conducive environment that provides incentives to the private sector, and foreign investors in implementing large-scale projects.

C. STRENGTHENING FINANCING ARRANGEMENTS FOR START-UPS AND MSMES

Access to finance is vital for SME sector development in Bangladesh. The availability of adequate funds is a challenge for these small-scale businesses, then again, in many instances, entrepreneurs raise complaints regarding the high rate of interest of bank loans. Bangladesh Bank is committed to facilitating MSME credits through the refinance window. Among MSME enterprises/entrepreneurs in our country, small entrepreneurs have more prospects for generating employment, reducing unemployment, and achieving economic growth. Keeping this in view, at least 40% of the total disbursement target of SME credit is reserved for small entrepreneurs, and the rest will be allocated to medium entrepreneurs. The government thinks this policy will be helpful to create a friendly environment for employment generation and higher production.

However, Bangladesh stands at the 92nd position in terms of venture capital availability among 141 countries, according to the Global Competitive Index 2018 by the World Economic Forum. In the early 2000s, a venture capital firm called BD Venture first started working for start-ups. The situation has now dramatically changed with the emergence of an ecosystem of start-ups in Bangladesh, but there are only 17 firms to date registered as alternative investment companies under the Bangladesh Securities and Exchange Commission (B-SEC), and only three of them have received licenses to launch funds. On the other hand, different actors like asset management firms, foreign investors, angel syndicates like BD Angels, and corporate investors across the ICT sector are now displaying a growing appetite for equity and quasi-equity based investments.[93]

The government started its initiative towards supporting start-ups in Bangladesh in 2016, and it is now finally taking shape. Governmental projects such as the iDEA Project and Startup Bangladesh Company Ltd (SBCL), which are programmes dedicated to providing a boost to fresh, promising businesses, were guaranteed to receive a fund of BDT 100 crore (USD 11.8 million), as allocated in the current

[90] Investing in Bangladesh, Nordea Trade, https://www.nordeatrade.com/en/explore-new-market/bangladesh/investment

[91] LightCastle Analytics Wing, 2020

[92] A.T. Kearney's Global Services Location Index, 2019

[93] LightCastle Analysis, 2020

fiscal year.[94] Nonetheless, global practice for the emerging start-ups is raising funds from foreign sources. Bangladesh based start-ups have raised USD 27 million in 2018, which is extremely disproportionate with USD 4.2 billion in funds raised in India, considering the existing economic differences. One of the major reasons discouraging international investors is weaker mechanisms to exit any profit out of the country. However, some tech-based start-ups, including ride-hailing/ transportation, e-commerce, Fintech, education, messaging, AR/VR, travel, energy, agri-tech, and gaming have been able to create notable hype worldwide, and bring in relatively big global investments. Twenty-two start-ups raised foreign investments of different sizes in 2018, including Pathao with USD 10 million and Shohoz with USD 15 million, pre-series B investments respectively by Gojek and Golden Gate Ventures. Local investment firms, on the other hand, are not yet ready with their risk appetites to fund startups, compared to foreign ones. To further propel innovation, the government should make a significant effort to improve the investment climate to attract more local and foreign investments for startups to create values from their expertise and fresh ideas.[95]

Considering the business dynamism and administrative requirements, we assign the least ready status for this readiness condition. The cumbersome financing mechanism is surely an obstacle to ensure equitable opportunities for tech-based start-ups and SMEs.

READINESS SPECTRUM

Although Bangladesh has prioritised ICT in its financial planning, there needs to be more emphasis on ensuring proper implementation. Improving the state of the private sector and foreign direct investment climate, and establishing firm arrangements for financing start-ups and MSMEs will be critical, as this lack of appropriateness in finance readiness might seriously affect the digital growth of the country. We assign an amber traffic light for the first condition, but red traffic lights for the last two.

Readiness conditions	Prioritising ICT Financing in economic plans	Increasing Private Sector and Foreign Direct Investment	Strengthening Financing arrangements for Start-ups and MSMEs
Readiness spectrum	Needs improvement	Least ready	Least ready
Traffic light			

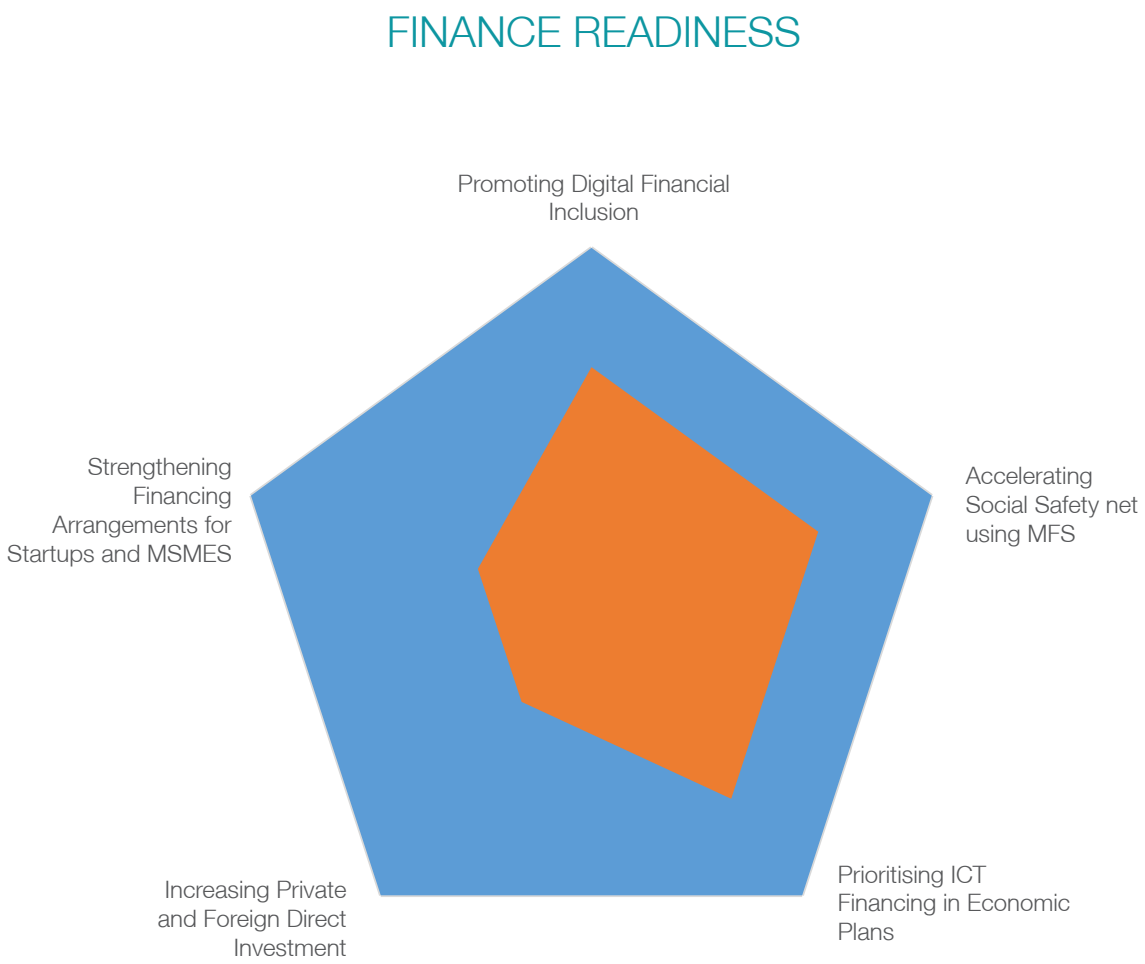
[94] Daily Star, 2020

[95] LightCastle Analysis, 2020

READINESS DIAGRAM

Following our scoring framework, we assign a score of 2 out of 3 for prioritising ICT financing in economic plans, promoting digital financial inclusion, and usage of MFS in social protection. However, increasing private investments and FDI, and strengthening financing arrangements for start-ups and MSMEs with least ready status receives a score of 1 out of 3.

In a radar diagram, the readiness of finance in Bangladesh can be presented in this way:



CROSS-CUTTING ISSUES

MARKET REGULATIONS, INTEROPERABILITY AND DISRUPTIVE TECHNOLOGIES IN THE FINANCIAL SECTOR

Sustainable financing for the digital economy in Bangladesh will further depend on proper market monitoring and regulations, to ensure a level playing field for the public and private actors, proactive synergy among the market actors within the financial ecosystem, and finally on effectively importing new technologies and making them profitable to scale up.

Regulation of digital transactions has become a concerning governance issue in the financial sector of Bangladesh. The banks already running MFS operations have been allowed to hold on to their existing licenses or form subsidiaries for the purpose. On the other hand, the new applicants will have to form subsidiaries without any alternative. They are permitted to take equity partners from other banks and non-bank financial institutions, NGOs, investment and Fintech companies. Mobile network operators (MNOs) have been kept out of the list of permitted partners, but have been allowed to become distributors or super-agents, along with NGOs and the postal department. Another pressing issue regarding MFS is money laundering accusation as they work as a haven for money laundering often because the transactions through MFS are still out of real-time monitoring.[96]

Business models and interoperability are major partnership challenges for digital financial transactions in Bangladesh. The ecosystem lacks synergy as the operators work as 'walled gardens', meaning that transactions can only be performed between users of the same system. The essence of mobile payment or mobile wallet is to create a cashless society and that will be possible if the interoperability among the MFS is implemented. Interoperability will significantly increase P2P transactions, which will automatically reduce the cash in and cash out operations. The market actors may not be keen to share their solutions with others or make their services accessible to customers who are not registered as their mobile money subscribers. While interoperability sounds like a rather straightforward implementation for MFS operators, it is not, as there are technical, commercial, and regulatory aspects that need to be covered by the government.

Financial technologies (Fintech) can bring disruptive innovations, offering a smooth, smart, and prompt solution to all types of financial activities to both banked and unbanked groups in Bangladesh. Crypto currency and digital cash, block chain technology, including Etherium, a distributed ledger technology (DLT) that maintains records on a computerised network are some of the latest and popular Fintech innovations. Big data and more accurate analytics and decentralisation of financial access will create opportunities for businesses, clients, and consumers to interact with each other in unprecedented ways. Taking into consideration that most of the people of Bangladesh are living under the low-income category, and the threats of climate change, inclusive and environmentally responsible financing through the utilisation of Fintech has to be given top priority. These cross-cutting issues should be carefully handled to secure financing and make transactions smooth in the digital space.

[96] Business Model on Mobile Financial Service of Bkash Limited in Bangladesh, 2011

ENABLING POLICIES FOR DIGITAL ECONOMY

The journey ahead for digital Bangladesh in its rapid development process can be obstructed by the lack of useful and up-to-date policies. Even if policies are in place, there are implementation difficulties at times. Well-formulated competition law may work as an enabler for assuring a fair market, while a reasonable taxation system can incentivise the market actors to accelerate business growth within the realm of digital product and service ecosystem. The innovations that are constantly being created in the market need to be protected through strict patent and copyright laws. Finally, the legal framework in Bangladesh should be well equipped with proper regulations to address the tremendous challenges offered by unprotected data in the upcoming digital age. In this chapter, we precisely highlight the importance of these four policy aspects that are inherently tied with the other three pillars discussed earlier and are essentially instrumental to leverage the opportunities of a digital economy we identify in the following chapter.

COMPETITION LAW TOWARDS A FAIR MARKET

A fairly weak competitive market encourages hoarding, black marketing of commodities, and other unfair practices. Difficulties of the consumers to avail quality goods and services at fair prices and market inefficiency influenced the formulation of competition law in Bangladesh, first proposed in 1996. The Bangladesh Parliament approved the much-awaited Competition Act after 16 years, in June 2012. The act was expected to prevent, control, and eradicate collusion, monopoly, and oligopoly, abuse of dominant positions in the market. However, the implementation and execution of this law have still been a major challenge. The competition law is not applied sufficiently across all areas and adapted accordingly, particularly in the digital technology space. Therefore, both disproportionate and balanced markets are prevalent, based on varied institutional capacities of the regulators to address the implementation difficulties of the law. For example, two MFS (Bkash and Rocket) has over 97% market shares in Bangladesh, while the rest of the 13 out of 15 MFS licensees enjoy only 3% combined. On the other hand, among mobile operators, Grameenphone holds the highest share of 46%, followed by Robi with 28%, Banglalink with 23%, and Teletalk with a 3% share.[97] The telecommunication sector of the country has benefited from this fair market environment with good prices, which is considered to be one of the reasons behind the increasing mobile penetration every year. These examples can be helpful for the government to understand the need to make competition assessments for policies and practices specially designed for a digital economy, to improve production and pricing efficiency in the future.

MAKING TAXATION EFFECTIVE

Policies should be tailored accordingly to support the massive informal economy and emerging new digital businesses, considering the huge opportunities laid in these major economic drivers in Bangladesh for a digital economy. Since the informal sector in the country is highly dependent on daily-wagers or contractual earners, the sudden digital shift might lead to a serious shock to the workforce. The government must pay significant attention to find a way to digitally connect the informal sector to the formal one for sustainable socio-economic development. Making the taxation system digital with a unique identification number and gradually including the whole income generating

[97] GSMA 2017

population into this system will increase the government's tax revenue, as well as reduce tax payees' harassment. At the same time, the government should be generous, in terms of imposing a tax on the growing digital industries to allow them adequate time to be formalised. Otherwise, formalisation may adversely affect the digitalisation agenda and the employment rates in the sector. Providing an attractive business environment for investors is equally important to create a symbiotic start-up ecosystem. Lucrative tax incentives can promote investment for early-stage businesses, and help offset the risks of investments. Currently, there are thousands of informal IT training centres and numerous computer shops in Bangladesh, that need to be taken under proper taxation and regulatory framework, with the vision of bottom to top proliferation of the IT industry.

SAFEGUARDING INTELLECTUAL PROPERTY

Bangladesh being a signatory of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement of the World Trade Organization (WTO), has adopted various IP policies and initiatives, however, there is still scope for improvement.[98] The Copyrights Act, 2000 does not provide any strong safeguarding mechanism against online copyrights piracy, p-2-p broadcast of copyrights substances, copyrights in a database, and restrictions in deep linking, although an amendment in 2005 increased the punishment and fine for the violation of the copyright in computer programmes.[99] In addition to this, the Information and Communication Technology law formulated in 2006 provides guidelines to prevent software piracy.[100] The Trademarks Act, 2009 addresses the intentional violation of the right of a trademark-holder by offering multiple remedies, penalties, and compensations. Under the current Patents and Designs Act, the inventor of a design is not able to claim any right for his creation.[101] The new draft of this law in 2006 grants 20 years of patent protection to the patentee, creating an intellectual property rights friendly environment, especially in the digital sphere. Nonetheless, this is still a big challenge for Bangladesh, due to the lack of coordination among the patent and copyrights office and in-depth expertise on digital aspects.

SECURING PRIVACY IN THE DIGITAL SPACE

With the rise of data-driven disruptive technologies like Artificial Intelligence, the Internet of Things, and Big Data, an unprecedented amount of data has been created and stored every day. Up-to-date legal framework is needed to safeguard individual privacy by eradicating the misuse of personal information by other individuals and organisations. Digital signatures, electronic records, and the control of certifying authorities are under protection by the ICT Act, 2006, but data privacy issues have not been covered by this law. Personal data has been defined as 'identity information' in the Digital Security Act, 2018, and is protected with the right of an individual's explicit consent or authorisation from collecting, selling, storing/preserving, supplying, or for any other purpose. Identity information includes names, pictures, addresses, e-signatures, dates of birth, national identity cards, birth and death registration numbers, fingerprints, passport numbers, bank account numbers, driving licenses, e-TIN numbers, credit or debit card numbers, etc. However, the lack of digital literacy and awareness regarding privacy leave the majority of the population under threat of data theft and surveillance in the digital space. Standalone policies cannot solve these complex issues of privacy, a significant 360-degree effort is necessary in this regard.

[98] Chowdhury, M. A. A., 2018

[99] Islam, 2016

[100] Hoque, 2010

101 Chowdhury, M. A. A., 2018

OPPORTUNITY ASSESSMENT

Technological innovations have profound potentials to raise productivity and offer solutions to many development challenges of Bangladesh. To take advantage of these opportunities, it is important to identify and highlight specific pockets that can be practically targeted for realising tangible benefits from these innovations.

This opportunity assessment aims to indicate the types of economic and social opportunities that Bangladesh may be able to tap into and scale up as a result of the technological innovations and developments.

To identify the areas of opportunity for Bangladesh in the digital age, we initially built an opportunity matrix tool for a broader range of potential areas. For each area, the matrix considered: 1) their priorities in various development strategies of the government and the development partners, 2) current public and private investment in those areas, 3) their GDP contribution, and 4) their predicted long-term value addition to the economy.

Simultaneously, we conducted series of formal and informal consultations with the relevant government, private sector, and civil society stakeholders. We presented our project information to them, requested their opinions and views, and recorded and transcribed the discussions. We matched the findings from this exercise with our secondary review in the matrix exercise to finally identify the opportunities Bangladesh might realistically take up.

We prioritised areas with existing income generating opportunities and emphasised scaling those opportunities up to the point which maximises their positive impacts on our economic growth.

From our analysis, we see that scaling up the business process outsourcing (BPO), information technology (IT)/software industry will be an important opportunity for the economic growth of Bangladesh in the digital age. Another opportunity for Bangladesh lies in using digital technologies to connect its enormous informal sector to the formal one. We find that emerging digital business models and start-ups also have possibilities for expansion. Focusing on these three channels of the economy may help Bangladesh increase export diversification, market efficiency, competitiveness, labour force diversification, and consequently, increase GDP substantially.

To leverage these opportunities in the digital economy, this report discusses some existing challenges; many of the challenges are related to the readiness conditions that have been discussed earlier in the readiness assessment. Additionally, this report explains the importance of accommodating frontier technologies used in already established or emerging digital businesses to be compatible with the global market. The report also reminds the policy makers to ensure inclusiveness in terms of gender and geography while realising these opportunities.

OPPORTUNITY 1

SCALING UP BPO AND IT/SOFTWARE INDUSTRY IN BANGLADESH

Starting its journey in 1997, Bangladesh Association of Software and Information Services (BASIS) has more than 1200 companies currently registered for software development and providing IT services.[102] Bangladesh started exporting software around two decades ago, starting with BPO. In 2017, more than 250 companies exported IT products and services to 60 countries and earned USD 800 Million, which was 2.2 percent of the total export value of the country.[103] Currently, software development firms hold 47% of the market share in the technology industry in Bangladesh, while the combined share of information technology enabled services (ITES) and the BPO sectors is 16%.[104] Adequate supply of skilled and semi-skilled labour is still a challenge for the industry, including the existing urban-rural disparity and the lack of gender inclusion in the workforce. Financial challenges and certain regulatory issues need to be addressed for the growth of the industry, and therefore, the financial services and regulations for this sector must have dynamic adaptation strategies to cope with the ever-changing global market.

ADDRESSING SKILLED/ SEMI-SKILLED LABOUR SUPPLY FOR LEVERAGING THE OPPORTUNITY

Among the top 250 global IT/ITES delivery locations, Bangladesh is the lowest cost destination, offering significant savings over its competitors. The ability to operate at significantly lower costs than India and the Philippines is one of the key value propositions of the IT/ITES industry of Bangladesh.[105] In addition to lower costs, Bangladesh also offers a large entry-level workforce, including a blooming freelancing community.[106] According to the Oxford Internet Institute (OII), Bangladesh is the world's second-largest supplier of online freelancers, second only to India.[107] There are one million freelancers in India who dominate the technology and software development market and contribute USD 400 billion to the national GDP.[108] In comparison, Bangladesh is the top supplier of sales and marketing support service freelancers who generate only USD 100 million annually.[109]

The growth of the IT industry depends on the steady supply of trained talents; however, there is a substantial shortage. The IT industry in Bangladesh is struggling to find people with adequate competences because of the low rate of enrolment in science, technology, engineering, and mathematics (STEM) at the tertiary level education. However, to meet the demand for high-quality skilled workforce in the IT industry, the government had trained 65,000 entry and mid-level IT/ ITES talents till 2018.[110]

More than half of the population in Bangladesh is currently under the age

[102] LightCastle Partners, 2020

[103] ICT Export Report, ICT Ministry, 2017

[104] BASIS

[105] Betting on the Future – The Bangladesh IT-ITeS Industry is poised for Growth, Everest Group Research, 2017

[106] LightCastle Analytics Wing, 2020

[107] The iLabour Project – Oxford Internet Institute, 2017

[108] Payoneer Blog, 2016

[109] Dhaka Tribune, 2017

[110] Betting on the Future – The Bangladesh IT-ITeS Industry is poised for Growth, Everest Group Research, 2017

of 25; however, one in every 10 young people here is unemployed.[111] Freelancing and BPO require a semi-skilled workforce and thus can help ease the existing unemployment problem in Bangladesh. At present, there are more than 500,000 regular freelancers in Bangladesh and most of them only have general education and no special training.[112] In 2017, only two percent of the registered freelancers received training under the Learning and Earning Development Projects (LEDP) of the government.[113] There are some private initiatives to train the freelancers at the entry-level. However, the absence of long-term, high-level skill training is an obstacle for the Bangladeshi freelancers in getting highly paid online work. Lack of proficiency in English is another hindrance in taking this sector forward as it is a major requirement for communicating with international clients.

CONNECTING THE RURAL ECONOMY TO THE FREELANCING/IT BUSINESSES AND REDUCING GENDER GAP

A planned geographical expansion of BPOs, especially in the poverty prone north and eastern parts of Bangladesh, can create employment opportunity for a large section of the youth who are currently unemployed but technically part of the workforce. IT education and training to the students in smaller towns and villages can reduce the regional digital divide in the sector. However, only training cannot ensure the inclusion of the rural youth in the IT industry unless the infrastructural challenges like device affordability and poor internet quality are not addressed.
At present, there are 4,565 union digital centres (UDCs) in all 64 districts of Bangladesh. UDCs are working as information hubs for the rural communities, providing them an easy access to various public information and services.[114] A unique feature of the UDCs is to deliver services following a public and private hybrid model, which allows them to bring technological solutions to the doorstep of the people.[115] UDCs usually have two entrepreneurs, ideally, one male and one female, recruited by the local government representatives, dedicated to providing IT-based services to the villagers by using internet tools in exchange for money. Rural communities in Bangladesh generally have poor access to information and poor ICT skills; these entrepreneurs are filling this gap and supporting the rural communities to access information and get governmental services offered online. UDC entrepreneurs also provide banking and e-commercial services.[116] Within 2017, 10,000 entrepreneurs of UDC were supposed to be trained to increase their capacity for reporting, article writing, outsourcing, and e-commerce. These trainings are necessary for ensuring the sustainability of the business models and strengthening their role as change-makers by providing ICT training to the rural citizen. With relatively low participation of women in ICT education at the tertiary level in Bangladesh, the freelancing sector also suffer from gender disparity. To ensure at least 30 percent participation of women in the ICT industry of Bangladesh, The Leveraging ICT for Growth, Employment and Governance (LICT) and the 'She Power' projects trained 20,000 women by 2019 to increase their skills in freelancing, IT service provision, and call centre operation. Addressing the financial challenges and regulatory issues of the industry

Private investors can avail a 10-year corporate income tax exemption if they invest in the ICT industry in Bangladesh.

[111] World Economic Forum, 2019
[112] ICT Division, 2020
[113] ICT Division, 2020
[114] a2i, 2017
[115] Rashid, 2019
[116] a2i, 2017

Local companies, however, are still lagging to fully leverage the large, young talent pool and tap into the competitive edge of having a low cost of operations. Leading global IT service providers such as Wipro, IBM, TCS, NTT Data, Infosys, and WPP, on the other hand, have gradually been entering into the local market because of the wide range of incentives available for foreign investors in the ICT industry including 100% equity of the business.

Cross-border payment system in Bangladesh works as a major obstacle to increasing revenue from the BPO sector. The system is much better in the neighbouring countries. The payment system here is basically through international bank transfer which is a time-consuming, tedious, and costly option. Many users despise to go through this process and often use illegal channels.[117] In the absence of international payment gateways like PayPal, freelancers and small and medium IT/ITES service providers usually deal with a handful of direct clients outside the marketplaces such as Fiverr and Upwork. Consequently, Bangladesh is losing a considerable amount of revenue every year.

Certain regulatory issues also discourage the growth of the industry. Creating an intellectual property rights friendly environment, especially in the digital sphere, is still a challenge in Bangladesh due to the lack of in-depth legal expertise on digital aspects and coordination among the patent and copyrights office. Some of these financial and regulatory issues have been discussed in the readiness assessment under finance and policy pillar.

STRATEGIES TO ADAPT TO THE DYNAMIC GLOBAL MARKET OF THE IT INDUSTRY

Diversification away from traditional IT products and services such as app development and maintenance, IT helpdesk, and web development towards a more advanced ITES/BPO services such as big data analytics, internet of things (IoT), 3D imaging, and robotics process automation (RPA) will increase the scope of business for Bangladesh in the global offshore services industry. Technologies such as IoT not only increases overall productivity but also enables more intelligent, greener production and smarter cities and infrastructure. Frontier technologies could also be used to improved delivery of essential services such as healthcare and education. Use of these technologies is likely to increase exponentially in future. Keeping up with relevant technological advancements will be a critical success factor for the future of Bangladesh's technology industry.

In its National Strategy of Artificial Intelligence, Bangladesh has already decided seven national priority sectors which include public service delivery, manufacturing, agriculture, smart mobility and transportation, skill & education, finance & trade, and health. Six strategic pillars for implementing this AI strategy in Bangladesh consists of i) research and development, ii) skilling and reskilling of AI workforce, iii) data and digital infrastructure, iv) ethics, data privacy, security & regulations, v) funding and accelerating AI start-ups, and vi) industrialization for AI technologies. Some emerging start-ups in the country have started realising the possibilities of using AI, IoT, and block-chain technology. However, Bangladesh urgently needs institutional investment and a regulatory framework to build an innovative and self-sustaining ecosystem for leveraging the ever-evolving frontier technologies.

[117] sThe Business Standard, 2020

OPPORTUNITY 2

CONNECTING THE INFORMAL SECTOR TO THE FORMAL ONE IN BANGLADESH THROUGH THE HELP OF DIGITAL TECHNOLOGIES

Many developing countries experience an increase in the share of the informal sector during their economic expansion.[118] The informal economy of Bangladesh currently accounts for 43% of the GDP and almost 88% of the total employment.[119] Though informal sector is a key player in generating jobs and absorbing surplus labour, it takes place outside the formal regulatory structure. Regulations have their own costs; thus the choice to operate outside the regulatory structure often depend on individual cost-benefit calculations of the producer.[120] Jobs in the informal sector are insecure and lack basic social and legal protections or other employment benefits. This massive informal sector in Bangladesh, therefore, can benefit from scaling up e-businesses and female digital inclusion with enabling policies and regulations.

ADDRESSING THE CHALLENGES OF BUSINESS IDENTIFICATION, TAXATION, AND ACCESS TO CREDIT

In Bangladesh, 99.8% of all enterprises (7.81 million) are small and micro (including cottage) enterprises, most of which belong to the informal economy.[121] Most informal businesses in the country cannot avail a business identification number (BIN). To have a BIN, a business is required to have a value-added tax (VAT) registration certificate. When businesses get a BIN, they are included in the formal legal framework and become eligible to carry out activities such as import-export, open of letters of credit, obtain bank loans,

and participate in tenders, and supply goods and services[122]. Without a BIN, employees of the informal economy, therefore, do not get legal protection and, consequently, bear the risks of exposure to different forms of abuse and exploitation. At the same time, the government of Bangladesh is missing out on a huge amount of tax from the informal sector even though tax is the biggest source of revenue for Bangladesh.[123] A reform process in Vietnam has helped the informal businesses to formalise, and consequently access better equipment, increase their scale of operation, and operate in a more competitive environment, adding an annual value of 20% on an average in revenue.[124] The process of formalization and taxation might discourage informal businesses from joining the formal sector. Digitisation can help simplify the formalization process to increase its appeal among informal businesses. However, premature formalisation can adversely affect informal businesses and cause financial burden on them.

India is gradually increasing the use of the Aadhaar card—a biometric unique identifier—for providing many citizen services. Aadhaar number helps the citizen cut down on the documentation needs in

118 Rada, 2010

119 Financial Express, 2019

120 Employment Impact Assessments: Integrating the informal sector into social accounting matrices and computable general equilibrium models

121 BBS Economic Census, 2013

122 National Board of Revenue, Bangladesh

123 Daily Star, 2020

124 World Development, 2016

tax return and makes the process cost-effective and efficient. There is no need to collect multiple identity proofs or run around for various documents for opening a bank account; the Aadhaar Card is sufficient as a proof of identity and address. The card even permits the holder access to facilities such as credit and insurance more easily, since the government already has all the necessary data.[125] Similar practical measures can be taken in Bangladesh to enable the informal business owners to access credit through their smart NID card.

EXPANDING THE E-COMMERCE SCENARIO IN THE COUNTRY

Bangladesh is ranked 46th in the global ranking of e-commerce revenues according to a study by the German online portal Statista. Bangladesh e-commerce industry stood at $1,649 million in 2019, rising to $2,077 million this year (with 166% growth) and will touch to $3,077 million in 2023.[126]

Funding is a major challenge for scaling up e-commerce business as majority are not registered. Banks, for instance, are subsidizing marketing and promotional costs for credit/debit cards with the leading apparel brands or restaurants; however, they are not warming up to e-commerce start-ups for the lack of collaterals. Banks are also not adequately prepared to finance e-commerce ventures, neither are local venture capital firms. In the e-commerce sectors, it takes a long time, usually over five years, to realize return on capital, but in reality, investors prioritize short-term investments.[127] The National Digital Commerce policy 2018 does not allow foreign investors to hold a stake of over 49% in any e-commerce venture in Bangladesh to protect and boost the local investors; but this also limits funding opportunities in this sector.

Seventy-nine percent of e-commerce sales take place on social media platforms in India and therefore Facebook has launched the 'Facebook Marketplace' in India in 2019, allowing people to buy and sell in their community.[128] Likewise, the F-commerce market in Bangladesh is also expanding; with more than 300,000 businesses operating through Facebook, it is currently generating approximately BDT 312 crore. This sector is mostly informal as only 100 of these enterprises are associated with e-Commerce Association of Bangladesh (e-CAB).[129]

These businesses can gain much benefit from the usage of systematic data analytics, which will allow digital professionals, marketers, and business owners to gain deeper insights and identify trends from the digital media and internet to make informed business decisions. Data analytics i.e. an integrated view of customer-related information through the internet, social media, mobile, and e-commerce usage in Bangladesh can provide local organisations with the insight to refine the process of product development, improve customer retention, or mine through the data to find new business opportunities.

It is easy for anyone to start a business on Facebook, but coming up with original ideas and creating unique value for customers is not that easy. Besides, fraudulent activities and lack of professionalism often cause the customers to lose trust on e-businesses. To prevent fraudulence and protect customer rights, the National Digital Commerce policy 2018 also mandated that the e-commerce entities clearly communicate the details of the products they sell online, including information on product quality and

125 UDYAM REGISTRATION PORTAL, Ministry of Micro, Small and Medium Enterprises, India

126 Dhaka Chamber of Commerce and Industry (DCCI), 2020

127 IDLC, 2018

128 IDLC, 2018

129 IDLC, 2018

return policy. Trade license and easy authentication of businesses through the NID can make online purchases safer for the consumers.

STRENGTHENING THE INFORMAL SECTOR AND SUPPLY CHAIN IN RURAL AREAS USING DIGITAL TECHNOLOGIES

Thirty-seven percent of the rural households in Bangladesh are non-farm.[130] 18% of the rural labour force are involved in elementary occupations, 14% in craft making and trading, and 13.5% in service and sales works.[131] With the penetration of mobile phone networks, tiny mobile recharge shops in the village areas have created new type of professions. Mobile financial service (MFS) providers are using this existing network of small retailers and creating a vast agent distribution network, which is geographically dispersed across the country, to serve the customers. A start-up named Priyoshop has decided to partner with the small retailers, especially in rural areas, and turn their shops into hub of digital commerce because these smaller players, located in the neighbourhoods, can effectively connect brands with rural consumers. However, e-commerce currently constitute less than one percent of the retail sector in Bangladesh.

During the pandemic, an exemplary model was created to assist the farmers. A volunteer-led virtual call centre was formed to help connect rural farmers with suppliers and buyers. A rickshaw van was assigned to transport the goods and payments were made through mobile transfers.[132] Producer organizations (POs), supervised by the Food and Agriculture Organization (FAO), have also started 57 virtual call centres in eight high-poverty districts of the country. They assist in forming an ecosystem with available technologies for the farmers by linking them with input suppliers and off takers. Volunteers managed the database of purchases and sales of agricultural inputs and services. The POs worked closely with the local authorities for transportation services and used of MFS like bKash, Nagad and Rocket for payment. The POs also used Facebook and Messenger to share transaction records or information and Zoom for virtual meetings.[133] This was an innovative model created solely based on addressing the problem of transmission of the coronavirus.

Similar systems and models can be built with the use of digital technology to assist rural farming communities. By using smartphone and mobile applications, farmers can create a network of farmers, traders, buyers, and consumers and establish communication with each stakeholders in the production and distribution channel, including the consumers directly. This will facilitate knowledge and information sharing, increase marker awareness in both urban and rural areas and facilitate informed purchase and selling decisions. This can address asymmetric information problems such farmers selling produce at a lower price than they should, often incurring loss, because they do not have information about the retail price. Therefore, information and communication systems can help bridge the gap between the farmers and consumers, ensuring that both get a fair price. Recently, LightCastle and Syngenta Foundation for Sustainable Agriculture (SFSA) jointly introduced a novel mobile-light Enterprise Resource Planning (ERP) for farmers that combines four components: a mobile application, a web dashboard, a monitoring & evaluation (M&E) tool, and a notification centre. Findings from the data so far indicate that yields of farmers using

130 BBS, 2019

131 Labour Force Survey, 2016-2017

132 World Bank, 2020

133 World Bank, 2020

the ERP increased by 25% on average compared to the non-user farmers (increase of 13%). Smallholders' income increased by 34% and post-harvest losses declined by 3-8%.[134]

EMPOWERING WOMEN IN THE DIGITAL BUSINESSES

Ninety-five percent of the female workers in Bangladesh are working in the informal sector.[135] Study shows that half of the women entrepreneurs who are registered, are registered as pseudo-proprietors and have their licenses secured by male entrepreneurs.[136] Often, after the demise of a male entrepreneur, his wife takes the responsibility of running the enterprise but does not have its ownership.[137] Considering the social conditions of women in Bangladesh, the e-commerce world seems to be well-suited to female entrepreneurs in our country because it gives them the flexibility to balance their personal and professional life without affecting security issues. Currently, 50% of Facebook stores are run by women entrepreneurs.[138] There is no monitoring, policy, or legal framework specially designed for these online women entrepreneurs. It is an unorganized sector without training and specific guidelines. If these issues are addressed, more women will be motivated to start online businesses.

The e-commerce market is growing fast, especially in rural areas; in 2017, it grew by 127 percent in urban areas and by 167 percent in rural areas.[139] However, there is a remarkable gap between urban and rural women in e-commerce because they have limited access to internet and business networks, including clients, suppliers, and creditors. Urban women have a higher capacity to run a business individually compared to rural women. The online commerce can address women's needs for income generation on the supplier side and safety and convenience on the buyer side. Linking mobile money wallets to e-commerce platforms has potentials to nudge a large segment of rural women shoppers and entrepreneurs into the world of digital payments. This could get them on the first rung of the financial inclusion ladder — an account to be used for payments — while building the foundation from which other use cases, such as digital credit, could emerge.[140]

134 LightCastle Partners, 2020
135 Labor Force Survey, 2016
136 Financial Express, 2020
137 IBID, 2020
138 Dhaka Tribune, 2020
139 E-CAB, 2019
140 CGAP, 2019

OPPORTUNITY 3

EXPANDING THE START-UP SCENE IN BANGLADESH

Bangladesh aims to grow its start-up sector by seven times through the accomplishment of four essential objectives by 2025. The objectives are to a) support technology-based innovation, b) create new employment opportunities, c) provide training to the entrepreneurs, and d) develop technical skills of the youth. The goal is to have five Unicorns—one billion-dollar companies—in Bangladesh by 2025. With a valuation of 1.45 billion dollars at present, the country's start-ups have the potential of reaching a combined 10-billion-dollar valuation within this period.[141]

The ridesharing start-ups in Bangladesh has been experiencing a boom, currently with 7.5 million rides per month and a valuation of BDT 2,200 crore, which accounts 23% of the entire transportation sector.[142] While traffic congestion eats up 3.2 million working hours per day in Dhaka, according to the World Bank, app-based ridesharing services offer the commuters ease of finding a transport, doorstep pick-up, and app-based fare estimation. The success of these start-ups lies in service innovation: motorbike-based ridesharing services have become more popular here instead of car-based ones like in the western cities. It contributed more than 40% growth of yearly motorbike sales as well as created income generating opportunities for at least 200,000 low- or middle-income youth in urban areas.[143]

While we see initial signs of growth of start-ups in Bangladesh, at this stage, there is a clear gap with the regional peers with similar digital ecosystems in terms of creating an enabling environment for the start-ups to scale up. To support the ecosystem, the business environment of the country should be transformed. Challenges of ensuring availability of funds have been discussed in the readiness assessment under finance pillar. Beyond those issues, acceleration or incubator programs, effective policies, and sustainability of the ecosystem are some of the critical factors to expand the start-up scene in Bangladesh.

SUPPORTING THE START-UPS WITH INCUBATION AND MENTORSHIP OPPORTUNITIES

To support the local start-up ecosystem with mentoring and co-working spaces, the government of Bangladesh is gradually setting up 28+ Hi-Tech Parks. Some private sector institutions also took incubation initiatives. Of these, Grameenphone Accelerator is a notable initiative, powered by Seedstars, it is one of the largest tech accelerator programs that has supported start-ups like Sheba.XYZ (online service marketplace), CMED Health (healthtech), Repto (online learning platform), and so on. In association with the ICT Ministry, Banglalink incubator has been facilitating innovative ventures since 2016.[144] The emergence of local and international accelerators and incubators has facilitated the development of 1000+ active start-ups till date.

However, the number and scope of the initiatives are inadequate compared to the need of the start-ups, most of which need intensive mentoring for growth. Startups are likely to receive mentorship either through the personal network or

[141] The Financial Express, 2020

[142] The Business Standard, 2020

[143] Reuters, 2020

[144] LightCastle, 2020

through the network of the incubator.[145] While many active and successful mentors are sporadically helping the start-ups, the ecosystem needs more collective and organised efforts to make mentorship accessible to as many start-ups as possible.

ENABLING POLICIES AND SUSTAINABILITY OF THE START-UPS

Providing an attractive business environment for investors by enabling policies is important to create an effective start-up ecosystem. Lucrative tax incentives can promote investment for early-stage businesses and help offset the risks of investments. The Government of Bangladesh already has multiple incentives for promoting foreign investments: tax is exempted for up to 15 years for foreign investors, no import duties are charged for export-oriented sectors, and retained earnings are treated as new investments.[146]

At the same time, the government should allow digital industries adequate time to be formalised. Otherwise, formalisation and imposing taxes may adversely affect the digitalisation agenda and the employment rate in the sector. Also, regulatory reform should be in place to prevent malpractices in the market such as lobbying, using speed money, and poor payment terms, because these practices increase the financial costs of the venture, often to extent of closing it down.

Policy reforms on allowing provident funds, gratuity funds, and insurance companies to invest in alternative investment instruments like venture capital funds was highlighted while discussing vision 2025 for start-ups in Bangladesh.[147] To enable fund of funds by bank and non-banking financial institution (NBFI) were also suggested in the document.

The core sustainability issue for the start-ups in the country is their survival rate; majority of the business models fail before completing three years since their inception.[148] The main reason is that many start-ups who require more investment in their graduation phases fail to secure funding. Again, the start-up ecosystem in Bangladesh is still predominantly centred on two of the largest cities, Dhaka and Chattogram. To scale and sustain in an inclusive way, it needs to grow and expand throughout the country.

145 KM Saqiful Alam, The Daily Star, 2020

146 LightCastle, 2020

147 ICT Division, 2019

148 KM Saqiful Alam, The Daily Star, 2020

REFERENCES

A2i. Access to Information. Prime Minister's Office. https://a2i.gov.bd/

Activating Venture Capital in Bangladesh. (2020, January 26). LightCastle Partners. https://www.lightcastlebd.com/insights/2020/01/activating-venture-capital-in-bangladesh

Ahl, H. (2002). The Making of the Female Entrepreneur A Discourse Analysis of Research Texts on Women's Entrepreneurship.

Alam Chowdhury, M. (2018). Enforcement of Intellectual Property Rights in Bangladesh: To What Extent Is It TRIPS-Responsive? Beijing Law Review, 09, 425–438. https://doi.org/10.4236/blr.2018.93026

Alli, A., & Shahed, A. (2016). Business Model on 'Mobile Financial Service of Bkash Limited In Bangladesh'.

Amanullah, D. M. Situation Analysis of Bangladesh TVET Sector: A background work for a TVET SWAp.

Angel investing 101: Doing it right in Bangladesh. (2021, February 13). The Daily Star. https://www.thedailystar.net/supplements/30th-anniversary-supplements/going-digital/news/angel-investing-101-doing-it-right-bangladesh-2043829

Asian Development Bank. (2015). Innovative strategies in higher education for accelerated human resource development in South Asia: Bangladesh. Asian Development Bank.

Asian Development Bank. (2019). Public-Private Partnership Monitor: Second Edition. Asian Development Bank. https://doi.org/10.22617/TCS190020-2

Automation Policy Brief 2018. A2i. Retrieved 25 February 2021, from https://www.oecd.org/employment/Automation-policy-brief-2018.pdf

Bangladesh. United States Department of State. Retrieved 25 February 2021, from https://www.state.gov/reports/2019-investment-climate-statements/bangladesh/

Bangladesh. (2016, November 27). UNESCO. http://uis.unesco.org/en/country/bd

Bangladesh Country Snapshot. World Bank. Retrieved 24 February 2021, from http://documents1.worldbank.org/curated/en/190391468190764030/pdf/100113-WP-PUBLIC-Box393225B-Bangladesh-Country-Snapshot.pdf

Bangladesh is booming—And its future looks even brighter | World Economic Forum. Retrieved 25 February 2021, from https://www.weforum.org/agenda/2019/10/bangladesh-is-booming/

Bangladesh IT and Digital Sector Tackling COVID-19 Implications. (2020, April 2). LightCastle Partners. https://www.lightcastlebd.com/insights/2020/04/bangladesh-it-and-digital-sector-tackling-covid-19-implications

Bangladesh Power Development Board. https://www.bpdb.gov.bd/

Bangladesh reports internet usage growth—Developing Telecoms. Retrieved 24 February 2021, from https://www.developingtelecoms.com/telecom-technology/optical-fixed-networks/9378-bangladesh-reports-internet-usage-growth.html

Bangladesh Ride Sharing Market: With 7.5m rides a month, ridesharing services take over Bangladesh | The Business Standard. Retrieved 25 February 2021, from https://tbsnews.net/economy/75m-rides-month-ridesharing-services-take-over-bangladesh-45453

Bangladesh—ICT Service Exports (BoP, Current US$)—1996-2017 Data | 2021 Forecast. Retrieved 25 February 2021, from https://tradingeconomics.com/bangladesh/ict-service-exports-bop-us-dollar-wb-data.html

Bangladesh's potential e-commerce industry | theindependentbd.com. Retrieved 25 February 2021, from http://www.theindependentbd.com/post/254295

Bangladesh Statistics 2019. Retrieved 24 February 2021, from http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/a1d32f13_8553_44f1_92e6_8ff80a4ff82e/2020-05-15-09-25-dccb5193f34eb8e9ed1780511e55c2cf.pdf

Bangladesh Tertiary Education Sector Review Skills and Innovation for Growth. World Bank. Retrieved 25 February 2021, from http://documents1.worldbank.org/curated/en/303961553747212653/pdf/Bangladesh-Tertiary-Education-Sector-Review-Skills-and-Innovation-for-Growth.pdf

BdOSN. Bangladesh Open Source Network. https://www.bdosn.org/

BIGD Digital Inclusion Series: Ep.3 - Last Mile Experience of Mobile Financial Services during COVID-19. BRAC Institute of Governance and Development. Retrieved 24 February 2021, from https://bigd.bracu.ac.bd/event/bigd-digital-inclusion-series-ep-3-last-mile-experience-of-mobile-financial-services-during-covid-19/

BMET. http://www.old.bmet.gov.bd/BMET/

Can informal digital commerce bring women's financial inclusion? (2019, March 10). The Daily Star. https://www.thedailystar.net/opinion/finance/news/can-informal-digital-commerce-bring-womens-financial-inclusion-1712647

Challenges of the startup ecosystem. (2017, February 25). The Daily Star. https://www.thedailystar.net/education-employment/challenges-the-startup-ecosystem-1366561

Copyright protection in literary and artistic works. (2020, August 18). The Daily Star. https://www.thedailystar.net/law-our-rights/news/copyright-protection-literary-and-artistic-works-1946869

Costly data, poor connection key challenges for online classes in public universities | The Business Standard. Retrieved 24 February 2021, from https://tbsnews.net/bangladesh/education/costly-data-poor-connection-key-challenges-online-classes-public-universities

Could e-Commerce Bring Women's Financial Inclusion in Bangladesh? Retrieved 25 February 2021, from https://www.cgap.org/blog/could-e-commerce-bring-womens-financial-inclusion-bangladesh

CPD Budget Analysis FY2021. CPD. Retrieved 25 February 2021, from https://cpd.org.bd/wp-content/uploads/2020/06/CPD-Budget-Analysis-FY2021.pdf

Dearth of research in Bangladeshi universities. Dearth of Research in Bangladeshi Universities | Theindependentbd.Com. Retrieved 25 February 2021, from http://www.theindependentbd.com/printversion/details/235310

Defining woman entrepreneurship. The Financial Express. Retrieved 25 February 2021, from https://thefinancialexpress.com.bd/views/reviews/defining-woman-entrepreneurship-1600615442

Demenet, A., Razafindrakoto, M., & Roubaud, F. (2016). Do Informal Businesses Gain From Registration and How? Panel Data Evidence from Vietnam. World Development, 84, 326–341. https://doi.org/10.1016/j.worlddev.2015.09.002

Digital technology ensures food supply in rural Bangladesh during COVID-19. Retrieved 25 February 2021, from

https://blogs.worldbank.org/endpovertyinsouthasia/digital-technology-ensures-food-supply-rural-bangladesh-during-covid-19

Digitised G2P payment to help 'save millions'. The Financial Express. Retrieved 25 February 2021, from https://thefinancialexpress.com.bd/trade/digitised-g2p-payment-to-help-save-millions-1573618345

Dutta, S., Lanvin, B., Wunsch-Vincent, S., World Intellectual Property Organization, Insead, Cornell University, & SC Johnson College of Business. (2019). Global innovation index. Creating healthy lives—The future of medical innovation 2019.

E-CAB e-Commerce Association of Bangladesh. https://e-cab.net/

E-commerce in Bangladesh: Where are we headed? The Financial Express. Retrieved 25 February 2021, from https://thefinancialexpress.com.bd/views/views/e-commerce-in-bangladesh-where-are-we-headed-1578666791

Economic Census 2013—Bangladesh Bureau of Statistics-Government of the People's Republic of Bangladesh. Retrieved 25 February 2021, from http://www.bbs.gov.bd/site/page/d13ee628-7458-4650-a824-6423d35d3620/Economic-Census-2013

eFarmersHub: Digitizing Agribusiness Operations. LightCastle Partners. Retrieved 25 February 2021, from https://www.lightcastlebd.com/cases/efarmershub-digitizing-agribusiness-operations

Employment Impact Assessments: Integrating the informal sector into social accounting matrices and computable general equilibrium models – tekijä: Bill Gibson. LibraryThing. com. Retrieved 25 February 2021, from http://www.librarything.com/work/24480126

Financing Solutions for Micro Small and Medium Enterprises in Bangladesh. World Bank. Retrieved 25 February 2021, from http://documents1.worldbank.org/curated/en/995331545025954781/Financing-Solutions-for-Micro-Small-and-Medium-Enterprises-in-Bangladesh.pdf

Foreign direct investment (FDI) in Bangladesh—Investing—Nordea Trade Portal. Retrieved 25 February 2021, from https://www.nordeatrade.com/en/explore-new-market/bangladesh/investment

Freelancers turn Bangladesh into a hub for ICT outsourcing. (2017, September 20). Dhaka Tribune. https://www.dhakatribune.com/career/2017/09/20/freelancers-turn-bangladesh-hub-ict-outsourcing

Freelancing in India: How does it work and where is it headed? (2016, June 26). Payoneer Blog. https://blog.payoneer.com/freelancers/industry-tips-fl/freelancing-india-work/

Future Skills: Finding Emerging Skills to Tackle the Challenges of Automation in Bangladesh. A2i. Retrieved 25 February 2021, from https://a2i.gov.bd/publication/automation-in-bangladesh/

'Government decides for 3rd submarine cable connect in Bangladesh'. Retrieved 24 February 2021, from https://www.thedailystar.net/business/government-decides-for-3rd-submarine-cable-connect-in-bangladesh-1688437

Government expenditure on education, total (% of GDP)—Bangladesh | Data. Retrieved 25 February 2021, from https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?locations=BD

GSMA | Global Mobile Trends 2017—GSMA Asia Pacific. Retrieved 24 February 2021, from https://www.gsma.com/asia-pacific/resources/global-mobile-trends-2017/

GSMA The Mobile Gender Gap Report 2020. Retrieved 24 February 2021, from https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf

Hassan, G. M., & Shakur, S. (2017). Nonlinear Effects of Remittances on Per Capita GDP Growth in Bangladesh. Economies, 5(3), 25. https://doi.org/10.3390/economies5030025

Hernandez, K. Barriers to Digital Services Adoption in Bangladesh.

ICT Division seeks Tk 50cr for Startup Bangladesh Co. (2020, January 2). The Daily Star. https://www.thedailystar.net/business/news/ict-division-seeks-tk-50cr-startup-bangladesh-co-1848337

IDLC Monthly Business Review. (2018). Retrieved 25 February 2021, from https://idlc.com/mbr/article.php?id=216

Implications of COVID-19 on the Software Industry. (2020, June 1). LightCastle Partners. https://www.lightcastlebd.com/insights/2020/06/implications-of-covid-19-on-the-software-industry

Infodev Documents. Retrieved 24 February 2021, from https://www.infodev.org/sites/default/files/resource/InfodevDocuments_820.pdf

Informal economy and economic inclusion. (2020, February 18). The Daily Star. https://www.thedailystar.net/supplements/29th-anniversary-supplements/digitisation-and-inclusivity-taking-everyone-along/news/informal-economy-and-economic-inclusion-1869601

Insights into the informal sector of Bangladesh. The Financial Express. Retrieved 25 February 2021, from https://thefinancialexpress.com.bd/views/insights-into-the-informal-sector-of-bangladesh-1556294363

Just 8% of third-graders can read English beyond textbook. (2020, January 4). The Business Standard. http://tbsnews.net/bangladesh/just-8-third-graders-can-read-english-beyond-textbook

Karthik, H., Kala, P., Jain, P., & Gupta, R. (2017). Betting on the Future – The Bangladesh IT-ITeS Industry is Poised for Growth. 2358, 14.

Kearney, A. T. . A.T. Kearney's 2019 Global Services Location Index (GSLI) Resonates with Digital Change. Retrieved 25 February 2021, from https://www.prnewswire.com/news-releases/at-kearneys-2019-global-services-location-index-gsli-resonates-with-digital-change-300867002.html

Labour Force Survey 2016-2017. Bangladesh Bureau of Statistics. Retrieved 25 February 2021, from http://data.bbs.gov.bd/index.php/catalog/200

MGI Digital Globalization Full Report. Retrieved 24 February 2021, from https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20globalization%20The%20new%20era%20of%20global%20flows/MGI-Digital-globalization-Full-report.ashx

Ministry of Social Welfare-Government of the People\'s Republic of Bangladesh. https://msw.gov.bd/

Mobile financial services data. Bangladesh Bank. Retrieved 24 February 2021, from https://www.bb.org.bd/fnansys/paymentsys/mfsdata.php

Mobile Phone Subscribers in Bangladesh June, 2020. | BTRC. Retrieved 24 February 2021, from http://www.btrc.gov.bd/content/mobile-phone-subscribers-bangladesh-june-2020

Mobile phone use to be even costlier. (2020, June 2). The Daily Star. https://www.thedailystar.net/business/news/mobile-phone-use-be-even-costlier-1907669

Murshid, K. A. S., Mahmood, T., & Shashi, N. A. EMPLOYMENT AND UNEMPLOYMENT AMONGST EDUCATED YOUTH IN BANGLADESH. 59.

National Board of Revenue (NBR), Bangladesh. http://nbr.gov.bd/

Over 6,000 articles by Bangladeshis in global journals with impact factor. (2020, February 29). The Business Standard. http://tbsnews.net/bangladesh/education/over-6000-articles-bangladeshis-global-journals-impact-factor-49429

Partnership with Provati Insurance Company Ltd. Retrieved 25 February 2021, from https://www.ifarmer.asia/blogs/12

PPI Visualization Dashboard—The World Bank & PPIAF. Retrieved 24 February 2021, from https://ppi.worldbank.org/en/tment=&region=&ida=&income=&ppp=&mdb=&year=&excel=false&map=BD&header=true

PPRC. Social Safety Nets in Bangladesh. Retrieved 25 February 2021, from http://socialprotection.gov.bd/wp-content/uploads/2017/06/PPRC-Social-Safety-Nets-in-Bangladesh.pdf

Rada, C. (2010). FORMAL AND INFORMAL SECTORS IN CHINA AND INDIA. Economic Systems Research, 22(2), 129–153. https://doi.org/10.1080/09535314.2010.482924

Rural population (% of total population)—Bangladesh | Data. . Retrieved 24 February 2021, from https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=BD

Sarwar. (2016, October 3). Training the Future—Towfiqul Islam Khan | CPD. Centre for Policy Dialogue (CPD). https://cpd.org.bd/training-future-towfiqul-islam-khan/

Schwab, K. The Global Competitiveness Report 2018.

Session on Digital Connectivity and E-Commerce: Bay of Bengal Economic Dialogue 2021. . Retrieved 25 February 2021, from https://www.facebook.com/sanemnet/videos/session-on-digital-connectivity-and-e-commerce-bay-of-bengal-economic-dialogue-2/437269814086825/

Shadat, W. B., Islam, S., Zahan, I., & Matin, M. (2020). Digital Literacy of Rural Households in Bangladesh.

Skills Development in Bangladesh. (2016). 67, 8. Asian Development Bank.

Skills Gap in the IT Sector: Utilizing the Power of Youth. (2019, May 23). LightCastle Partners. https://www.lightcastlebd.com/insights/2019/05/skills-gap-in-the-it-sector-utilizing-the-power-of-youth

Slow internet speed disrupts workflow. Retrieved 24 February 2021, from https://thefinancialexpress.com.bd/national/slow-internet-speed-disrupts-workflow-1586173888

Successful PPPs. ITU. Retrieved 24 February 2021, from http://www.itu.int/ITU-D/treg/publications/SuccessfulPPPs.pdf

Team, M. C. D. (2020, July 5). Bangladesh Motorcycles Market—Fact & Data 2020 | MotorCyclesData. Motorcycles Data. https://www.motorcyclesdata.com/2020/07/05/bangladesh-motorcycles/

The 'missing' women in Bangladesh's ICT success story | The Business Standard. . Retrieved 25 February 2021, from https://tbsnews.net/panorama/missing-women-bangladeshs-ict-success-story-72769

The Online Labour Index | The iLabour Project. Retrieved 25 February 2021, from https://ilabour.oii.ox.ac.uk/online-labour-index/

Udyam Registration: Zero cost, No Fee and Free Registration of MSMEs. Retrieved 25 February 2021, from https://

udyamregistration.gov.in/Government-India/Ministry-MSME-registration.htm

UNCTAD. (2019). Digital economy report. UN. http://digitallibrary.un.org/record/3833647

Union Digital Centers in Bangladesh—Present Status and Future Prospects. . A2i. Retrieved 25 February 2021, from https://a2i.gov.bd/publication/union-digital-centers/

Vision 2025 launched to create startup and VC-friendly ecosystem in BD. The Financial Express. Retrieved 25 February 2021, from https://thefinancialexpress.com.bd/trade/vision-2025-launched-to-create-startup-and-vc-friendly-ecosystem-in-bd-1581233200

Why Bangladesh should introduce PayPal. (2020, September 5). The Business Standard. http://tbsnews.net/thoughts/why-bangladesh-should-introduce-paypal-128617

Why technical education is imperative. The Financial Express. Retrieved 25 February 2021, from https://thefinancialexpress.com.bd/views/why-technical-education-is-imperative-1580483097

World Intellectual Property Indicators 2018. WIPO.

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