Digitalization and Development

A Social Science Perspective

Editors
Marie Jo A. Cortijo and Mehnaz Rabbani

Knowledge for a Better World

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BRAC Institute of Governance and Development (BIGD)
BRAC University

Contents

List of authors

Stefan Dercon
Professor of Economic Policy
University of Oxford

Sajjad Zohir
Executive Director
Economic Research Group

Mushtaq Khan
Professor of Economics
School of Oriental and African Studies (SOAS),
University of London

Mehnaz Rabbani
Director, Operations, Strategy, and Partnership
BRAC Institute of Governance and Development
(BIGD), BRAC University

Wasima Sadia
Senior Program Associate
BRAC Institute of Governance and Development
(BIGD), BRAC University

Tahmid Bin Mahmud
Senior Research Associate
BRAC Institute of Governance and Development
(BIGD), BRAC University

Mohammad Shahadat Hossain Siddiquee
Professor, Department of Economics
University of Dhaka

Md Saiful Islam
Lecturer, Department of Economics
University of Dhaka

Iffat Jahan Antara
Researcher

Pragyna Mahpara
Senior Research Associate
BRAC Institute of Governance and Development
(BIGD), BRAC University

Subaita Fairooz
PhD Candidate, The University of British Columbia

Silvia Guglielmi
Qualitative Researcher, Overseas Development Institute

Erin Oakley
Senior Research Associate
Milken Institute School of Public Health

Farhana Alam Ripa
Associate Professor, School of Pharmacy
BRAC University

Maheen Sultan
Senior Fellow of Practice, BRAC Institute of
Governance and Development (BIGD), BRAC University

Sarah Alheiwidi
Senior Qualitative Researcher and Manager
GAGE, Overseas Development Institute, Jordan

Sarah Baird
Professor of Global Health and Economics
Milken Institute School of Public Health

Nicola Jones
Principal Research Fellow, Gender, Equality and Social
Inclusion, Overseas Development Institute

Betsy Kaeberle
Director, Evaluation and Impact, Association of State
and Territorial Health Officials (ASTHO)

Sabina Faiz Rashid
Professor, James P Grant School of Public Health
BRAC University

Jennifer Seager
Associate Professor, Milken Institute School of Public
Health, George Washington University

Umnoon Binta Ali
Application Developer-GenAI, Dexian

Kazi Rafat
Researcher, Apurba NSU R&D Lab, Department of
Electrical and Computer Engineering
North South University

Nabeel Mohammed
Associate Professor, Department of Electrical and
Computer Engineering, North South University

Mohammad Mamun Or Rashid
Assistant Professor, Language Technology Specialist
Department of Bangla, Jahangirnagar University,
Bangladesh Computer Council

Mohammad Tareq Hasan
Associate Professor, Department of Anthropology
University of Dhaka

Foreword

When we at BIGD started our work on digitalization in 2017, social science research on digitalization was relatively scant. Bangladesh was experiencing a wave of digitalization – the unprecedented changes in media and entertainment, work, service delivery, mobile financing…digitalization was and still is transforming every aspect of our lives. At the time there was very little data, theoretical framing or critical thinking on digitalization among social scientists in Bangladesh, despite the fact that Bangladesh is a pioneer in mobile financial service. Being a social science research institute, where we look at problems and try to find solutions using the dual lens of governance and development, our primary interest is not only to understand how digitalization is changing the lives of people, but also to understand how digitalization is changing relationships, power dynamics and roles in the private and public spheres.

Over the past few years, we have had the opportunity of working on this issue and also convening discussions with other academics from home and abroad. I am happy to see that this report brings together some of these discussions. I hope that this will create space for more research ideas and collaborations across multiple disciplines to ensure that we can realise the potentials of digitalization in governance and development. At a time of crafting new pathways and trajectories of our future, it is crucial that we ask ourselves how digitalization can enrich lives, livelihoods and citizenry in the most inclusive and progressive way, to cater to the new challenges and aspirations of Bangladesh.

Dr. Imran Matin
Executive Director, BRAC Institute of Governance and Development (BIGD), BRAC University

Preface

In June 2022, BIGD, BRAC University, hosted an international conference titled 'Digitalization and New Frontiers of Service Delivery: Opportunities and Challenges'. This was an effort to convene and create collaborations among academics from different disciplines to enhance the agenda of inclusive digitalization in Bangladesh. While digitalization is inevitable and essential for improving governance and development, the pathway to equitable development by digitizing services is not straightforward. Has digitalization of public services contributed to improving accountability, transparency or improved the lives of citizens in an equitable manner? The benefits of digitalization are not necessarily equally distributed, with the already marginalized being further disadvantaged when established ways of access are changed. Many of the chapters in this report deal with this question, trying to explain why and how digitalization can be effective, and why sometimes it is not. Given the socio-economic and political context of Bangladesh, it is important to first understand the mechanisms in the supply and demand of digital services using a multidisciplinary lens. Needless to say, digitalization is altering every aspect of human life – from they way we learn, communicate, work to the way we interact within our homes, our communities and the state. Without studying how digitalization interfaces with each of these aspects, it is not possible to make digitalization effective in driving a positive transformation.

This report is a collection of selected papers and ideas that were first presented at the 2022 conference. The exciting thing about this report is that the contributors are from different disciplines and different parts of the world, but all analyzing the potential of digitalization in Bangladesh. The common thread is the belief that Bangladesh can very well ride the wave of digital transformation in a way that strengthens development and empowerment, but there are caveats that we need to be cautious of in order to prevent creating further and new forms of inequality. Each chapter proposes ideas and recommendations from different perspectives based on rigorous analysis of evidence. This report is in no way comprehensive and there are several important topics and areas of research that are missing. However we feel that each chapter addresses unique dimensions of digitalization, offering food for thought and direction for further research.

Although it took some time for all these pieces of work to be completed and compiled, we believe that this report will be of value to policy makers, practitioners and academics who are interested to contibute to a meaningful digitalization journey for Bangladesh. We are grateful to all the contributors and hope that this will lead to further collaborations and multidisciplinary research on digitalization. We are also grateful to Nusrat Jahan, Sadia Afreen Proma and Fatima Ara Khan for helping us to put this together.

Marie Jo A. Cortijo and
Mehnaz Rabbani

Chapter One

Digitalization for Inclusive Development

Lessons From Global Experiences[1]

Stefan Dercon

1. Introduction

Digital transformation as a means to achieve inclusive development has garnered substantial interest in recent times. We are just starting to grasp the possibilities of digitalization, and it is vital that we understand its impact as it permeates our communities and economies. The Blavatnik School of Government at the University of Oxford is assisting policymakers and other key stakeholders in various countries. In Bangladesh, it is collaborating with the BRAC Institute of Governance and Development (BIGD) to reflect on the implications of these changes and how they might be approached in order to benefit all strata of the population.

Digitalization is ubiquitous, profoundly influencing how people live their lives around the world. In India, for instance, while driving on a terrible road, you can encounter a new building serving as a call centre for London-based companies. In Indonesia, GoCheck, a local app, is revolutionizing traditional modes of transport by connecting informal sector motorcycle taxis with customers, leading Uber to withdraw its operations from the country. In rural Kenya, digital payments through the M-Pesa mobile money transfer system have been in use for over a decade. In Durban, South Africa, firms specialize in teaching English to Chinese students using Zoom, showcasing the power of technology to reach far and wide. Even in Ethiopia—one of the last two countries with a state monopoly in the telecommunications sector and where very poor telecom infrastructure translates into weak mobile phone reception and terrible internet connection—a firm is currently providing live football statistics to the Dutch Football League using algorithms and calculations.

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[1] This chapter is based on work done by author as part of the Digital Pathways work at Oxford. More details and references can be found in: (i) Ndulu, B., Stuart, E., Dercon, S. and Knaack, P., 2023. Driving Digital ransformation: Lessons from Seven Developing Countries (p. 241). Oxford University Press. (open access); (ii) Pathways for Prosperity Commission, 2019, Charting Pathways for Inclusive Growth, Blavatnik School of Government, Oxford University. (online)

These examples are a testimony to the remarkable things technology can achieve and the potential it holds, even in countries faced with substantial economic challenges. We are witnessing the emergence of digital transformation, with digital technologies systematically integrating into the economy and society, albeit in a somewhat chaotic fashion.

The increased use of digital technologies is profoundly affecting the production, consumption, and exchange of goods and services. This shift is also leading to changes in the way business is conducted and the economy, government, and society as a whole are organized However, as with any process of technological change, the introduction of digital technologies is not affecting all economic sectors and socioeconomic groups equally. Both wealthy and poorer economies are faced with similar challenges, yet the public policy response has been sluggish and divided between optimists, who overestimate the potential of technology and the role it can have in our lives, and pessimists, who warn of the impending end of life as we know it.

In one country, a conflict between the digital advisor of the government and the information and communications technology (ICT) ministry has led to a standstill. In Ethiopia, a standard battle seen across the world is taking place between the Central Bank and telecommunications firms over the emergence of digital money and low-cost transactions that use a non-banking model similar to M-Pesa in Kenya. Despite attempts to mediate between the different parties and the favourable attitude of the progressive finance minister and the Central Bank towards introducing digital money for low-cost transactions, regulations were written that made this impossible. These examples provide insights into the challenges of changing policy in this arena.

This chapter delves into the process of adapting the policy framework governing digital money and technology, even as these changes are already occurring and transforming the way we live. It aims to draw lessons from the diverse scenarios observed in several countries and to critically reflect on our own involvement in working with policymakers and the setbacks experienced

2. Opportunities

Understandably, there is a lot of enthusiasm for improving government service delivery through digitalization. However, our experience working in various countries has shown us that when we limit our focus to government service delivery, we overlook the potential for growth and a range of untapped opportunities. It is essential to broaden our perspective to consider the impact on the economy and society as a whole, where e-service delivery is just one aspect.

When examining the opportunities that digitization can unlock, the prevailing perception often centres on how it will alter the production and delivery of goods and services, essentially framing it as a provision-centric issue. In affluent nations, this often leads to a singular focus on automation and the accompanying fear of job losses. To address this, the tech industry, which primarily captures rents through its ownership of intellectual property related to capital-intensive technologies, proposes implementing a universal basic income.

In reality, fundamental changes are occurring not only in the way goods and services are produced but also in the way goods, services, money, capital, labour, and information are exchanged, which is how most of us experience digitalization. Digital technology has enabled a dramatic decrease in transaction costs, allowing for faster and more efficient exchanges of goods and services, information sharing, and capital and loan allocation. Additionally, algorithmic matching

has enhanced the efficiency of labour markets, leading to the exclusion of middlemen in some domains and a greater focus on direct exchange, rather than just production—the foundation of an economy, as identified by Adam Smith. This shift in the way we exchange things using technology needs to be acknowledged by economists and factored in by policymakers, beyond a sole focus on automation.

The rise of the ready-made garments (RMG) sector in Bangladesh serves as a compelling example of technology's role in changing how goods and services are exchanged, rather than produced. The growth of the RMG in Bangladesh was significantly influenced by technology on two fronts. Firstly, the introduction of production lines of sewing machines, which was the initial technology required for production, was not a technology of automation. Rather, it was merely a transfer of an outdated technology that had been introduced in the 1930s in sweatshops in the United States (US). It was not until the 1980s and 90s that further technological advancements facilitated the growth of the RMG sector. The cost of transporting goods worldwide decreased dramatically, down by up to 90% between the 1950s and the 1980s, thanks to the use of container ships. Automation in ports and the use of standardized technology to circulate goods across the globe also contributed to enhancing the profitability of the RMG sector. The second major advancement that allowed the RMG sector to flourish was the improvement in communication technology, such as telephones and fax machines, which enabled remote production of simple goods like T-shirts. This has led to alterations of global value chains for a wider range of goods. To sustain its economic growth, Bangladesh must keep pace with new ways of participating in the global economy and exporting goods, highlighting the critical role of technology in economic development.

The Philippines is a good illustration of the shift in the way services are now produced globally due to digital technology. It is probably the first and largest example of a successful player in the outsourcing industry. Despite being relatively unknown, the country has emerged as an early mover in business process outsourcing (BPO) services, such as data entry, accounting, and telemarketing. In the decade preceding COVID-19, the country experienced a three-fold increase in the value added to its gross domestic product (GDP) through the BPO sector, with one-third of its exports comprising these services. It captured 10–15% of the global BPO market and employed over 1.3 million people, mostly women, in white-collar jobs.

Digital technology will continue to remain crucial in the development of superior and novel products and services, as well as more efficient production processes, primarily through automation. However, as these two examples illustrate, the opportunities for finding new ways of exchanging goods and services are also going to be equally, if not more, important.

3. Risks

As researchers, academics, and policymakers, it is natural to be concerned about the potential risks associated with innovation. Indeed, balancing innovation and regulation poses a real governance challenge. The temptation to prioritise the economy by promoting innovation before regulation can result in the formation of monopolies, reminiscent of those seen with Rockefeller and other robber barons in 19th and early 20th century America. In the 21st century, leading tech firms wield immense global power and generate significant profits due to their control over intellectual property and, frequently, a first-mover advantage. Many of these companies brought innovative products and services, such as online marketplaces, productivity software,

social media platforms, and ride-sharing services, experiencing exponential growth in the process during the last two decades. Regulators in the West, where most of these companies are based, have so far been slow to catch up with this fast-changing, uncharted world of business, often motivated by the desire to encourage innovation. Delaying regulation, however, creates problems further down the line, as seen in Western countries and rich economies in Europe and the US, where the monopoly of several technology companies and its impact have become major concerns. Finding the right balance between fostering innovation and regulating it thus is crucial.

The risk of exclusion is another important consideration. Just as previous systems marginalized certain groups (for example, by burdening processes with paperwork and bureaucracy), new technologies and services may generate similar problems. This is particularly evident in rich economies where older people may struggle to access services more than their younger counterparts, who have been brought up with these technologies.

These are some of the significant challenges for industrial policy, as policymakers must determine the appropriate level of interaction with businesses. A balance must be struck between taking no action and excessive involvement. In some countries, there may be a tendency to provide too little or too much support to businesses and certain industries, making it challenging to assess the appropriateness of such support.

In the example of Bangladesh, some companies dominate the market, having benefited from government support and their early mover status. This raises questions about the legitimacy of their rents and profits and how to accommodate the entry of new firms into the market. There are risks of incumbency and the formation of new business

models that can be difficult to modify once firmly entrenched, as seen in the case of social media.

Another risk specific to policymakers is the tendency to think about digitalization in a compartmentalized fashion, as opposed to considering it as a system. The challenges faced by policymakers are often similar, regardless of whether they are dealing with e-service delivery or other issues related to digitalization. For example, data management and the nature of infrastructure and incentives for service providers are often overlooked when discussing the provision of services. However, compartmentalizing these challenges must be avoided because, in reality, they are interconnected. Failing to see these interconnections and take appropriate strategies to address them can result in undesirable outcomes and failures.

4. A Digital Economy Toolkit: Lessons Learnt

It is within this context that we embarked on an assessment of the digitization process in various countries in order to gain a better understanding of the actions that can be taken in light of prevailing risks and opportunities. Rather than imposing a standard approach and dictating what countries should do, we encouraged key partners to conduct their own evaluations and engage with a diverse range of stakeholders in the economy and government in order to develop a strategic plan. This method ensures countries' ownership of the process, fostering a vested interest in making it a success. While main themes for action, such as infrastructure, finance, human capital, and necessary policies and regulations, had been identified previously, there is no one-size-fits-all blueprint. Even in better-off economies, there is no clear guidance on how to achieve the right balance. Solutions must emerge locally.

So, what lessons did we learn from this process? Firstly, a thorough understanding of local politics and the interplay between politics and economics is vital for advancing public policy. We witnessed firsthand the challenges posed by bureaucratic politics, where different government agencies compete for control—for example, turf battles over who should lead ICT initiatives between the ICT ministry and prime ministerial offices. Given that the changes considered here affect the economy and society as a whole, leadership and control cannot be compartmentalized and limited to one department. They must involve finance, economy, and social ministries, all playing important roles. Unfortunately, in many places we observed, progress was hindered by bureaucratic politics.

In several countries, we also witnessed how special incumbency interests hindered progress. For example, the banking sector may resist digital money initiatives such as mobile payments to protect their local transaction revenues. This long-standing problem has seen much progress in Bangladesh. However, similar issues arise in other sectors, such as exclusive contracts for e-service delivery that lock countries into incumbency interests, thus limiting competition and slowing progress. This occurs not only in developing countries but also in developed economies.

The most striking difference observed is in the commitment of the elite to use digital transformation for broader economic progress and inclusion. Across the board, politicians also showed great enthusiasm but for very different reasons. In some countries, progress stalled because their sole focus was on demonstrating tangible outcomes, such as the provision of laptops to schools (the "one child, one laptop" policy, for example). Others approached the matter with a more strategic mindset, carefully considering where they might bring about change and with a willingness to change economic

structures. However, many countries faced challenges due to the dominant interests of incumbent economic forces, making progress difficult. Malawi, for example, experienced limited progress, while in South Africa, despite interest in digitalization, progress was hindered by the conflicting interests of labour unions and capital.

5. Success Factors

The key to the success of digitalization for inclusive development is a strong commitment from stakeholders, particularly major economic players, rather than mere empty promises or public relations stunts. Additionally, a clear and honest understanding of the current state of affairs, as opposed to a projected image, is required. Progress also relies on the presence of individuals or groups within the government who can drive change forward and gather political support beyond mere slogans, as has been the case in Mongolia. While the issue is complex, there is scope for optimism, as in some countries, incumbency interests are not as strong, leaving more room for new players to emerge in the economy. Given that this is a relatively new area, there is actually greater scope to politically go beyond traditional industrial policy practices that have consistently favoured the same groups, holdings, and families, thus making the emergence of new players in the economy possible. However, caution must be exercised in order to navigate these changes effectively.

6. Conclusion

So, what can these experiences teach us, researchers? We must be mindful of a certain number of issues, such as inclusivity: the potential economic gains from digitization often receive excessive hype, but we must carefully consider who the losers and winners might be. We need to question which vested interests may obstruct progress and understand what can actually be

implemented, given the structure of the private sector and the political landscape. Grasping the potential for corrupt practices or the possibility of ambitious initiatives (such as state-of-the-art high-tech parks) that may not yield substantial progress is essential. The role of the state must be considered: is it strong enough, and are the right policies and incentives in place? It is clear from our research so far that many of the obstacles encountered may be overcome if a champion is identified.

Chapter Two

A Framework to Assess Digital Transformation in a Technologically Less-Developed Country
Challenges and Opportunities in Bangladesh[2]

Sajjad Zohir

Abstract

The journey towards a "digital world" is often perceived in terms of three sequentially linked "phases": digitization, digitalization, and digital transformation. This paper considers digitalization as the process that transforms an analogue world into a digital one, with a focus on its dynamics in a technologically less-developed country (TLDC). Two important departures from the dominant stands in the literature are made in this paper. First, business models for digitalization, which aim to deliver services by using digital devices, are distinguished from the engineering perspective that emphasizes on innovations in digital devices and their uses. A second departure from the mainstream ideas is made by introducing the choice between procurement (buy/rent) and build (create), and how the two options have different implications for skill development in a TLDC.

Nurturing creativity for an idea economy as well as skill development in science, technology, engineering, and mathematics (STEM) areas are associated with building or creating by the self. In contrast, business models for digitalization go hand-in-hand with the procurements made by governments in TLDCs. The paper proposes a framework to think through when projects are designed and approved. While TLDCs such as Bangladesh are major consumers of digital devices, the absence of a "build and create" environment contradicts the development of an idea economy and the preparation of the workforce for the ensuing Fourth Industrial Revolution (4IR). The paper argues that a feasible entry point for changing the existing status quo

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2 The essence of this paper was presented at the BRAC Institute of Governance and Development (BIGD) conference on "Digitalization and New Frontiers of Service Delivery: Opportunities and Challenges," held in Dhaka from 20 to 22 June 2022. The author acknowledges contributions from Mehnaz Rabbani for making sure that I complete the report, and to Marie Jo A. Cortijo who took a great deal of pain to tread through the first draft, forcing me to bring clarity. I remain responsible for the remaining opacity.

imposed under external loan agreements is to redefine these contracts. Furthermore, program designs can be enhanced by identifying digital devices involved in various economic activities, including government service delivery, and ensuring public commitment to building/creating some of these devices. For Bangladesh, software development is one such option where local information technology (IT) firms can be closely linked to service delivery as well as the production of goods.

2.1. Introduction

The human journey, since antiquity, has been marked by changes in technology that have transformed the way work is performed. This theme appears in the literature under different names. With the advancement of information and communications technology (ICT), it was referred to as "computerization" during the 1990s, "digitization" and "e-governance" at the turn of the century, and as a consolidated concept of "digital world"[3] when recovery from the financial crisis of 2007–2008 was being sought. This happened almost simultaneously in many countries.[4] As this paper is being written, the buzzword has started to shift from "digital world" to "smart world."[5] This study takes the perspective of a developing country where the digitalization process is still a long way from maturing to a level of significance,[6] and where many of these buzzwords are tied to loan projects.

The journey towards a "digital world" is often perceived in terms of sequentially linked "phases": digitization, digitalization, and digital transformation. This paper, however, considers digitalization as the process that transforms an analogue world into a digital world. Subsequently, an attempt is made to understand its dynamics in a technologically less-developed country (TLDC). The nature of its progression has implications for in-country skill development and knowledge creation, as well as for defining the feasibility of "digital transformation" of a society. The rationale for such an inquiry is aptly phrased in Paus' (2017) statement, "To avoid being trapped at the middle-income level, the development strategy for middle income countries has to focus squarely on the promotion of domestic innovation capabilities in a systemic way." Innovation capabilities are more apt to face a Fourth Industrial Revolution (4IR) if efforts are linked to the digitalization process. It is, therefore, important to understand the digitalization process which often falters in the absence of appropriate ecosystems.

The primary objective of the paper is to develop a framework to assess digitalization after having reviewed different existing perspectives on the subject and contextualizing the term. The literature on developing countries tends to focus on business models that are innovative in the delivery of services and go hand-in-hand with the use of digital technology. Thus, from a science, technology, engineering, and mathematics (STEM) perspective, digitalization is narrowly perceived in terms of increased use of digital technology, irrespective of whether these are created (built) or procured (bought or rented). The framework proposed in this paper unifies several dimensions

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[3] Examples include Digital Bangladesh, Digital India, or digital transport.

[4] External loan programs are often packaged in the guise of "digital world" or digitalization, as illustrated in Relly and Sabharwal (2019).

[5] The move towards a "smart world" is evident in the narratives of the 2022 IEEE Smart World Congress. For a definition of smart world, one may see "What is Smart World" on the IGI Global website. In India, Modi's government's Smart Cities Mission program initiated the use of this term during 2016–2018, while the Myanmar government began to use it in early 2019.

[6] While digital transformation is made possible due to extensive digitalization, a sector-specific "smart world" is possibly one manifestation of (sector-specific) digital transformation. Digital transformation is considered a sector or society-level process perceived to bring in a state of "smart world."

to illustrate the issues that program designers need to attend to in order to promote creativity.

2.1.1. Towards Defining a Narrative: Methods and Outline of the Paper

The statements made in the previous section and the narrative on the faltering digitalization process presented in this paper were arrived at through an iterative process of reviewing the literature, constructing a framework, deducing a fresh set of questions, and extending the review to develop further the framework and the narrative. It is essentially a mental exercise that simultaneously reconstructs the framework and the narrative that is aligned with the framework.

An extensive literature review helped in sorting the semantics, which subsequently helped operationalize the concepts used in a technology-dependent society. These concepts are discussed in Section 2, along with an introduction to regimes (often by choice) of "build or procure" that predefine the "ecosystem" to be introduced in program design. Section 3 presents evidence of signs of faltering digitalization primarily drawn from Bangladesh's experience. Section 4 outlines a framework to operationalize digitalization processes and argues why the choice is skewed in favour of procurement (buy or rent) against build (create). It then elaborates further on the chain of impacts following a loan agreement on which much of present-day digitalization efforts are rooted. The concluding section summarizes and suggests a few entry points for change.[7] It is suggested that leveraging digital transformation will remain elusive unless disruptions are introduced in a country's (TLDC's) contract with external agencies, and the internal agencies overseeing the implementation of relevant projects are overhauled.

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[7] Information to verify the proposition on the relation between international financial flows with the resource (mis)allocation and degeneration of local institutions, and with subsequent unsatisfactory performance in the country's efforts towards digital transformation for sustained economic prosperity, is generally not available in the public domain. Thus, the attempt to develop the narrative will be tentative.

2.2. The Journey Towards Digital Transformation
Concepts and Frameworks

Box-1 provides definitions for the concepts and terms commonly encountered in the literature on ICT and digitalization.

Box-1.

Definitions of Key Concepts in ICT and Digitalization

Data are quantitative and qualitative measures representing real life situation.

Information summaries data that provide meaningful insights to interpret and predict situation.

Knowledge is the stock of our understanding (that is, ideas, which is a flow) about the reality (framed as conditionally verified hypotheses) arrived at upon theorizing/conceptualizing existing information and presumed to guide actions till the understanding is updated or there is a paradigm shift.

Analogue data are data that are represented in a physical way, and stored in physical media. The analogue domain/space is infinite.

Digitized data originate in the analogue domain and are later digitized, capturing in a limited number of spaces only.

Digitization is the process by which analogue data in physical media are converted to digitized data.

Digital data originate in digital space. The dimension of digital space is finite, which depends on the infrastructure of the platform (inter-connected software programs and applications) that generates data as well as the program identifying the variables to capture.

Both digitized and digital data are amenable to digital processing.

Technology is a collection of processes that involve methods to combine skills, tools, know-how and means to transform resources into goods or services. Ideas and knowledge are important factors that underlie technology. Technology can be non-digital (manual, mechanical, electric, electronic etc.) or digital.

Digital technology functions by using digitized and/or digital data. It is broadly grouped into the following functions:

1. Transform real life measures into digital space: sensorinternet of things (IT)

2. Data processing technology: algorithms, organiing, and representingrtificial intelligence (AI), machine language (ML), natural language processing (NLP), blockchain

3. Storing, retrieving and communicating technology: IT

4. Reproduction technology: robot (in mechanical space), software (digital space)

5. Innovation: "Simply put, innovation is looking at a problem, understanding it and trying to make it better. Innovation can be applied to something which already exists, or it can be used to develop something completely new" (, 2023).

6. Ecosystem: "The whole system … including not only the organism-complex, but also the whole complex of physical factors forming what we call the environment" (Tansley, 1935). The term is used to mean different things at different times, with emphasis changing with progressions.

2.3. Perspectives on the Basic Constituents of Digitalization

There are broadly two streams of literature on digitalization. The dominant one originates from business schools, while the second one, rooted in STEM, provides a technology perspective.[8] The Sloan School of Management at the Massachusetts Institute of Technology (MIT) is a forerunner in propagating the first perspective, and Figure 2.1 captures the essence of their views. The approach considers digital opportunities, and digitization prepares the ground for engaging with innovative business models and processes to carry forward digitalization. Even for the third stage (i.e., digital transformation), the diffusion of digital technology is facilitated by restructuring economies, institutions, and societies.[9] Such an approach appears more suitable for TLDCs, whereas technologically developed countries (TDCs) are keen on marketing digital technology developed and produced by them. It is, therefore, no wonder that innovation is mentioned in the context of developing business models, and improving existing or developing new technology is left outside the scope of innovations in TLDCs.[10] Later in this paper, questions are raised on whether joining the "digital world" as "consumers only" is sufficient for an aspiring TLDC keen on preparing its youth with appropriate skills. At a conceptual level, it also calls for recasting our understanding of "ecosystems," as explained in the following subsection.

The second perspective considers digitalization as a transformation to improve processes by leveraging digital technologies and digitized data. It is also more direct in suggesting that digitalization involves digital transformation. Implicit in this and included in the unified framework proposed later in this section is the process of creating economic value out of local ideas on (and eventual production of) digital technology (even if it be on a limited scale) that supports creative engagement for skill and knowledge building. The latter is further elaborated in Section 3.
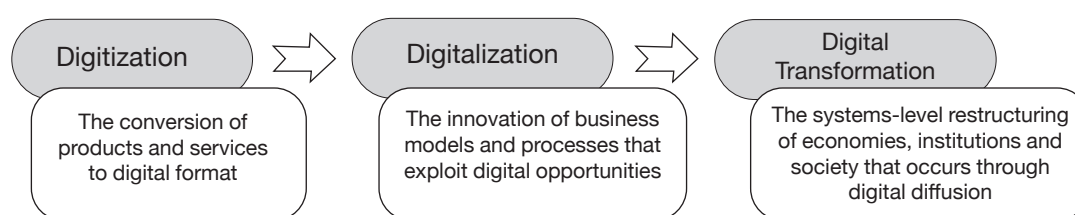
Source: Unruh Kiron 2017

Figure 2.1. Transformation in the Perception of the Use of Digital Means

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[8] In doing so, it is recognized that the two broad categories of skills we often refer to, soft and hard/trade-specific, have close correspondence to the two streams. It also alludes to the existence of two or more ecosystems that are relevant for pursuing digitalization. See Figure 2.

[9] Ideally, causality runs both ways—digital diffusion transforms economy, institutions, and society, and the latter facilitates the diffusion of digital technology.

[10] One may find most startups in TLDCs to be on business models for service delivery.

The two perspectives are summarily captured in Boxes A1 and A2 in the Annexe, which together suggest that digitalization involves technology but is not limited to it, and a digitalization strategy requires factoring in people, processes, and technology.[11]

2.4. Basic Building Blocks
Primacy of Ecosystems With Partial Illustration

One important departure from a traditional economic framework in this paper is the introduction of the concept of "ecosystem" as a building block in understanding statecraft, albeit not a new idea. Earlier, the promotion of industrial activities focused on the geographical concentration of specialized suppliers, service providers, organizations such as universities, commercial unions, and interconnected enterprises that compete against each other as well as collaborate in certain activities (Porter, 1998). With the expansion of ICT-based business and increasing interests in innovation, the use of the concept of an ecosystem has gained wider acceptance.

The ecosystem perspective goes beyond a simple production function (or, input-output mapping) approach. Irrespective of the world being digital or not, the creation of economic value depends on ecosystems[12] that allow:

- Carrying out the production of goods and/or the generation of services,

- Marketing goods and (delivery of) services to realize economic values, and

- The reproduction and upgrading of human resources (labour with skills and ideas) that are required in production (generation), marketing (delivery), and to lead human society to a better world.

It would be wrong to assume that any random collection of entities will constitute an ecosystem. While an "environment" captures random states, ecosystems presume some degree of interconnectedness.[13] The biotic relations among constituents dominate discussions on ecosystems in biology, ecology, and geography. However, the term acquired a purpose-based meaning in the "abiotic" environment of the economy and industry, even more so with the expansion of the digital world. In the latter, inter-industry (inter-activity) linkages may be considered akin to the "biotic" elements in a conventionally perceived biological ecosystem.

For Suuronen et al. (2022), Moore's (1996) business ecosystem, when meshed with a digital ecosystem, results in a digital business ecosystem (DBE). There has to be "suppliers" in the system, as well as a digital platform, where all stakeholders put trust in and participate. However, it is implicit in the mainstream discourse that the (digital) technology that enables the digital system is externally provided to TLDCs. Thus, there is scope for ideas and innovations for program design for TLDCs in the business part of the model but less so in the fields of science and technology. Hanelta et al. (2021), however, go beyond and into greater details (see Figure A1 in the Annexe). The various issues associated with digitalization are (i) the contextual conditions that

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[11] A review of three stages is provided by Bumann and Peter (2019). A relevant excerpt from Bumann and Peter (2019) is reproduced in Box 2.

[12] Since multiple ecosystems are presumed to be in operation, it is used in plural. Here, "system" is defined, à la Tansley (1935), as a "set of things working together as parts of a mechanism or an interconnecting network" (Darko, 2019).

[13] The literature considers the terms "environment" and "ecosystem" as synonyms.

trigger and shape digital transformation, under which material is one of the sub-groups; (ii) the mechanisms covering elements that innovate and the elements that integrate; and (iii) the consequences with spillovers creating changes on other levels of analysis. Though the business side is emphasized, the framework allows for ideas and innovations in the material context as well.[14] The rest of this section proposes a partial framework to address two more issues often overlooked in the literature. First, skill development and hard and soft learnings are often referred to. Other than innate qualities, these skills are widely acknowledged to be acquired at workplaces. Second, there is evidence to suggest that choices regarding building/creating and procurement (buy or rent) are made a priori, which shape the ecosystem perceived in initial project designs and subsequently pre-determine the nature of

digitalization and the digital business ecosystem that evolves. Both are important for TLDCs, and Figure 2.2 attempts to capture this.

The box shaded in green refers to all ecosystems and sub-systems currently existing or put in place to realize preset goals and objectives. One of the objectives may be to establish a digital "business" ecosystem. The initial "digital ecosystem,"[15] along with various sub-systems supporting production and marketing, are parts of the baseline setting. An effective digital ecosystem cannot be put in place by undermining the "adigital" real space that links stakeholders, technology, and resources.[16] In cognizance of the business and technical dimensions of the digitalization process, the blue box mentions the establishment of a digital business and technology ecosystem (DBTE), the actual outcome of which (in TLDCs) may range
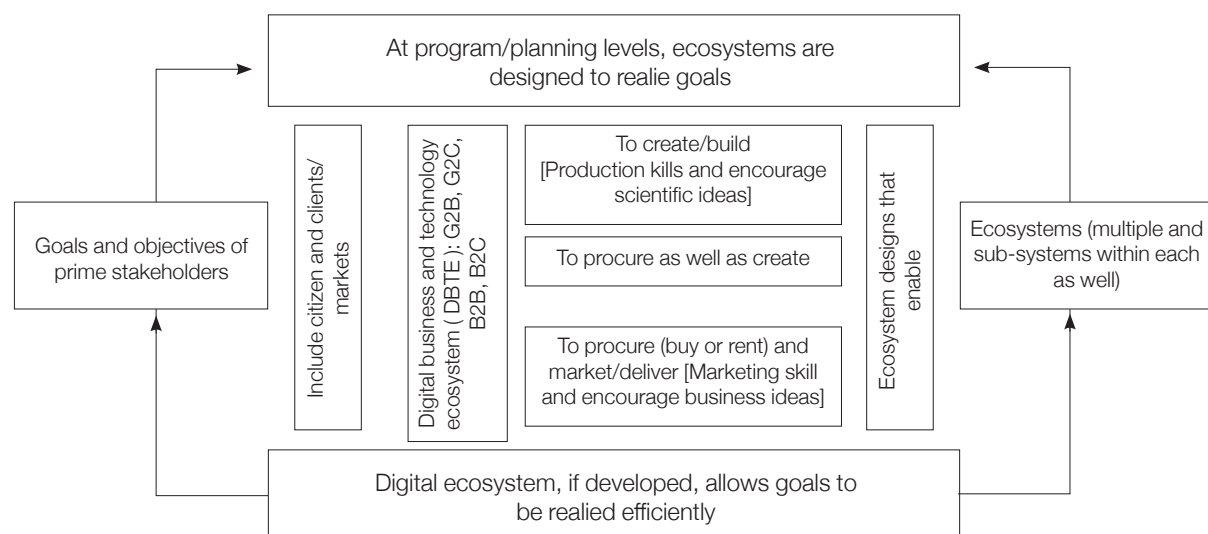
Note: A TLDC engaged in procurement ought to develop skills to negotiate procurement contracts that guard against risk and en-sure maximum benefits to the country. Unfortunately, interest dominates hence, marketing & delivery. G=Government, B= Business, C= Customers (sometimes referred to as P=public)

Figure 2.2.   Perspectives From the Recipients' End (TLDCs)

[14] Words in bold highlight the recognition of the STEM side of digitalization in Hanelta et al. (2021).

[15] "A digital ecosystem is a group of interconnected information technology resources that can function as a unit. Digital ecosystems are made up of suppliers, customers, trading partners, applications, third-party data service providers and all respective technologies. Interoperability is the key to the ecosystem's success" (Brush, 2019).

[16] The segments of ecosystem that are not digital ought to be addressed in ecosystem design. Figure 2 considers those exogenous and does not address, in the outcome space, how the "adigital" ecosystem is affected due to the intrusion of "digital" ecosystem.

from remotely controlled operators to a system where ideas generated inside TLDCs induce creation (of IoTs and even hard technologies). Much of the outcome and, therefore, the digitalization process, depend on choices made with regard to build-procure options. The three broad options under the latter are listed in yellow-shaded cells. Within such a framework, "digitalization" is essentially a transformation of the initial ecosystem into a more mature digital ecosystem, covering not only businesses but all other spheres of society as well.

2.4.1. To Create, Buy, or Rent: Relevance to Skills Development

Program designs that aim at changing the economy and society normally list a number of interventions. These interventions require goods and services, which are identified in a traditional log-frame under three broad heads: "inputs," "activities," and "outputs." Project budgets under the auspices of multilateral agencies distinguish between local and foreign currency components. However, no distinction is made between the goods and/or services sourced at the country level and those procured abroad. Since this has implications for the development and sustainability of the local economy and human resources, this subsection elaborates further on the choice options.

The decision-tree for a meaningful classification of interventions, irrespective of whether those aim at producing (or generating) goods (or services),

and/or selling (or delivering) those in markets or to specific target groups, may include the following steps:

- Will the goods (services) be produced (generated) locally, or will they be externally procured (imported)?

- If procured, will they be bought or rented?17

- In production, it is likely that machineries and equipment will be required. Will these (or parts of these) be produced locally or procured externally?

With the digitalization of production technology, certain ICT services may either be "created" or "procured." Marketing/delivery is a service that traditionally relies upon non-tradable labour.[18] With the introduction of digital technology, this no longer holds true. Platforms and software applications used to facilitate the marketing of goods and delivery of services may also be created or procured. Creation and procurement may take place in a single line of activity as well as in an economy with multiple activities.

Such classification is relevant for assessing skill development potential and sustainability.[19] In extreme cases, dependence on buying may be equated with consumerism that calls for "no engagement" in production, and "no tinkering" with scientific ideas crucial for new product development and new methods of production.[20] One may learn by using a bought item—primarily as an operator and occasionally, in the realm of ideas, while engaging in repair & maintenance

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[17] See, for example, Han et al. (2022) to illustrate this. End-consumable products are not rented, but services (such as health, housing, and education) may be availed by procuring the services of outside agencies.

[18] As may be found in the system of national accounts of pre-digital days.

[19] Referring to the United Nations Industrial Development Organization (UNIDO)'s classification of countries, the United Nations Conference on Trade and Development (UNCTAD, 2023) mentions front-runners, producer economies, and user economies, which justify the framework we use to characterize "digitalization" in terms of builder and users. When the global chain in the supply of digital technology along with a finer distinction between ideas and fabs from physical production are considered, a greater correspondence between the framework (proposed) in this paper and the UNIDO classification can be found.

[20] Unfortunately, the literature on the choice between buying and renting is exclusively focused on real estate.

(R&M).[21] When it comes to public procurements through purchases, no one seems to take responsibility for R&M, thus depriving a TLDC of potential creative learning from R&M.

Innovation survives and thrives within the fabric of tech ecosystems, and these ecosystems help support and generate enormous economic value. Whether necessity is "the mother of invention" (or innovation) or whether scarcity leads to innovation, there must be a probing question around which ideas will emerge to bring about changes (innovations). The frequency of idea generation for change depends on the presence of an adequate breeding ground of ideas. The questions a consumer faces while using a bought item differ significantly from the ones faced while searching for a technical solution to a practical business problem, for example, or while developing a digital business ecosystem by integrating various digital technologies. Thus, the choice made in the build-procure space is vital in guiding (or not guiding) and nurturing the development of innovative ideas.[22]

2.4.2. Political Ecosystem: Relevance for Use and Abuse of Information

The discussion in Section 2.2.1 is relevant for all principal actors: government (public), private, and quasi-private, including non-governmental organizations (NGOs). However, digitization and the use of both digitized and digitalized data have largely taken off in the government sector. These initiatives have led to the collection and storage of private information. Proper use or abuse[23] of the data will depend on the character of political governance, assuming that economic governance is under the control of national-level political governance.[24] Since digitalization creates opportunities for the emergence of perfectly discriminating monopolists (or monopsonist),[25] it can create and sustain monolithic power or a "mechanical enforcer" on behalf of a higher authority who controls and processes information. In either case, the absence of appropriate political ecosystems may lead to non-communication between in-country stakeholders. Thus, a "digital ecosystem" meant to support the digitalization process in a country may fail to fulfil expectations unless compatible ecosystems in other "spheres" (especially, in the political space) are put in place.

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[21] In TLDCs, many durables are short-lived because markets for individual items are inadequate to support the development of R&M services. In cases of digital technology such as Siemens MRI machines, individuals are trained to operate the machine and digital data is in the hands of the headquarters.

[22] Even a consumable item may have to be customized, and thus there will be room for innovative ideas, such as in cooking. However, consultants' involvement in the details of operational manuals and follow-up trainings may leave little room for creative engagements at the receiving end.

[23] While a private sector agency may also be privy to such personal information, the government is legally in a position to develop and protect the relevant database, and facilitate digital transactions in the private sector with limited access to cross-check identity and/or eligibility.

[24] In a globalized world, it would be foolish to assume that political sovereignty is absolute. Accordingly, present-day political governance in a TLDC needs to be understood.

[25] Economics textbooks describe them as "principals" who have all the information on clients and, therefore, can enforce individual-specific pricing to extract all consumer (or producer/worker) surplus.

2.5. Evidence on Digitalization:
Limited Illustrations From the Bangladesh Experience

This paper distinguishes digitization from digitalization and the mere use of digitized and/or digital data for the purposes of decision-making.[26] Digitalization is considered a transformation to improve processes by leveraging digital technologies and digitized/digital data. Since the use of digital technology (as an "intermediate input") is a prerequisite, one may set a threshold technology use (lowest denominator) while including a process under digitalization. Drawing from the list of potential functions of digital technologies listed in Box 1, one example may be an IoT, such as a sensor that transforms real-life measures into digital space; or a customized app,[27] a software that increases net value by reducing costs.[28] This description of digitalization is not adequately captured by the "readiness index" that the United Nations Conference on Trade and Development (UNCTAD, 2021) proposed to capture the ability of countries to embrace new technology.[29] Apart from considering ICT deployment as a prerequisite,[30] such a "building blocks" classification does not help much in understanding the "digitalization" process.

Based on the above, the rest of this section illustrates the nature of "digitalization" in progress in Bangladesh, drawing from reports and daily newspapers, making inferences tentative.

For brevity, the discussion will be limited to characterizing the digital process in terms of the elements and frameworks noted in the previous section. As a preamble, Section 3.1 sketches Bangladesh's journey towards e-governance.

2.5.1. Journey Towards e-Governance

Initiatives towards the automation of government records and services within a local area network (LAN) environment began in Bangladesh in the late 1980s. This led to the digitization of data, which, in most cases, failed to be owned by respective government agencies. Departmental data had been digitized from time to time. But those were rarely used and got buried. In essence no one wanted to own after the consultants left. A few exceptions were in education (Figure A2 in the Annexe) and under management information system (MIS)-Health. With the widespread use of the internet, portals were developed for data storage as well as for online services (such as for the Registrar of Joint Stock Companies [RJSC]) in the first few years of this century. In spite of repeated external assistance, these remained static for many years, and the amount of data shared with the public persistently declined. While rent-seeking practices are mostly to blame for this, institutional obstacles and the absence of coordination among line agencies

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[26] Though data-based decision-making is an important constituent of digital governance and of digitalization at large, the use of data for decision-making predates digitalization.

[27] Gigler et al. (2018) note that "the first digital revolution, built around platforms and apps, fuelled the innovation and growth."

[28] The literature often claims that value is added on account of digitalization, even though the market price of a product or service in question may not have changed. In fact, value addition may even decrease due to the use of an IoT, since the latter claims a share in the market price.

[29] The index comprises five building blocks: (i) ICT deployment, (ii) skills, (iii) R&D activity, (iv) industry activity, and (v) access to finance. Interestingly, UNCTAD (2021) is comfortable with having only a few countries with the ability to invent and produce frontier technology. Thus, its prescription to other countries is to "embrace the technology, ... while continuing to diversify their production base by mastering existing technologies."

[30] Contextual conditions elaborated by Hanelta et al. (2019) appear more robust. Hanelta, A., R. Bohnsackb, D. Marzc and C. Antunes Maranteb (2021) A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change, Journal of Management Studies 58:5 July 2021.

also contributed to the problem.[31] There was also large-scale digitization of data on land and personal income taxes, but this did little to "inform decision-making" or help deliver better services to citizens (clients) until a decade ago.

The journey towards drawing up an action plan to establish a digital world (United Nations Development Programme [UNDP], 2011) was preceded by the formation of an ICT Task Force in 1997, the launching of the Aspire to Innovate (a2i) program in 2006, and an ICT policy and ICT Act in 2009. The UNDP report placed a2i, an agency under the Prime Minister's office, at the centre of the nationwide initiatives to establish a digital world. The report identifies key areas for intervention.[32] While there had been several mentions of a gender strategy, unfortunately, the document had no reference to a digitalization strategy. Even the endline evaluation of a2i (Rahman et al., 2019) does not mention project achievements in the fields of digitalization. It does, however, mention several high-impact initiatives, such as e-Nothi (e-filing), e-Mutation, the person-to-government (P2G) payment system, and existing training programs. Figure A2 in the Annexe summarizes the journey with so-called digitalization in e-governance initiatives in Bangladesh, much of which appear to be in the phase of digitization.

While much of the initiatives prior to the COVID-19 pandemic were confined to the domain of remote software development (i.e., initiatives to design an all-purpose architecture for interactive portals/ digital platforms), their success has been limited. Approximately 600 mobile apps were developed by the ICT Division during 2013–2015; only 44 of which could be found on Google Play, though those apps rarely function properly (Mithu,

2022). The long and often wasteful journey in government initiatives is also evident in parts of the discussion to follow.

2.5.2. Selected Evidence and Anecdotes

Three broad areas are covered in this section. Following the proposed framework to assess digitalization, the first focuses on consumerism, irrespective of the effects it may have on ideas and skill developments in the local economy and society. The second covers soft technology (software, along with data sciences), which requires a certain level of human resources before entry is possible. The third covers hard technology, where prospects, if at all, lie in low-end IoTs by assembling chips available in the market, designing chips for external producers, and by contributing to certain segments in the externally-driven production of digital devices. While there is quantitative evidence available on the first category, most of it may not be relevant to the present work. Progress in the last category, even if achieved, is not often disclosed to the public due to corporate secrecy—which is sometimes related to taxation issues. Given the proliferation of information technology (IT) firms that engage computer science graduates and software engineers, anecdotes on the second are relatively more readily available.

2.5.3. Use of Digital Technology in Bangladesh

Bangladesh falls into the third group of "user economies" in the United Nations Industrial Development Organization (UNIDO)'s classification of countries mentioned earlier. Imports of ICT goods and IT-enabled Services (ITeS), relative to exports, are good proxies to assess whether a

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[31] For example, while company registration is done at RJSC, trade licenses are issued by local governments (city corporations and municipalities).

[32] The document expresses intent "to unleash potential of youth talents and create good quality employment for them in the IT sector through cluster of innovation driven entrepreneurial initiatives." Areas of intervention include education, universal quality healthcare, agriculture, judiciary, law enforcement, environmental management, social security, land management, and responsive local government.

country is a "user economy." There are multiple sources of data, and definitions often differ. Bangladesh imported USD 1.47 billion worth of ICT goods in 2015 ([CEIC database](#)), and its import of ICT goods "increased significantly over the past decade to reach around USD 650 million in 2019." Imports of IT/ITeS services stood at USD 2.4 billion in 2019, more than 95 per cent of which comprised IT-enabled services (Research and Policy Integration for Development [RAPID] and CUTS International, 2022). Lemma (2021) infers from the 2018 product space map for Bangladesh that the country currently has no capabilities in the production of either electronic goods or similar manufactured products. This is reflected in the fact that Bangladesh only exported USD 15 million in 2019, presumably finding its way into the global value chain.[33] Bangladesh stands second to India in terms of the supply of online labour to the global market (RAPID and CUTS International, 2022). The UNCTAD database shows that the exports of ICT/ITeS services stood at USD 1.64 billion in 2019, of which, around half a billion were ICT services and the rest digitally deliverable ITeS services (Lemma, 2021).

Thus, Bangladesh is a consumer of digital technology with its imports exceeding USD 2 billion a year. This facilitates the delivery of digital services to local markets, the development of e-commerce and other digital platforms, and enables local labour to participate in and earn from the global online market. While business process outsourcing (BPO) relying upon software skills has been on the rise, as is revealed in the rest of this section, the country's procurement biases compel local institutions to rely on external sources of software expertise.

2.5.4. Participation in the Development and Production of Digital Technology in Bangladesh

Measures of the extent of device usage (such as smartphones), internet access, or the number of persons having the requisite knowledge to use or access digital services are good proxies for the size of the consumers' market. However, these factors alone are inadequate for guaranteeing progress in digitalization towards achieving a societal digital transformation.[34] The evidence to understand how choices are made between procurement and build to push digitalization beyond the expansion of the "consumer" market is not always amenable to quantification and mostly relies on anecdotes. Moreover, such evidence is seldom documented in political environments with poor economic governance. Experts suggest that the agencies responsible for developing software programs for government agencies have become intermediaries and that the procurement procedure of such agencies may sometimes be influenced by a preference to transfer resources outside the country. Unfortunately, public audits are rare, and expenditure on ICT components remains concealed in major projects of individual line ministries.

Drawing upon consultations carried out by the author for several research studies and a review of electronic media, the following list has been compiled, featuring incidents, practices, as well as observations that illustrate the type of digitalization underway.

a. Several large IT firms that develop software[35] for global as well as local markets have

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[33] Bangladesh's export of electronic goods, an alternative proxy for ICT goods export, stood at USD 70 million.

[34] Consider a community where only one person has a smartphone and provides mobile financial services (MFS). Everyone in the community avails of the services without having to acquire digital competence. The key player, the MFS operator (or the "entrepreneur" at the Union Digital Centre [UDC]), may develop the business without investing in mass-level competency!

[35] Bjit Techsci, for example, has offices in Japan, Finland, Singapore, the USA, Sweden, Bangladesh, and the Netherlands. Software ranges from simple ones that monitor cash flows in ATM machines to more complex ones embedded in AIs. Companies that store compiled data on websites and make them available to the public via a search engine are not considered software developers.

emerged in the country. However, they are not keen to work with the government because of issues with payments. Concurrently, government agencies prefer to procure high-priced services from external sources.

b. All banks use software programs to run their operations, and these are reportedly procured from sources outside the country. Local commission agents allegedly use senior officials of the central bank as a means to influence the type of software and the source from which it is to be obtained.

c. The Customs Department under the National Board of Revenue (NBR) was one of the forerunners in adopting the computerization of data in the 1990s,[36] though subsequent attempts towards complete automation fell short of expectation. A National Single Window project was initiated in 2017 with a total project value of USD 5.85 billion, of which USD 5.29 billion came from the World Bank (WB)![37] Almost five years after inception, it is being acknowledged that the project's aim to bring 39 agencies under one umbrella is unlikely to be realized (Hossain, 2022). Bangladesh Customs' official website now uses the Bangladesh Customs Office Management Software, which was developed by Dcastalia, that belongs to DigitalOcean-ASN - DigitalOcean, LLC, US. The mother company, DigitalOcean has 15 centres and projects in 185 countries.

d. The National Board of Revenue (NBR) has partnered with the Dubai-based Webb Fontaine Group FZ-LLC to implement the Bangladesh Single Window (BSW) trade facilitation system, a project worth Tk 5.85 billion (approximately USD 21.8 million), targeted for completion by 2026 (The Financial Express, n.d.). This decision has drawn criticism, as similar work could reportedly have been carried out by local firms employing domestic IT professionals.

e. Similar procurements are reported in another line ministry project, where the procurement of enterprise resource planning (ERP) software for warehouse management is said to have been carried out separately from the main project through a local business, a consulting company, and a business house in the region with a specialized IT unit. Reportedly, the local firm as well as the consulting firm acted as commission agents.[38]

f. Several external funding agencies support development activities in the coastal south of Bangladesh. Many such projects are housed at the Bangladesh Water Development Board (BWDB). Several low-cost digital devices are available in the global market that have the potential to generate real-time information on parameters such as water level, water quality, soil quality, and more, which could feed into decision-making processes. Unfortunately, due to a lack of interest in continuity in local-level knowledge, the market for such services did not develop. Thus, neither the government agencies nor the private sector took an interest in developing business models that would use these digital devices.

g. The local industry, including the export-oriented ready-made garments (RMG), occasionally engages local professionals to develop IoTs. However, the general production environment is shaped by the needs of imported machinery and subsequent automation that comes with imported apps and other digital devices. The market is organized to ensure the presence of

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[36] They have used an Automated System for Customs Data (Asycuda) since 1994.

[37] See also, *The Financial Express* (2022). Similar projects with external finance are found in other TLDCs as well.

[38] The requisite human resources for delivering a comprehensive ERP may not be available in the country. For example, Hussain et al. (2022) find no noteworthy progress in the adoption of blockchain technology in Bangladesh. However, project designs need to be a lot more judicious to develop local resources when it is lacking.

representatives of the tech industry from the North who are prompt in receiving feedback and addressing any challenges. As a result, the dominant local industry is less keen on engaging with local professionals unless programs are purposively designed with their involvement (as well as higher education) in mind.

h. Consider an MRI machine developed by a renowned tech firm. The latest versions of these machines come equipped with an ever-expanding array of digital devices, including apps. These advanced versions are capable of scanning the human body, storing the information in the cloud, and generating analytics through AI algorithms. Once the analytics are prepared, they are reviewed by a physician who may add additional observations.[39] The final output is then ready to be delivered to the patient in a relatively short period of time. The market for such medical equipment is not large, and therefore, a trained operator from the local professional pool placed in a hospital or a health clinic is enough to fully utilize the value of the machine. Ironically, the job at the consumer end of utilizing the MRI machine does not, strictly speaking, require the involvement of a specially educated physician. Yet, given the relative prices of services in the market, a physician may end up serving as an operator who markets the service while also acting as the guardian of the expensive machine, with limited or no involvement in processing medical information. Among the physician-cum-operators, there may be quick learners who acquire new techniques in data science or on AIs attached as accessories. There will, however, be no demand for technical

(hardware as well as software) services that can connect with local professionals in related fields.

i. The use of digital devices facilitated by mobile telecommunication has contributed to developing viable enterprises in dairy farming (*The Business Standard*, 2021). The involvement of a new genre of entrepreneurs/dairy farmers has been associated with innovations in both business models and "technical" (IoTs and AIs) aspects. Troubles faced by the subsector in the recent past illustrate the importance of fiscal and trade policies of a country in promoting digitalization.

These examples illustrate how Bangladesh's journey into the digital world, so far, is a mixed experience. The country depends on imports for most of the digital devices that meet consumer needs as well as for those used as intermediate inputs for the generation of services and production of goods. The opportunity for innovation and creativity lies in the development of software and a few other IoTs, and that also in the small-scale private sector.[40] While significant government demand for software (and other IoT) development exists, there is a tendency to procure from foreign agencies and potential complexities in payment procedures hinder local IT firms' ability to benefit from the "closed market."[41]

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[39] IDEAS (2021) notes that synergy and collaboration between medical equipment manufacturers, software and new technology developers, governments, and healthcare decision-makers are pressing to ensure the digital transformation of the health sector.

[40] The term small and medium-sized enterprises (SMEs) is avoided here, as the term "medium" may lead to incorrect inclusions.

[41] There are numerous examples where open tendering has not been practised in procuring services. No attempt has been made to capture the digitalization initiatives undertaken in agencies related to the armed forces of the country. Similarly, the potential to involve local IT firms in satellite initiatives has been overlooked.

2.6. Operationalizing a Meaningful Digitalization Process

There are concerns that digitalization in a market with skewed ownership of technology will eventually marginalize TLDCs in the idea space and will push their workforce into low skills, widening the disparity across nations. Emphasis on marketing and delivery of goods and services procured from elsewhere may encourage new ideas in developing business models for delivery. This is evident from the blooming of startups in many TLDCs. While there are examples of startups growing into large entities serving beyond local markets, many merge into (or get sold to) tech-heavy global conglomerates, which benefit from information and networks generated locally by the startups.[42] Given this, TLDCs need to find entry points to establish their presence within the global value chain.

As is evident from Section 3, TLDCs largely remain users of digital technology to, for example, help them run certain functions of the government, make businesses more efficient, and introduce new services in both the private and government sectors. Such changes may face resistance from stakeholders extracting rent from procurements and/or from entrenched interest groups unwilling to let digital systems function. When a digital business ecosystem evolves, say, in financial transactions, control over digital data as well as the production of both soft and hard technology is likely to get concentrated among TDCs. Such trends will marginalize the sovereignty of a TLDC. Exposure of the local economy and polity to the whims of the forerunners in digital technology is unavoidable. Countries historically dependent on imported technology face shrinking choices in an increasingly digital

world. Thus, opportunities to create and build assets decrease as digital transformation progresses globally. Dependence on imported ideas and technologies creates operators who face increasing de- and re-learning costs as technology changes. When just procuring, the only skills acquired are those required to perform those jobs. Unquestioned dependence on imports prevents the workforce from learning to develop digital technology suitable for local conditions and compatible with the organizational culture and ability of the workforce. Such procurement, often tied to external borrowing, is associated with cross-border transfers of resources.[43] It also discourages the acquisition of advanced skills through creative engagements, making an idea economy and society elusive.

Alternatively, a TLDC may adopt a strategic approach, accepting the current structure of production and consumption of digital technology, as well as the skewed distribution of power among countries and interest groups, and plan entry points for change. One possibility is the "create and buy option."[44] Creation involves the application of own ideas, using own resources, for the use in activities that meet the TLDC's needs. Figure 3 sketches a technology-based abstract reality that includes the generic components defining (mechanical and soft) technology array, whose use in production has the potential to generate digital data and to be stored and processed for information and knowledge. These are facilitated using digital devices, and digital transformation would imply completing the loop with ideas feeding into reshaping the technology space.

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[42] Kader (2022) informs that "Indonesian GoJek invested in Pathao" and "Australian Seek International bought 35% shares of Bdjobs.com in two rounds."

[43] IT is one area where precise valuation is more difficult to be established than, for example, measuring "earth works" or assessing the quantity of foodgrain carried in a floating vessel.

[44] The option of rent has several more dimensions to address in a formal contract. While those are worth probing into, this paper abstracts from the rent option.

In designing a project, a TLDC government may think through the constituents in Figure 2.3 and identify specific sub-activities where local content holds potential and develop the requisite ecosystem to promote the use of that content. A digitalization strategy should ideally chart the pathway to enhance the role of local soft and hard technology so that knowledge is locally generated, widely shared to promote the learning process (skill development), and progress may be made towards the digital transformation of society. The prescription is not meant to bar the importation of digital technology. On the contrary, it is suggested that there are tagged-in activities that need to be carried out locally, and the right environment should be put in place to realize that. An example of this is data analytics using cloud facilities. Hypothetically, this is feasible with the human resources available, and with a more competitive environment in sourcing out dynamic portal designs and public investment in cloud storage with affordable access without discrimination, TLDCs may gain. TLDCs also have the potential to develop IoTs if a well-thought-out and viable marketing plan is included while preparing a digitalization strategy.

In TLDCs, strategies are often drawn up to subscribe to the idea of moving fast with whatever technology is available in the global market. This applies to export-oriented production units that want to remain competitive and are less keen on R&D to develop suitable technology when services of equipment sellers are readily available. It applies no less in cases of government procurement, as mentioned earlier. All these are directly or indirectly influenced by loan agreements between TLDC governments and developed countries or multilateral agencies who, in most cases, represent the business interests of developed countries. Figure 2.4 captures some of the forces that shape the choice between "buy" and "build." The Ministry of Finance is likely to be more concerned with the balance of payments (BOPs) situation and less so with the purpose for which foreign currency is brought in. The government agency (or any other) to house a project is often predetermined, and fast loan disbursement is often the guiding principle. Thus, procurement plays a central role in loan projects, and project personnel are content with such arrangements as long as they benefit from them. The discussion above suggests that an effective digitalization strategy requires political support to disrupt the status quo in loan negotiations as well as to find the appropriate agency to house projects and professionally steer the implementation of the strategy.
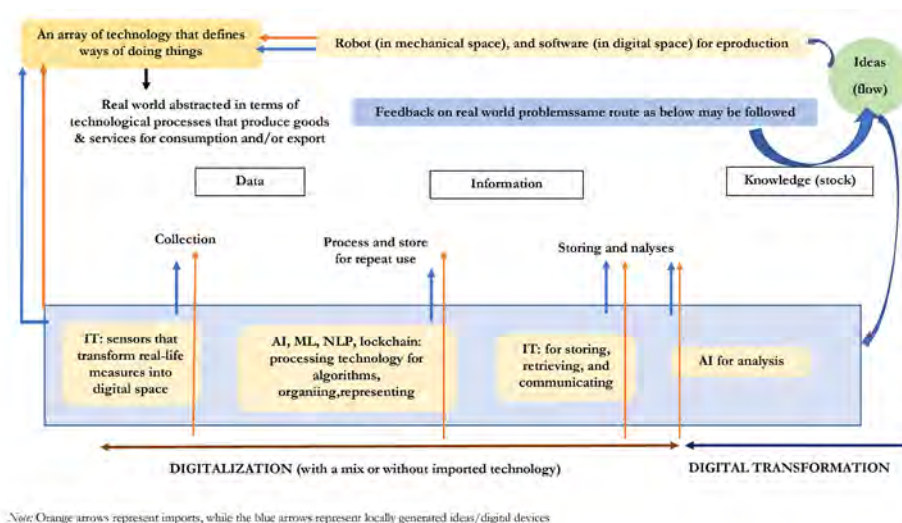

Figure 2.3. Technology-Defined Real World, With Institutions and Behaviour Defining a Create-Procurement Mix
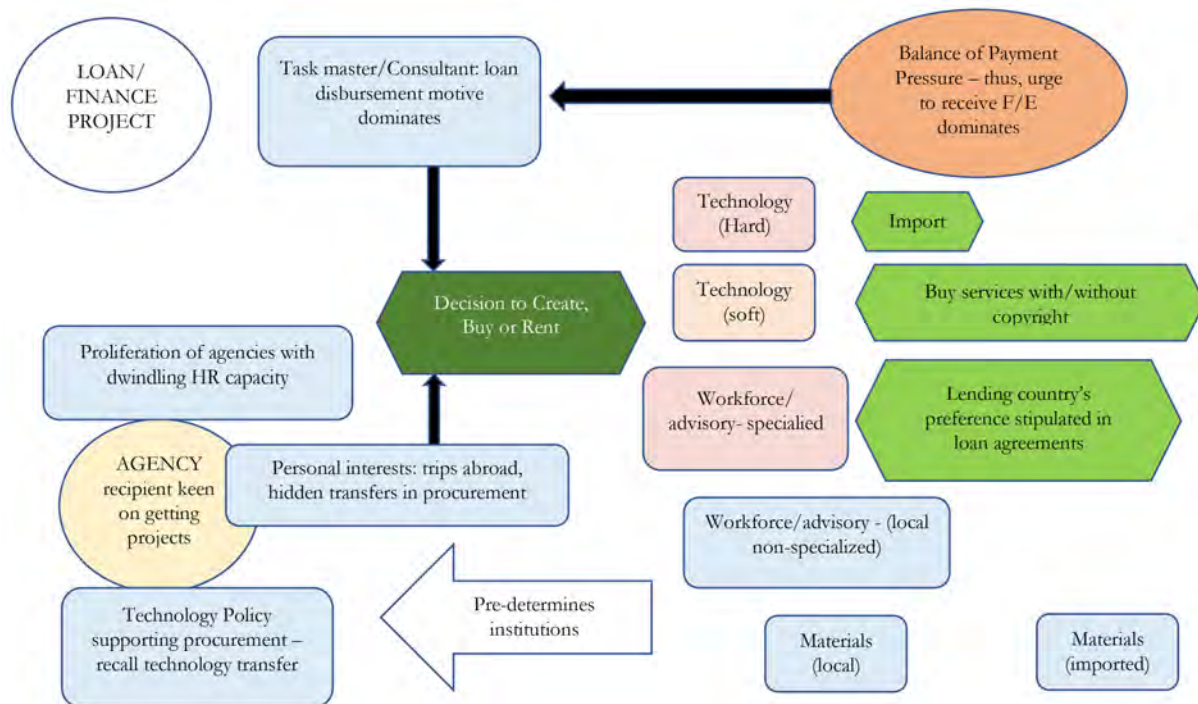
Figure 2.4.   Decision Environment Influencing the Create-Procurement Choice

2.7. Concluding Observations

This paper follows an inductive approach in order to develop a framework for assessing the progress in digitalization in a TLDC. Two important departures from the dominant discourse are made. First, the paper distinguishes business models for digitalization that focus on delivering services through digital devices from an engineering perspective. The latter encompasses the development of both software programs and hardware for digital devices. The paper argues that the two routes towards digitalization involve different kinds of skill development. The engineering perspective is considered more appropriate for developing the kind of skills TLDCs need, while the business model is necessary for the sustenance of economic activities using digital devices. The present-day literature is dominated by the business perspective, which needs critical assessment and reorientation for effective program design.

The second departure is made by introducing the choice between procurement (buy/rent) and build (create). Nurturing creativity for an idea economy and developing skills in the workplace are better realized in a regime where the choice is made to "build or create." When relative costs and sources of funds are of little or no consideration, procurement through purchase is often perceived as the easier option for many governments in TLDCs. The purchase of digital devices from TDCs by private firms in TLDCs may be justified by the desire to remain competitive in the global markets. The allocation of public money to procure digital devices from foreign firms when resources are locally available is questionable. It is suggested that such bias in government procurement is the result of rent-seeking practices.

The business model for digitalization goes hand-in-hand with government procurement in TLDCs, especially when these procurements are funded through external borrowing. Although not extensively explored or detailed, it is widely acknowledged that external loans from bilateral and multilateral agencies are often tied to purchases of technology in TLDCs. This is echoed in reports from UNIDO, UNCTAD, (*The Least Developed Countries Report 2023 | Crisis-resilient Development Finance, 2023*) and other such agencies, as well as in "global funds" made available to assess a country's digital readiness. As a result, program design is often influenced by practitioners' pursuit to increase the use of digital technology. Such objectives set the tone for subsequent queries that attempt to identify the barriers to technology adoption. An alternative way of thinking through is captured with questions such as "How do we expand the reach of a service?" This approach allows for a more comprehensive exploration of not only technology and institutional issues but also potential barriers.

While TLDCs cannot avoid dependence on imports of devices and software support, it is important to identify areas where a shift towards "build and create" can be encouraged with strong political commitment. When the space for ideas is opened up at the local level[45] and the scope is persistently widened with purposively designed programs, one can truly dream of digitalization that will lead to the digital transformation of society.

As globalization and digitalization continue to challenge the sovereignty of nations, governance in the information age must conceptualize the relationship between data, technology, and digitalization (Kostkaa et al., 2020). Thus, agencies responsible for digitalization in a country like Bangladesh should strive to negotiate contracts that discourage unnecessary external procurement, allow inter-industry linkages within the country, and actively support local sources of professional services through linkage programs. Most importantly, these agencies must ensure their own freedom to redefine a blended form of digitalization that appreciates local developments in both business and technical expertise. A good starting point could be safeguarding software and apps development by local IT firms.

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[45] Ideas that reflect on problems confronted in a TLDC and engage primarily local communities to develop solutions.

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Annexe

Box A1.
Business Perspective: Excerpts From Bumann and Peter (2019, pp. 15–16)

Although the three concepts digitiation, digitaliation and digital transformation have distinct meanings, they often are used interchangeably as research confirmed (Bloomberg, 2018). While Bounfour (2016) has already revealed a lack of clear definitions, Unruh & Kiron (2017) assert that no consensus on the difference of these terms exist and their definition strongly hinge on the person or organisation using them. Literature tries to describe the three terms based on their scope (i.e. a narrow to broad perspective).

The first phase of transformation is described as digitisation, which Maltaverne (2017) refers to as the conversion from analogue to digital (e.g. digitisation of data). Digitalisation is the second phase and means the process of using digital technology and the impact it has (e.g. digitalisation of a process). Unruh & Kiron (2017) have a similar understanding and describe digitalisation as the innovation of business models and processes that exploit digital opportunities.

Finally, digital transformation … encompasses the whole enterprise, not just a specific process. Maltaverne (2017) describes it as the designing of new ways of doing things that generate new sources of value. According to Unruh & Kiron (2017) it is […] a systems-level transition that alters behaviours on a large scale and it arises when new digital business models and processes restructure economies. Digital transformation is customer-driven and requires cross-cutting organisational change along with the implementation of digital technologies (Bloomberg, 2018; Peter, 2017). Hebbert (2017) also asserts the dissimilarity of different definitions and in her opinion, real digital transformation is […] about a company's ability to react and successfully utilise new technologies and procedures – now and in the future.

Box A2.
Technology Perspective: Selected Quotes From Tan et al. (n.d.)

"Digitization refers to the process of encoding pieces of data into digital formats, turning analogue data into computer readable format, for transmission, re-use and information processing."

"Digitalization is a transformation to improve processes by leveraging digital technologies and digitized data"

While it is acknowledged that "the act of digitization does not by itself involve digitalization" it is asserted that "Digitalization is an eventual technological trend that leverages digital technologies to transform the data into a quantified format, turning many aspects of our life into data which is subsequently transferred into information realized as a new form of value."

CONTEXTUAL CONDITIONS
Contextual conditions trigger and shape digital transformation

Material Determinants	Organizational Determinants	Environmental Determinants
Emergence and diffusion of digital technologies and applications	Organizational strategy and legacy	Legal and infrastructural conditions
Digital properties	Digital transformation awareness of TMT	Digital consumer demand
Data availability		

Legend

Inside the organization

Outside the organization

MECHANISMS
Mechanisms link contextual conditions with outcomes

Elements that Innovate	Elements that Integrate
Developing digital business strategy	Unlock organization
Creating digital innovation	Increasing technological fexibility
Exploitation and leveraging of digital capabilities	Physical-digital hamonizing by TMT
Mobilization for and acceleration of digital transformation by TMT	Developing digital transformation strategy
Merging human-computer interaction	

OUTCOMES
Outcomes refer to the consequences of digital transformation on the organizational economics and sspilover level

Changes in the Organizational Setup	Changes in Economics	Spillovers creating changes on other levels of analysis
Permeable, agile organizational structures	Improved firm performance and new forms of value	Higher exposure to cyber threats
Tehnology-focused and supported management	Dynamic and constantly changing industry level performances	Digital-permeated markets, economies and societies
Digital and customer experience-focused business model		Blurring boudaries between physical and online industry structures
Automatized, data-driven and virtual business processes		Digitalization of the indivual
Smart, connected and customized products		Paradigms of customer-centricity and connected markets
Ecosystem-oriented and embedded organization		

Source: Hanelt et al. (2020)

Figure A1.   Multi-Dimensional Framework of Digital Transformation

Source: Haq (2021).

Figure A2. Evolution of Bangladesh e-Governance

Chapter Three

Asymmetries of Information and Power and Digitalization Outcomes

Mushtaq Khan

3.1. Introduction

Digital technologies have brought forth a wave of transformation in reshaping governance, promising to make it more efficient and enhance services delivered through digital platforms. These changes are particularly noticeable in how governments interact with citizens and manage resources. Fully grasping the scope and impact of these transformations requires analyzing societal power dynamics, capabilities, and interests. These factors are pivotal in how governance evolves and adapts in response to technological advancements. This understanding is particularly crucial in developing countries where resources and access to technology can be limited. This chapter explores how the interplay between power, capabilities, and interests shapes the governance challenges in these countries. It aims to provide deeper insight into how digital technologies can either bridge or widen existing gaps in governance, influenced by societal structures and the distribution of power and resources.

3.2. Digitization and Power Dynamics: Theoretical Underpinnings

One of the main issues digitalization can address is the reduction of transaction costs associated with access to services, such as the expenses incurred when obtaining a service like travelling to government offices or waiting times. Digitizing services can significantly minimize the need for physical visits and streamline processes.

Digitalization also plays a significant role in diminishing information asymmetries, which occur when disparities in knowledge exist between citizens and public officials, for example. This imbalance can be exploited, leading to corruption. A government official might possess more information than a citizen, using this advantage

to engage in corrupt practices. Citizens can also contribute to corrupt practices by leveraging their power and connections to obtain services they are not rightfully entitled to.

Digitalization can mitigate these issues by creating a more transparent and equitable system where access to services and information is based on need and entitlement rather than power and connections. It can help bridge the information gap by making it more accessible and transparent, thus reducing corruption opportunities. The transformation towards a more digitized system promises to create a fairer and more efficient environment for citizens and officials.

3.3. Addressing Key Assumptions for Maximizing Benefits of Digitalization

To fully realize the benefits of digitalization, a number of fundamental conditions must be met as listed below.

3.3.1. Accuracy of Underlying Databases

The foundation of effective digitalization lies in the accuracy of databases containing citizen data and their service entitlements. Despite the technological advancements in many developed countries, maintaining and updating this information remains a challenge. Yet accuracy is essential to ensure that the right services reach the right individuals.

3.3.2. Robust Error Correction Systems

The implementation of robust error correction systems is also key. User-friendly systems should allow citizens to report any discrepancies in their data at the earliest possible opportunity. The importance of this aspect cannot be overstated, as the integration of flawed data into digital systems can result in more significant complications compared to analogue systems.

The Gap Between Information and Enforcement The presence of information does not inherently lead to its enforcement. This gap is particularly evident in developing countries, where the enforcement of rules and regulations is not uniformly applied across all societal strata. Often, the assumption that the availability of information guarantees action is proven incorrect. This discrepancy can lead to digitalization increasing existing societal imbalances, primarily affecting the less powerful and marginalized who often require assistance to utilize available information to their advantage due to systemic barriers in error correction and enforcement mechanisms. This reality raises the question of who truly benefits from digitalization and highlights the need to ensure that its benefits extend to all layers of society, not just the powerful.

3.4. Challenges of Error Correction and Enforcement in Developing Countries

In developing countries, establishing reliable databases presents significant challenges. These databases tend to contain more errors than in more developed nations, making even the primary process of identity verification complex. Standardizing personal information such as births, deaths, addresses, and even the spelling of names is a hurdle, as these details are frequently inaccurately recorded. Discrepancies such as differing birth dates across various documents of the same individual are common. Furthermore, the verification process often depends on local officials who may be easily influenced by citizens, compromising the integrity of the data.

The problem is compounded when these unreliable identity databases are linked with other flawed databases, such as those maintaining tax records, land registries, and welfare records. Linking weak identity databases with inefficient records leads to suboptimal outcomes, particularly in determining eligibility for various services or rights.

Additionally, the rule of law in developing countries is often more susceptible to manipulation, especially by powerful citizens who can expedite error correction in their favour and delay enforcement when judgments are not in their interest. They may even influence the creation of new records to their advantage. A practical example of this type of manipulation is observed in land registry and mutation records. The digitization of these records, such as the e-mutation process, is now heavily influenced by financial power, whereby the better-off are able to expedite this process and gain a significant advantage in any subsequent legal disputes. Indeed, the first individual to secure their e-mutation in the digital records gains the upper hand, making it challenging to contest these records later. This process demonstrates how digitalization, while intended to streamline and improve systems, can be manipulated to favour the more powerful, exacerbating existing inequalities.

3.4.1 Principals, Agents, and the Enforcements of Rules

The effectiveness of digitalization in improving systems and processes largely depends on the context of its application, particularly in addressing information asymmetry and rule enforcement concerns. Digitalization is particularly effective in scenarios where information is unevenly distributed between parties. In such cases, where an established system is in place to enforce rules—where possessing the correct information leads to necessary corrections or actions—digitalization can lead to significantly better outcomes. This has been observed in specific applications in India, where the nature of the application itself led to improvements due to the digitalization process.

However, the effectiveness of digitalization is limited when individuals lack the influence or means to leverage information for enforcement. In scenarios where information is available but not acted upon by critical figures such as bureaucrats or politicians, the potential benefits of digitalization are not realized. This inaction often stems from insufficient incentive or power to use the information effectively. Such situations are commonly recognized in academic literature as a problem of "unprincipled principals," where those in charge are aware of what needs to be done but fail to act due to the absence of motivation or authority, rather than moral shortcomings.

Moreover, while information is a powerful tool, its impact is not uniformly distributed across different societal groups. For the less powerful, information does not always translate into power. In contrast, for those who are already powerful, access to information can further increase their power, exacerbating existing asymmetries. This unequal distribution of power based on information access highlights a critical aspect of digitalization's impact on societal structures.

In conclusion, while digitalization has the potential to be a powerful agent of change and improvement, its effectiveness is contingent on various factors, including the nature of the information asymmetry, the robustness of rule enforcement mechanisms, and power dynamics. Addressing these underlying issues is essential for harnessing the full potential of digitalization to create equitable and effective systems, particularly in contexts where power imbalances and lack of incentives impede the proper utilization of information.

3.5. Implication of Different Identities of Different Violation Types

In the context of developing countries such as India and Bangladesh, the impact of digitalization on governance and the resolution of various violations is complex and multifaceted. To understand this dynamic comprehensively, a structured framework is utilized (see Figure 1). At its core lies the critical distinction between violations rooted in the impracticality of rules and those arising from intentional non-compliance. This distinction is essential for crafting targeted strategies to effectively address these issues.

Top of Form

At the other end of the spectrum, we encounter violations where actors possess the necessary capacity to comply with rules but consciously choose not to do so. Instead, they opt for unscrupulous practices, such as tax evasion or non-compliance, to maximize their gains. This category of violations underscores the significance of assessing not only the capabilities but also the intentions and motivations of violators. This distinction becomes particularly relevant in developing countries due to the substantial heterogeneity of economic actors. On one side, there are informal sector participants with limited productivity and the desire to comply but are constrained by their capabilities. Conversely,

In the first category, violations occur because certain actors, such as businesses engaged in international trade, genuinely strive to adhere to rules but encounter insurmountable barriers due to the complexity or incompatibility of these regulations with their operational capabilities. This underscores the importance of assessing the capabilities of actors involved in the governance process. Understanding their constraints and limitations is pivotal in addressing these types of violations.

modern and capable entities can comply but may deliberately opt for non-compliance, often engaging in opportunistic behaviour.

Additionally, the framework considers the power dynamics between violators and enforcers of rules. Determining whether violators hold more influence and power relative to the enforcers or are less potent is a pivotal factor in shaping the outcomes of digitalization efforts. Power imbalances can significantly impact the effectiveness of digitalization initiatives, as those with more power may manipulate the system to their advantage, further exacerbating violations.

		Types of violation (why does it happen?)	
		Compliance with rules is not feasible (violator cannot comply)	Compliance with rules is feasible (violator can but will not comply)
Relative power of violator	High	1. Powerful violate difficult rules (Evasion aided by corruption) Information may have positive effects by mobilizing powerful to change rules to improve compliance	3. Powerful, maybe even more able to extract illicit rents Information with asymmetric power may have negative effects by making extraction and control easier
	Low	2. Less powerful violate rules (Particularly in informal economy) Premature enforcement may lead to economic exclusion	4. Fraud based on asymmetric information Information likely to have positive effects; enforcement is likely

Figure 3.1. Implication of Different Identities of Different Types of Violations

In summary, the structured framework offers a systematic approach to analyze the implications of digitalization in developing countries regarding violations and governance. Categorizing violations based on rule feasibility and understanding violators' diverse capabilities, intentions, and power dynamics will help tailor strategies to address digitalization's unique challenges and opportunities in different contexts. These strategies aim to harness the potential of digitalization to improve governance, reduce violations, and enhance equity while also considering the complex interplay of factors in these diverse and dynamic environments. Ultimately, the goal is to leverage digitalization for positive transformation and equitable governance in developing countries.

This categorization allows for the distinction of four types of violations, each experiencing unique impacts of digitalization.

1. The powerful violate difficult rules (evasion aided by corruption)

Context

In this category, compliance with rules is not feasible and the violators hold significant power. Consider a scenario where a robust business engages in international trade, complying with tax, safety, and health regulations. However, these regulations are exceedingly complex, making full compliance unattainable. Traditionally, such entities will resort to minor acts of corruption, such as paying "speed money" to regulators, to operate within the bounds of the regulations. These are influential and comparatively large firms operating in the market.

In this scenario, the introduction of digitalization will transform the landscape. Digitalization will expose instances of non-compliance with regulations. This newfound transparency poses challenges for these powerful actors,

especially in international transactions, as their partners demand rule compliance for viability. Consequently, digitalization exerts pressure on these powerful entities to advocate for changes in the rules.

This process also prompts error correction: these powerful actors will approach the government or leverage their connections within bureaucracy or politics to highlight the impracticality of existing rules. As a result, the rules undergo simplification, and databases are corrected to align with practicality. This, in turn, leads to a reduction in the kind of corruption that prevailed. This represents a significant positive outcome of digitalization even if this effect materializes only when error correction mechanisms are accessible to robust participants who possess the influence and means to initiate such changes effectively.

In essence, digitalization compels powerful actors to advocate for rule changes due to the increased transparency it brings. This process of error correction leads to simplified rules and reduced corruption. Nonetheless, this positive transformation's success hinges on influential participants' ability to effectively access and navigate the error correction mechanisms.

Evidence

Significant advancements have been witnessed in developing countries, particularly in India, where initiatives like Aadhaar1 and the unified payment system have led to notable enhancements in the business environment. These improvements have accelerated business processes, including the obtention of permits, the establishment and dissolution of companies, and the facilitation of payment collection. Hence, India has witnessed a substantial boost in its global business ranking with a clear improvement in the ease of business within the country, albeit with some associated criticisms.

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[1] Aadhaar is a 12-digit unique identity number that can be obtained voluntarily by residents of India, based on their biometric and demographic data. It is the world›s largest biometric ID system.

Beyond businesses, the positive impact of digitalization extends to services accessible to influential citizens. For instance, processes like passport applications and online electricity bill payments have undergone significant streamlining thanks to the involvement of influential citizens. Their engagement puts pressure on governments to enhance these services. In the case of Bangladesh, it is now possible to conveniently pay electricity bills using a mobile phone, a stark contrast to the previous process that involved sending someone to the office or bank and incurring additional expenses.

Digitalization has substantially improved the business landscape and citizen services in developing countries like India and Bangladesh. These advancements have enhanced the ease of conducting business and made essential services more accessible and efficient for the benefit of all citizens.

2. The less powerful violate rules (particularly in the informal economy)

Context

Another critical aspect of violations warrants closer examination, particularly in cases involving less powerful actors primarily operating within the informal economy. These individuals and entities, such as small and medium-sized enterprises (SMEs) or street vendors such as peanut sellers, need help complying with rules and regulations. Attempting to enforce such rules and digitize their operations by integrating them with tax and benefit systems requires careful consideration.

These less powerful actors need more mechanisms for error correction or the capacity to pressure the government to tailor rules to their capabilities. Consequently, their only recourse may be to exit the market as they can no longer adhere to the imposed regulations. This phenomenon, often called "premature formalization" or "premature enforcement," poses a substantial challenge in many developing countries, particularly regarding the rapid formalization of tax-related processes.

The SME sector, in particular, bears the brunt of the rapid formalization, which can harm its viability and sustainability. Therefore, it is imperative for policymakers and stakeholders to carefully navigate the path towards formalization, considering the diverse capabilities and constraints of less powerful actors within the informal economy. Balancing the objectives of compliance and economic inclusivity is essential to avoid inadvertently driving these actors out of the market, thereby undermining their livelihoods and exacerbating inequality.

Evidence

India has implemented the Goods and Services Tax (GST) system, a major tax reform with significant implications for businesses operating within the country. This tax system is intricately linked with Aadhaar. Under the GST, any business operating in India must pay this value-added tax (VAT)-like tax. To do so, they must meticulously maintain records of invoices for both incoming and outgoing transactions. Failure to do so can lead to severe financial repercussions, potentially resulting in bankruptcy. Additionally, businesses must collect tax on the supplies they purchase from their input suppliers. This intricate system has garnered favour among large corporations but has faced opposition from small businesses. Small enterprises need help maintaining the extensive records required for tax compliance, making collecting the tax already paid on their inputs challenging.

The consequences of this disparity are significant, with many SMEs facing financial strain and even closure. This phenomenon illustrates the concept of "function creep," where a system designed for more significant players is extended to smaller entities without considering their capabilities. This distinction between SMEs and large corporations holds in developing countries and advanced economies. While greater formalization can

benefit advanced SMEs, it can prove detrimental to struggling SMEs, leading to their closure.

It is crucial to recognize that the argument for closing down inefficient SMEs, often made in advanced economies, does not apply to developing countries. In advanced economies, inefficient resources can be reallocated to more productive uses, but such alternatives may not exist in developing nations. Consequently, closing down these SMEs would not result in resource reallocation; instead, it would lead to unemployment and the inefficient use of resources. Therefore, the argument that closing informal sector players improves efficiency only holds in the context of developing countries. In summary, implementing the GST system in India, while beneficial for large businesses, has posed challenges for SMEs, resulting in closures and economic consequences. This underscores the importance of considering the unique dynamics and capabilities of SMEs when implementing tax and formalization measures in developing countries rather than applying a one-size-fits-all approach.

3. Powerful, maybe even more able to extract illicit rents

Context

In addressing the third scenario, we encounter a situation where influential entities, despite being able to adhere to regulations, choose to disregard them intentionally. The focus here is on the impact of digitalization in this context. The available evidence indicates that digitalization exacerbates the issue by facilitating non-compliance but the covert and elusive nature of this makes it difficult to prove.

To illustrate this point, consider the example of the land mutation process in Bangladesh. Influential individuals usually rush to expedite their land mutation procedures because almost all land-related documents in Bangladesh contain discrepancies. These discrepancies may involve issues with land registration, ownership records, cadastral surveys, and possession claims. Once the mutation is done on the digital system, it can be used as proof of ownership despite discrepancies in other documents. Those who navigate the system swiftly and are willing to expend resources gain a significant upper hand. This situation highlights a critical aspect of how digitalization, in specific instances, can inadvertently aid in manipulating systems by those in positions of power or influence.

Evidence

In the context of India, robust evidence indicates that integrating Aadhaar identities with blockchain technology, particularly in land acquisition, has significant implications. This integration incentivizes influential individuals to promptly establish their records in the blockchain and Aadhaar system. Once these records are set, they become immutable, effectively halting any possibility of error correction. This scenario favours influential individuals as it allows them to secure their ownership faster. Conversely, the poor are at a disadvantage since they are no longer able to protest against errors in the database. This perpetuates inequality.

A Master's thesis by a former Indian Administrative Service (IAS) officer detailed how digitizing Indian customs reduced small-scale corruption by establishing a seamless connection between exporters and importers, eliminating the need to physically inspect containers. While this reduced minor corrupt practices, it inadvertently facilitated major corruption among significant players who could manipulate both ends of the transaction. Consequently, unchecked containers could smuggle almost anything into the country, and even random checks on high-value imports became rare. This corruption is often linked to high political levels, rendering the rule of law ineffective.

Additionally, there are concerns about how political entities in India exploit access to Aadhaar systems. This access enables targeted voter manipulation, offering promises based on caste voting patterns and occupations. Such data exploitation allows those in power to maintain their positions by manipulating electoral processes.

A profound implication of this technological integration is evident in Assam (Tathagat 2020, Jha and Chakrabarty 2025). Approximately 1.9 million people were declared stateless as part of the National Register of Citizens (NRC) initiative. These individuals are now required to submit their Aadhaar numbers, potentially disqualifying them from accessing various services in the future. The Aadhaar system's centralization means that if the state intends to target a specific community, it now possesses a powerful tool. This scenario starkly illustrates the increased asymmetry of power brought about by digitalization. In the past, people could rely on multiple documents to contest state actions. However, now there is a singular, centrally-controlled document, drastically reducing the ability of individuals to challenge the state.

These examples from India and similar cases from Bangladesh demonstrate how digitalization, while offering numerous benefits, can also significantly increase power asymmetries and vulnerability among specific populations. The technology's potential for misuse in manipulating political processes and targeting specific communities underscores the need for careful consideration and regulation in its implementation.

4. Fraud based on asymmetric information

Context
In examining diverse digitalization scenarios, it becomes evident that the nature and power of the violators are vital factors in determining the potential effects of digitalization on service delivery, including its role in facilitating inclusion or fostering exclusion. The fourth scenario presents a situation where established regulations are practical and achievable, but the violators want more power or influence. This context is marked by opportunistic fraud, predominantly perpetrated by low-level bureaucrats. These individuals often collude with citizens at a similar hierarchical level to misappropriate funds. This violation is distinct, involving less powerful individuals exploiting opportunities for fraudulent activities. It highlights a different facet of digital violations, where the lack of power or influence shapes the method and scale of the fraudulent activities.

Evidence
The fourth example illustrates how digitalization can effectively mitigate certain types of fraud, especially when the violators are not particularly powerful and resort to opportunistic use of information. A prominent case in point involves using digital identities in India to prevent the misuse of fake identities for illicitly obtaining government subsidies.

In scenarios where digital entities are employed, identity fraud significantly decreases. The reason is straightforward: with the requirement for a verifiable digital identity, it becomes nearly impossible for fictitious individuals to claim subsidies. While this approach effectively curbs identity fraud, it does not address eligibility fraud. Eligibility fraud occurs when an individual with a valid identity claims subsidies or benefits for which they do not qualify. For instance, a person might claim poverty-related subsidies despite not being financially disadvantaged.

Determining eligibility is a more complex issue and is only partially resolvable digitally. Databases need to be sufficiently sophisticated to determine eligibility based on identity alone accurately. Consequently, determining who is genuinely in need often falls to local officials or politicians, who may manipulate data to include non-eligible individuals as poor and exclude those genuinely in need.

Digitalization does not eradicate what is known as quantity fraud either. Even when an individual's identity and eligibility are established, there is no guarantee they will receive the total amount of the intended subsidy. For example, a person eligible for a grain sack might only receive half a sack. Thus, while digitalization can reduce identity fraud, it does not eliminate other forms of fraud, such as eligibility and quantity fraud.

In the broader context of these four types of violations, it is clear that digitalization has a mixed impact. In specific scenarios digitalization offers positive outcomes by reducing specific types of fraud. In these cases, the technology serves as a beneficial tool in streamlining processes and ensuring the rightful distribution of resources. However, in other scenarios, digitalization can have a detrimental impact. These instances often involve more complex forms of fraud that digitalization cannot effectively address, leading to exploitation and misuse. This dichotomy highlights the nuanced role of digitalization in governance and social welfare, underscoring its potential benefits and limitations.

3.6. Policy Recommendations

The discussion on the policy implications of digitalization in service delivery reveals a landscape marked by clear benefits and potential drawbacks, particularly concerning power asymmetries and adverse effects in certain areas. To navigate these complexities effectively, a multi-faceted approach is required.

A crucial starting point is a thorough understanding of the existing analogue processes. This entails examining why current pre-digital systems may be failing. For instance, in exploring why land registration and mutation processes are problematic in Bangladesh, it becomes evident that the core issue is not asymmetric information. Instead, the fundamental challenge

lies in the deep-rooted inconsistencies in land records accumulated over centuries, resulting in conflicting claims and documentation. In the past, the inherent ambiguities in land records allowed for multiple points of contestation, keeping the space open for various parties to make their claims. Digitalization, if applied without addressing these underlying inconsistencies, could inadvertently enable the powerful to monopolize land ownership, thus exacerbating existing problems. Therefore, it is imperative to understand the specific nature of the problem before attempting to implement digital solutions.

Another consideration is whether the digital system will feasibly reduce discretion and prevent the exacerbation of power asymmetries. It is essential to evaluate whether the system includes mechanisms for error correction and aligns with the capabilities of the intended beneficiaries. For example, a digital system should enable a peanut seller to continue their business or find employment, not just cater to the more powerful segments of society.

The path to effective digitalization in service delivery is complex and requires a nuanced understanding of existing systems, careful consideration of potential power imbalances, and a commitment to ongoing research and adaptation. When considering introducing digital systems, it is necessary to conduct detailed, sector-by-sector, and application-by-application research. This approach ensures that digitalization is tailored to each context's specific needs and challenges, thereby maximizing its effectiveness and minimizing potential negative impacts.

The insights drawn from this paper were shared with relevant authorities and stakeholders, such as the Aspire to Innovate (a2i) initiative and the Ministry of Information and Communication Technologies, with positive results: some of the outlined problems were acknowledged and a willingness to explore new perspectives on the challenges and opportunities presented by

digitalization was expressed. This openness to rethinking digitalization strategies is promising, suggesting a readiness to collaborate closely with experts and practitioners in refining and improving these systems, offering a hopeful pathway towards more equitable and effective digitalization practices.

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Chapter Four

Adoption of Digital Public Services in Bangladesh
What We Know

Mehnaz Rabbani and Wasima Sadia

4.1. Introduction

In Bangladesh, a wide range of public services are now available online, at least partially. The digitalization of public services aims to streamline bureaucratic processes and reduce the complexity involved in their delivery, making these services more accessible to citizens. The government has made considerable investments in relevant infrastructure and system improvements to decentralize public services and automate various functions.

Over the years, many government websites and software applications have been developed to support the transition to e-governance. To date, 384 e-services have been designed with the expectation that citizens will use them as a single access point. Additionally, since 2010, around 8,280 Union Digital Centres (UDCs) have been established across the country (Jahan, 2023). These centres aim to close the rural-urban digital divide by delivering e-services directly to rural and marginalized populations.

However, the uptake of most public e-services remains very low, especially when compared to the widespread adoption of private digital services like bKash and platforms like Facebook in Bangladesh. Citizens still navigate bureaucratic hurdles to access most public services offline. Even for the few public e-services with relatively higher uptake (e.g., birth registration, national ID), it appears that people prefer to seek help from intermediaries. Low adoption and reliance on intermediaries raise questions about the effectiveness of digitalized public services in reducing bureaucracy and improving service delivery.

Given the welfare potential of digital public services, it is essential to identify the challenges associated with their adoption in order to devise effective remedial actions. Since 2019, the BRAC Institute of Governance and Development (BIGD) has conducted various studies to understand the dynamics of e-service adoption in the country.

Among these studies, two rounds of a nationally representative survey in rural Bangladesh—conducted in 2019 and 2021—comprehensively assessed rural populations' digital access, digital literacy, and use of selected e-services. The findings revealed that most e-services had poor adoption rates and that people struggled to avail themselves of these services independently. We initially assumed that poor digital literacy was a key reason for the low adoption, but further analysis of the survey data failed to establish a clear link between the two. These findings motivated us to investigate more deeply the factors influencing the adoption of e-services and shaping people's preferences, through a series of qualitative and quantitative studies.

In this paper, we draw on years of research to highlight the key factors influencing the adoption of digital public services in Bangladesh.

4.2. Does Digital Literacy and Access Ensure the Adoption of e-Services?

Assumptions and debates abound regarding what motivates citizens to use e-services, including culture, education, digital literacy, attitudes and beliefs, and infrastructure. However, in 2019, when BIGD began evaluating the performance of government e-services, no significant research had been conducted on this topic in Bangladesh. A 2015 study had suggested that the digital divide in the country significantly hindered citizens' uptake of public e-services (Waughen, 2015); in particular, the low level of digital literacy was believed to be the primary barrier to e-service adoption.

To explore this further, BIGD initiated a study in 2019 to examine the state of digital literacy in rural Bangladesh. In this study, digital literacy was measured in terms of both digital skills and access to technology. The findings confirmed the presence of a rural-urban digital divide in the country—the vast majority of rural households had limited access to digital devices and low digital skills (Sadat et al., 2020).

Very few survey participants—who were also the most digitally able persons in their households—knew how to perform tasks such as paying bills (3%), shopping online (3%), or earning money online (1%). Interestingly, engagement was significantly higher in activities such as participating in social media (41%), commenting on social media (28%), making video calls (15%), and using mobile banking services (35%). This suggests that even if low digital skills are a key barrier to accessing e-services, they do not prevent people from using other types of digital platforms. This incongruity raises the question: why do some e-services gain popularity while others fail to gain traction, even among the same population with low digital literacy?

The relationship between digital literacy and the use of digital services is certainly not linear. In the 2019 study, we struggled to develop an appropriate index that could accurately measure a person's ability to use digital services. We found that different services require different types of skills, which may not always be easily ranked in a way that allows for the creation of a comprehensive index. The e-services themselves were not equally digitized, with most requiring a mix of digital and manual steps. Although we did develop an index, it could not establish a direct link between digital literacy and the use of e-services.

To gain a deeper understanding of how digital literacy affects the adoption of public e-services,

another round of the survey was conducted in 2021, titled "Digital Literacy and Access to Public Services in Rural Households of Bangladesh." In this survey, 31 public e-services were selected across eight categories—identification, social safety net programs, basic utilities, education, financial transactions, business, health, and non-essential services—to understand the adoption journey and how digital literacy and access to smartphones influence usage (Shafi, 2023). We shortlisted the e-services that had uptake rates of at least 5%.

We found that regardless of access to smartphones or digital skill levels, adoption rates and the likelihood of self-use depend on the specific e-service. Most participants sought help from intermediaries to access the majority of e-services. The data indicates that smartphone

access does not automatically lead to self-use of e-services. For example, respondents with smartphones typically paid bills and checked exam results on their own; however, for other e-services, they relied on tech-savvy relatives, or friends, or formal/informal intermediaries. Additionally, having greater digital skills or literacy did not necessarily lead to self-use of e-services. For instance, respondents with digital skills who self-registered for the COVID-19 vaccine still did not use services related to social identification or social safety on their own.

This anomaly may arise for a number of reasons—such as fear and trust issues, poor user-friendliness of the e-services, or the availability of cost-effective alternatives. Our data suggests that digital literacy is unlikely to be the main reason behind the low adoption of public e-services.

4.3. The Missing Link in e-Service Adoption: Insights From GIS Mapping

Although we could not establish a direct link between digital literacy and e-service usage from the household surveys conducted in 2019 and 2021, some interesting findings prompted us to consider other factors that might influence digital access. We found that household education and income levels are significantly related to digital access. We also observed regional heterogeneity in both digital access and digital skills (Sadat et al., 2020). This led us to wonder whether regional variations in access and skills might actually be attributed to differences in education and income levels.

Another noteworthy finding was that female-headed households in certain regions used smartphones more than others (Sadat et al., 2020). One possible explanation for this trend could be the high concentration of international migrants in those regions. These observations

encouraged us to analyze district-level data further, in hopes of shedding light on how dimensions such as education, income, and international migration influence digital access and skills, and thereby facilitate access to e-services. To this end, we conducted a mapping exercise using Geographic Information System (GIS) tools to identify any district-level patterns in digital access based on several important socioeconomic dimensions—literacy rate (as a proxy for education), poverty (as a proxy for income), international migration, and agricultural and industrial employment. While the digital access data (use of feature phones, smartphones, computers, and the internet) came from BIGD's survey, the other dimensions were extracted from the Household Income and Expenditure Survey (HIES) 2016, conducted by the Bangladesh Bureau of Statistics (BBS). After converting all datasets into district-level representations, we

plotted them on a map of Bangladesh using GIS software. This exercise generated maps for each of the dimensions, offering visual representations of how digital access varied by district based on literacy, poverty, international migration, and employment rates.

While our household-level analysis showed a significant relationship between education and digital access, we could not establish a consistent relationship between district-level literacy rates and digital access. The comparison yielded varying results across districts. For instance, in Faridpur, both literacy and digital access are high. In contrast, districts such as Habiganj and Cox's Bazar demonstrate high digital access despite lower literacy rates. Thus, the findings were inconclusive. Similarly, we could not confirm a negative correlation between headcount poverty and smartphone access—significant correlations were observed in some districts but not in others. The analysis of agricultural and industrial employment also failed to yield clear conclusions. The only maps that provided conclusive insights were those analyzing the relationship between international migration and digital access (see the Appendix). We found that areas with a high concentration of international migrants have more smartphone users compared to areas with lower migration rates. We also found that higher migration rates are associated with a decline in basic phone usage. Additionally, there is a positive correlation between internet use and international migration. Migration appears to be a strong motivator for smartphone and internet use. About four in five households in districts with a high concentration of migrants—including Brahmanbaria, Pirojpur, Chuadanga, Munshiganj, Manikganj, and Noakhali—use the internet for daily activities such as communication, recreation, business, and education. In contrast, districts with a lower concentration of migrants, such as Rangpur and Rajshahi, have lower levels of smartphone and internet accessibility.

The positive correlation between smartphone and internet use and international migration observed in our mapping exercise can be explained by the need for communication. For people wanting to connect with family members abroad, apps such as IMO, WhatsApp, and Facebook Messenger offer the cheapest and most reliable means of communication, which requires direct access to a smartphone and a stable internet connection. Alternatives like direct cellphone calls are usually more expensive and less reliable. Moreover, relying on others' smartphones or intermediaries is often not feasible, given the frequency of communication and the challenges posed by different time zones. Maintaining privacy is also difficult when using someone else's phone. As a result, people in migration-dominated areas are more likely to own smartphones and use the internet.

While households with migrant members may initially begin using smartphones and internet connectivity out of necessity, they often acquire digital skills and become familiar with other online services in the process, particularly in areas such as recreation, business, and education. This helps explain the significantly higher levels of internet use, not just for browsing but also for functional and recreational purposes, in migrant-dominated areas. The positive correlation between migration and digital access and skills thus demonstrates the importance of necessity in motivating investment of time and money into a specific technology.

4.3.1 The Role of Necessity in the Uptake of Public e-Services

The mapping exercise revealed that the need for communication is a strong motivator for acquiring digital access and using certain e-services. This raises the question of whether the same principle applies to public e-services. In other words, do people use public e-services out of necessity?

To explore this, we consider why certain e-services are more widely adopted than others. The 2021 survey found that only 10 out of the 31 pre-selected services had more than 5% uptake. Further analysis revealed that the services with noticeable uptake were mostly essential services (e.g., birth registration, electricity bill payment, and mobile banking), while those that failed to gain traction were primarily business-related and non-essential services.

It can thus be argued that the first requirement for the success of an e-service is understanding the immediate needs of users. For instance, consider a situation where a child needs a birth registration certificate to be enrolled in school. In this case, the child's parents must apply for the certificate. Likewise, if household members are not travelling abroad, they are unlikely to apply for a passport until the need arises. Both the birth registration certificate and passport are available only through digital channels. These examples demonstrate how need—or perceived need—plays a key role in influencing the adoption of public e-services. The clear success of the Shurokkha app for COVID-19 vaccine registration presents a strong case for need-based adoption: when a service is perceived as a necessity, users will find a way to use it, regardless of their level of digital literacy or access (Khene & Hernandez, 2024).

Although this hypothesis has not been explicitly tested in our study, it is consistent with the Technology Acceptance Model proposed by Davis (1989), which suggests that perceived usefulness and ease of use play a critical role in determining technology adoption. In particular, perceived usefulness directly influences a user's attitude toward, and intention to use, a technology.

4.4. Exploring the Role of Intermediaries and User Behaviour in Public e-Service Adoption

How is it that users access necessary e-services even when they lack the required access or digital skills? In Bangladesh, a wide range of formal and informal intermediaries help bridge this gap. These intermediaries include local computer shop owners, agents, neighbours, technically skilled individuals in the community, UDCs, and Union Parishads. In another study on the onboarding experiences of women in digital finance, we found that female early adopters in the community were quickly recognized as go-to persons for other women—essentially acting as intermediaries. State-sponsored UDCs and financial service agents were introduced across the country to bridge the gap between users and service providers. By offering essential support for a small fee, these intermediaries have played a crucial role in making e-services accessible to the general public. In many villages, UDCs have become the primary channel for accessing public e-services.

As demand for these services grew, local entrepreneurs began offering them at competitive rates, enhancing user convenience by adding supplementary services like scanning and printing. Although users incur service fees and sometimes travel costs to access these intermediaries, the convenience and efficiency they offer often outweigh the expenses. This explains why users, including those who have the necessary access and skills, may choose not to engage with e-services directly. The availability of affordable intermediaries helps explain why we find no linear relationship between digital literacy and e-service usage.

The design of e-services also significantly influences whether users will seek help or use

the service independently. For example, some e-services (e.g., identification and social safety net programs) provide online application forms, but the process often involves complex steps such as submitting scanned documents, undergoing multi-step verification, manually verifying documents, and printing final copies. Our 2021 survey found that people, regardless of their digital literacy levels, tend to use intermediaries for e-services that are complex or not fully digitized. However, even when cost-effective intermediaries are available, people tend to rely on them for fully digitized and simpler e-services as well. For example, although paying electricity bills online is a fully digitized service, only 5.5% of the 90.39% of respondents who used this service chose to do it independently. The rest relied on intermediaries. Even during the COVID-19 lockdown, 90.25% of users sought help from formal or informal

intermediaries to register for vaccines online—despite the associated risks of travelling to local markets. Similar patterns were observed for all fully digitized e-services, even among individuals with moderate to high digital literacy. It appears that using cost-effective intermediaries is the most preferred method of accessing e-services for rural Bangladeshis.

Thus, the presence of intermediaries adds complexity to understanding the process of e-service adoption in Bangladesh. While it may seem reasonable to assume that people will use services independently when they have both the need and the digital literacy, this is often not the case. Convenience and affordable alternatives appear to play a decisive role in how people choose to adopt and use public e-services.

4.5. The Adoption Dynamics of Public e-Services Through the Lens of Diffusion of Innovation Theory

Although intermediaries may discourage self-use, they play a vital role as change agents by introducing people to digital services—especially in contexts where direct access and digital skills are limited. Formal intermediaries such as UDCs were introduced during the early phase of e-service implementation with the expectation that, over time, citizens would be motivated to acquire digital access and develop the skills needed to use these services independently. However, in the context of Bangladesh, we have continued to observe a strong reliance on intermediaries.

Everett Rogers' Diffusion of Innovation Theory explains that people do not adopt new technologies immediately (Rogers, 1983). Adoption decisions vary across individuals—some are eager to experiment with new technologies,

while others perceive them as risky and wait for broader social acceptance. As a result, adoption typically begins slowly, driven by a few early adopters. Over time, the rate accelerates and eventually levels off when the majority has adopted the innovation. When plotted cumulatively over time, this adoption pattern follows an "S-curve."

Ryan and Gross (1943, as cited in Rogers, 1983) observed this pattern of adoption in their seminal study on the adoption of new farming technology in Iowa. The technology required farmers to significantly change their seed storage practices. In the first five years, adoption was just 10%, but it jumped to nearly 40% over the following two years. As more farmers adopted it, the growth rate slowed and eventually plateaued. Similar S-curve adoption patterns have been

documented for technologies in agriculture, public health, and information and communication technology (ICT) across various studies.

However, not all technologies diffuse at the same pace—some take longer, some spread rapidly, and others stall after initial uptake. In Bangladesh, the adoption rate is below 5% (including both self-use and usage via intermediaries) for the majority of e-services in our study, even years after their introduction. Yet, apart from the availability of cost-effective alternatives, we have not been able to clearly identify the key factors that are slowing the adoption of these services. Once again, Rogers' (1983) theory provides useful insights. He suggests that people adopt or reject a technology based on how they evaluate its usefulness, compatibility with their values and existing practices, complexity or ease of use, and observability (visibility of its benefits, often through promotion or peer use). However, our surveys did not explicitly explore the influence of these factors on the adoption of e-services.

4.6. Social and Cultural Barriers to e-Service Adoption Among Women and Girls in Bangladesh

Certain social and cultural norms in Bangladesh act as significant barriers to e-service adoption among young girls and women (Jahan, 2021). In rural areas, unmarried women and young girls are often restricted from using mobile phones and the internet due to concerns that such access could lead to premarital relationships. According to the GSMA (2023, as cited in Khene & Hernandez, 2024), family disapproval is the top barrier reported by about one in seven women who do not own a mobile phone, and by one in eight women who do not use mobile internet.

As a result, phones in rural households are typically owned and used by men. Focus group discussions (FGDs) and interviews reveal that in households with a single smartphone, it is usually reserved for use by young boys or adult males—even older, educated women are often not permitted to use it (Jahan, 2021). This severely limits women's access to e-services and opportunities to develop digital skills. The disparity is evident in our 2019 survey: only 8% of digitally able women were able to successfully navigate the national passport website, compared to 13% of digitally able men (Jahan, 2021).

Another qualitative study exploring the onboarding challenges of digital financial services—such as bKash, Nagad, and Rocket—highlighted how social, cultural, and religious norms further restrict women's access (Hossain et al., 2024). In rural areas, women often depend on male family members to open mobile financial service (MFS) accounts or withdraw money from such accounts, with many sharing their PINs with the male members. Since the PIN is shared and thus unsecured, women tend to withdraw funds immediately upon deposit due to security concerns. This behaviour prevents women from taking full advantage of the features and benefits of digital financial services.

Religious beliefs also create barriers. Many Muslim women, particularly those who strictly observe religious norms, feel uncomfortable participating in facial recognition procedures, such as unveiling or smiling, for identity verification in front of male agents. Since most MFS apps require facial recognition, this discourages many women from opening accounts in their own name. These barriers are reflected in the data. According to the 2024 GSMA Consumer Survey (as cited in GSMA, 2025), 50% of men in Bangladesh own

mobile money accounts, compared to only 23% of women. Additionally, women's usage of mobile money is significantly lower than that of men.

These findings underscore how deeply embedded social, cultural, and religious norms contribute to gender disparities in digital access. To close this gap, targeted strategies must be developed that take these contextual realities into account and ensure equal access for women and girls.

4.7. Lessons From bKash's Success and the Challenges of Public e-Services

Although 597 public services in Bangladesh have been digitized, only a small proportion has gained meaningful traction (Hossain et al., 2019). In contrast, certain private digital services, especially mobile banking, have achieved rapid and widespread adoption. Notably, mobile financial services offered by private companies had the second-highest adoption rate (73.69%) among all evaluated e-services in a 2021 study (Shafi, 2023). Among these, bKash stands out as one of the most successful services in the country. Since its launch in 2011, bKash's user base has surged from 2 million in 2012 to 80 million in 2024.

So, what did private companies like bKash do differently to achieve such remarkable adoption? The answer likely lies in how they designed their services with users' actual needs in mind. During its planning phase in 2008, bKash identified a major market gap: limited access to traditional banking, particularly in rural areas. At the same time, there was a growing demand for a reliable way to send and receive money remotely, especially for external or internal remittances and other forms of financial support.

To meet this need, bKash introduced a simple mobile banking solution that allowed users to send and receive money using basic feature phones. They also built an extensive network of agents and merchants across the country to assist people in using the service. Crucially, bKash invested in creative marketing and incentive-based promotions to build awareness and trust. Its simplicity, accessibility, and direct alignment with user needs made it appealing, even to early adopters with minimal digital experience. Importantly, bKash did not rest on early success. It continuously evolved and expanded its services to keep pace with user demand. This adaptability has been key to its sustained growth and relevance. The company's success illustrates how digital services can thrive when they are user-centred, adaptable, and effectively promoted.

Conversely, public digital services have largely struggled. While many government e-services address genuine needs, they are often poorly promoted and not well known to the public. For instance, the government developed an e-commerce platform to help farmers sell their products directly to consumers. Yet, to date, the site lists only one product—highlighting the gap between service creation and user engagement.

Motivated by the vision of a "Digital Bangladesh," the previous government focused on digitizing services based on criteria like importance, impact, ability, and feasibility. However, many of these efforts lacked user-focused design and effective rollout strategies. Furthermore, weak promotional efforts have severely limited public awareness and uptake. In the survey conducted to formulate an E-Government Master Plan, 20% of respondents identified lack of promotion as a key barrier to the realization of successful e-governance (Hossain et

al., 2019). To improve adoption, the government must re-evaluate both the relevance and user-friendliness of its e-services and strategically invest in public awareness campaigns. Additionally, to improve the existing public e-services, grievance redress mechanism must be taken seriously. Currently, there are multiple platforms and systems in place for feedback and complaint registration—such as hotlines, online portals, and in-person services—most of which were developed during the COVID-19 pandemic (Ahmed et al., 2023). However, the existence of too many overlapping systems often leaves citizens confused about where to lodge feedbacks and complaints and makes it difficult for policymakers to act on the information effectively. Instead of maintaining multiple fragmented systems, the government should develop a single, centralized grievance platform. Countries like Indonesia and Nepal have successfully implemented one-stop service and public grievance systems, offering useful models for Bangladesh to follow (Ahmed et al., 2023).

4.8. Conclusion

The Government of Bangladesh has made significant investments in digital infrastructure and e-governance, leading to the rapid introduction of nearly 500 e-services in the country. This progress is reflected in Bangladesh's improved standing in the United Nations' E-Government Development Index (EGDI), where it now ranks 100th out of 193 countries—up from 134th in 2010 (Rommo, 2024). Yet, the poor adoption of the majority of these services depicts a different picture. People tend to use only a small number of essential e-services, while the rest remain severely underutilized. The primary reason for this gap is likely the failure to accurately identify the real needs and capabilities of end users.

Without widespread adoption, the resources spent on digitizing services become a loss to the government. To minimize this loss and maximize public welfare, the government must prioritize the development of services that address pressing needs in the Bangladeshi context. This should be followed by mass awareness campaigns to ensure these services reach the intended users. Ideally, before launching any e-service, a rigorous feasibility assessment should be conducted during the design phase to ensure the service will be both usable and sustainable.

However, such assessments are particularly challenging in developing countries like Bangladesh, where power and information asymmetries can distort outcomes. Contrary to common belief, simply digitizing a service does not guarantee reduced corruption or increased efficiency (Khene & Hernandez, 2024). For example, the case of electronic government procurement (e-GP) illustrates this problem. Over a decade after its launch, 75% of contracts are still awarded through single bidding, suggesting that corruption may not have decreased as expected (The Daily Star, 2025). Similarly, e-Nothi, the digital filing system for government agencies, has seen low usage and no clear evidence of improved efficiency or reduced bureaucracy.

These examples highlight that digitization alone cannot overcome systemic governance issues. As Khan and Roy (2019) argue, in contexts marked by weak rule of law and power imbalances, digital services may end up reinforcing existing inequities rather than reducing them. For instance, efforts to formalize informal businesses through mandatory digital registration and taxation could impose unsustainable burdens on small vendors, potentially driving many out of the market. Thus, the government must carefully evaluate the socioeconomic implications of e-services and

assess whether they are likely to increase public welfare or further disadvantage vulnerable groups. Our research also reveals a sobering picture of stark gender inequality in digital literacy and access to public services. Deep-rooted social, cultural, and religious norms continue to hinder women's access to even the most essential digital services, such as mobile financial platforms. Without remedial action, rapid digitization risks exacerbating gender disparities by making it harder for women to access services and opportunities.

Public e-services have immense potential to improve governance, transparency, and service delivery in countries like Bangladesh. But realizing this potential requires careful planning, inclusive design, and responsive implementation. A multidisciplinary approach—considering both the demand and supply sides—is essential for success. The private sector offers valuable lessons in this regard: bKash's success, for instance, stems from designing services that met specific user needs and investing heavily in outreach and promotion. The government must adopt a similar user-centric, need-based approach, supported by strong promotional strategies. Additionally, a centralized grievance redress mechanism should be developed to allow citizens to register their complaints, enable government agencies to act on them, and inform policymakers about necessary service improvements. Furthermore, understanding and addressing the social, cultural, and political dynamics that shape digital access and adoption is crucial. Only then can public e-services be truly inclusive and effective in improving the lives of all citizens.

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Appendix

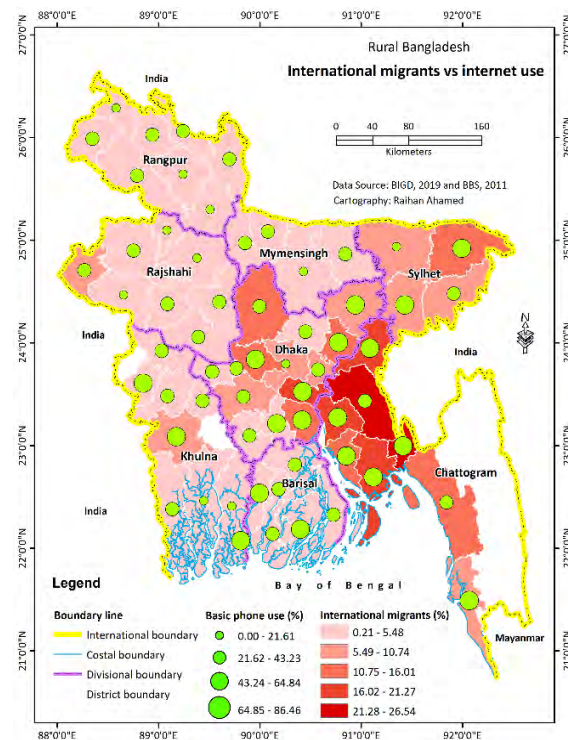Use of basic phones, smartphones, the Internet, and computers on the maps* for international migration
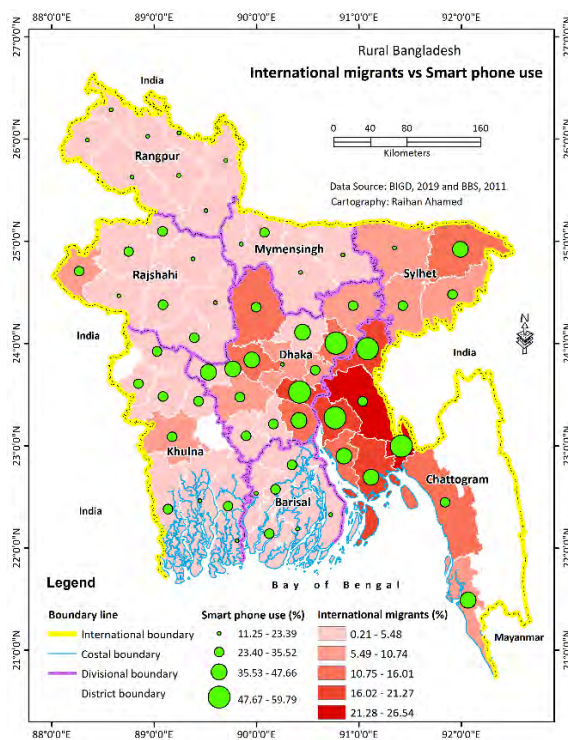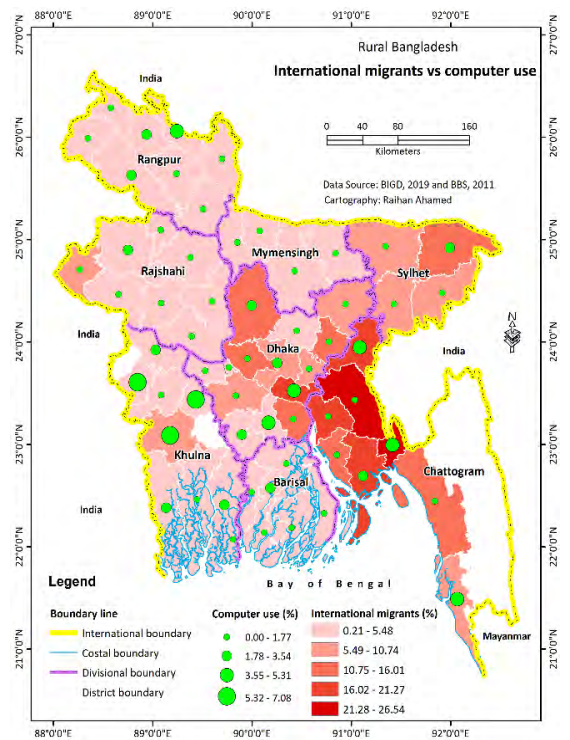

a) Basic Phone Use in International Migrant Dominant Areas
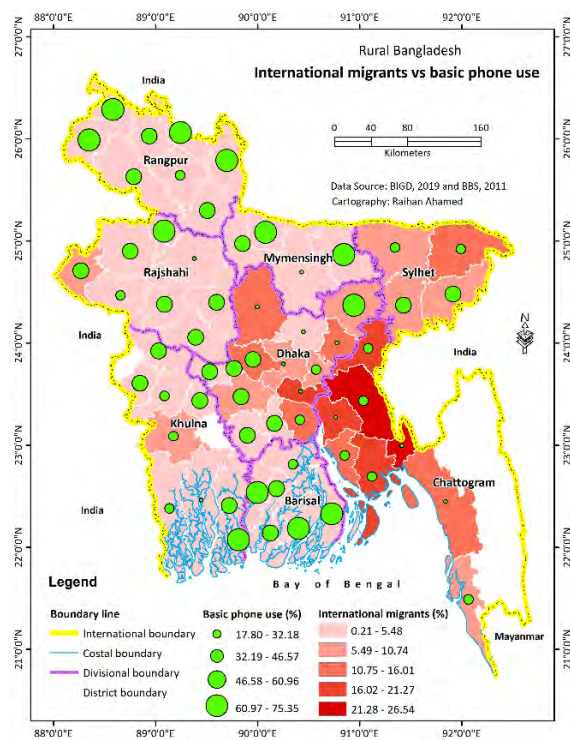
b) Smart Phone Use in International Migrant Dominant Areas

c) Internet Use in International Migrant Dominant Areas

d) Computer Use in International Migrant Dominant Areas

* These maps are generated using GIS by Raihan Ahmed, Senior Programme Associate, BIGD.

Chapter Five

Understanding the First and Second Digital Divides in Rural Bangladesh
Internet Access, Online Skills, and Usage

Tahmid Bin Mahmud
(Based on working paper by Mohammad Shahadat Hossain Siddiquee and Md Saiful Islam)

5.1. Digital Divide: An Introduction

The digital divide refers to the uneven distribution of information and communication technologies (ICTs) among the population. It can be segregated into two levels: the first refers to differences in access to internet infrastructure, and the second refers to differences in individuals' online skills and internet usage (Bucy & Newhagen, 2004; Dimaggio et al., 2004; Katz & Rice, 2002; Zillien & Hargittai, 2009). While access to the internet is crucial for digital inclusion, in recent years, the focus of the digital divide discourse has shifted to the importance of acquiring online skills, as they are vital for effectively utilizing the internet.

The digital divide between rural and urban areas is significant in Bangladesh, primarily driven by income and wealth inequality. In turn, the uneven distribution of ICTs between these areas further contributes to economic and social development disparities. The Government of Bangladesh has made efforts to address this problem by tackling disparities at both levels of the divide between rural and urban areas. This has become a crucial issue and a significant challenge for policymakers, practitioners, and academics.

It is against this backdrop that the BRAC Institute of Government and Development (BIGD) at Brac University conducted a "Digital Literacy and Access to Public Services 2019 (DLAP 2019)" survey on which this study is based. The purpose of the DLAP survey was to understand the extent of inequalities in individual internet access and online skills and identify the factors that contribute to these inequalities to inform policy.

This study draws on the theory of the digital divide, which examines different forms of inequalities and aims to provide a deeper understanding of individual internet access and

online skills (i.e., the first- and second-level digital divides) in rural Bangladesh, where there is a lack of data and research.

The Bangladesh Telecommunication Regulatory Commission (BTRC) has reported a steady increase in internet subscriptions and access since 2011. In March 2020, the number of internet subscribers; defined as those who had at least one instance of access in the last 90 days, reached 103.25 million. However, broadband internet users are primarily located in Dhaka, Chattogram, and Sylhet, and have only recently begun to expand to district and sub-district levels. Rural areas have also seen steady growth in internet penetration since 2011, particularly with the advent of 3G in 2013 and 4G in 2018, which have been drivers of digitization. The government has implemented pro-rural policies, such as establishing Union Digital Centres (UDCs), digitizing local government institutes, and introducing ICT in education and healthcare services. Despite this growth and government initiatives, rural areas are not experiencing sufficient growth in online skills and internet usage.

The "After Access" survey by LIRNEasia (2018), an Asia Pacific-based think-tank, helps to contextualize these figures: it found that Bangladesh had the lowest internet use among the countries surveyed in Asia, with only 13% of the population using the internet (see Figure A1 in the annexe). In contrast, Bangladesh has the highest rate of mobile phone usage at 74% for the population aged 15–65 years (see Figure A2 in the annexe). This points to a significant difference between internet access and online skills in Bangladesh. Rural residents lag behind urban residents by as much as 42% in terms of their internet use (see Figure A3 in the annexe). Additionally, Bangladesh faces a significant gender gap in internet and computer use and mobile access, with women in Bangladesh being 62% less likely to use the internet (see Figure A4 in the annexe) and 34% less likely to own a mobile phone than men (see Figure A5 in the annexe).

The DLAP 2019 study aims to address the growing concern of ensuring equitable internet access and usage for the rural population in Bangladesh. By identifying the factors that contribute to the first and second digital divides in rural areas, the study can help policymakers make informed decisions to reduce these gaps and promote digital inclusion.

5.2. The Framework

5.2.1. Van Dijk's Framework for Understanding the Digital Divide

This study utilizes the conceptual framework suggested by Van Dijk (2005) to examine the first-level digital divide in Bangladesh, as depicted in Figure 5.1. The causal model proposed highlights how existing inequalities in personal characteristics, such as age and gender, and
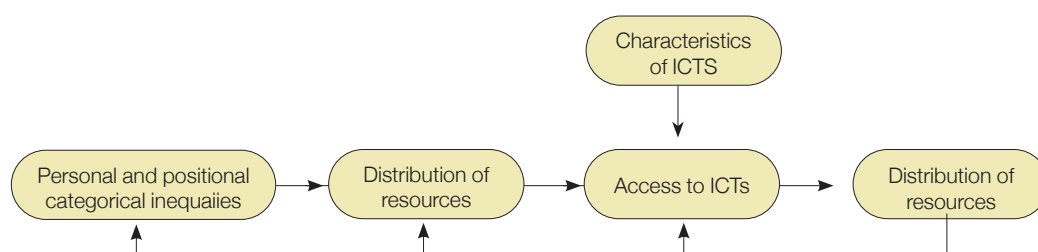
Source: Van Dijk (2005, p. 15).

Figure 5.1.   A Causal Model of the First-Level Digital Divide

positional characteristics, such as education and employment, perpetuate the digital divide by affecting access to the internet. These inequalities lead to an unequal distribution of resources, resulting in unequal access to technology. This, in turn, leads to unequal participation in society, which reproduces these categorical inequalities.

This study aims to measure how individual characteristics—age, education, and regional variations—influence internet access and contribute to the first-level digital divide. It also examines the influence of gender, marital status, and household income. Van Dijk (2005) proposes a cumulative and recursive model of four stages of access to ICT: motivational, material, skills, and usage access (Figure 5.2). This model helps identify the second-level digital divide.

Individuals' motivation to access ICT is determined by multiple factors, such as the cost to acquire technology, the time to use technology and knowledge about its usefulness. Material access is influenced by factors such as gender, age, social status, education, household income, and occupation. Once material access to ICTs is ensured, skills to operate and use them become crucial. Education, occupation, and gender also play a role in online skills. The final stage is the user's access to technology—internet usage in our study. Factors such as the amount of usage time, years of experience, and types of online activities matter for user access. Our survey findings will be used to analyze individuals' material access and practical and operational skills.

5.2.2. Digital Literacy and Access to Public Services 2019 (DLAP 2019)

The DLAP 2019 survey has a statistically representative sample of rural Bangladesh at the national and divisional levels, covering eight administrative divisions: Barishal, Chattogram,

Dhaka, Mymensingh, Khulna, Rajshahi, Rangpur, and Sylhet. The survey includes 60 districts out of 64, excluding the hill tract districts due to language and other barriers; 6,500 sample households were selected randomly from 325 primary sampling units (PSUs) or villages using appropriate statistical methods. As the main objective of this survey is to examine internet access, online skills, and the usage of the internet in rural Bangladesh by looking at individuals' status, an adult who is well-informed about mobile and the internet was selected from each household to answer the questionnaire.

Source: Van Dijk (2005, p. 22).
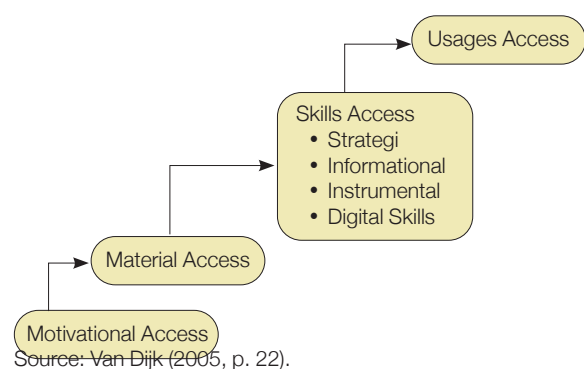
Figure 5.2.   A Cumulative and Recursive Model of Successive Kinds of Access to Digital Technologies

The average age of the respondents in the survey is around 34 years, with a majority in their mid-forties. Only 21% are over 45 years old, and 63% are male. The most common household size among the respondents is four individuals—28% of the cases—which is also the average household size in Bangladesh. Just under a fifth of the sample respondents have never attended any educational institution, while 44% have below Secondary School Certificate (SSC) education, 32% SSC/Higher Secondary Certificate (HSC)/ equivalent, and only 5% have an undergraduate degree or higher. An average household monthly income of up to BDT 10,000 is reported by 39% of the population, while 16% report an income of over BDT 20,000 per month. Just under half of

the respondents are unemployed and students; more than two-thirds of the respondents are married. In terms of location, 19% of respondents belonged to the Dhaka division, and 15% from Chattogram and Rajshahi, respectively.

This study uses three outcome variables to explore the first- and second-level digital divides: internet access, online skills, and internet usage. The connection between these outcome variables and individuals' background characteristics is examined using two analytical methods: binary and regression analyses. The binary analysis highlights the relationship between each outcome variable with age, household size, education, literacy, household income, occupation, marital status, and gender. On the other hand, regression analysis—a probit model and ordinary least squares (OLS)—demonstrates how the explanatory variables (i.e., background characteristics) account for disparities in internet access, online skills, and internet usage.

To measure *internet access*, four questions are asked: whether the respondent has a broadband connection at home, an internet connection on their mobile phone, access to the internet through someone else's mobile phone, or from a local computer shop. An individual is considered to have internet access if they answered affirmatively to any of these options.

To measure *online skills*, the study uses a survey measure of user know-how by administering a practical test to determine whether respondents can find specific information on the internet. They are given five minutes to respond to the following questions: "Could you find out what documents are required for a passport application?"; "Could you find out what the passport fee is?"; and "Did you find the hotline number of the passport office?" The study considers an individual to have internet skills if they can accomplish at least one of the assigned tasks through internet searching

within the stipulated time.

To measure *internet usage*, the study considers a list of nine functional activities: reading news, downloading/listening to songs, downloading/watching movies, online training, watching YouTube videos, playing games, paying bills, searching for information, and using social media. Using a binary response scale (1 for yes, 0 for no), the study aggregates the total number of activities carried out by an individual on the internet, resulting in a dependent variable ranging from 0 to 9.

5.3. First-Level Digital Divide

The survey reveals that 37% of respondents have access to the internet. However, there is a notable difference in how people access the internet. About 33.6% of the respondents use their own phone to access the internet, dominating all the other methods shown in Figure 5.3.
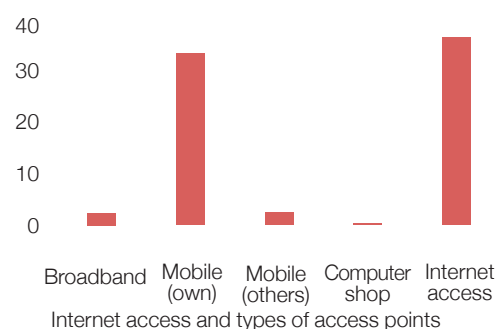

Figure 5.3. Internet Access: Opportunity and Means to Internet Access in Rural Bangladesh

A first-level digital divide emerges from the data due to various factors as discussed below. Probit regression results for internet access show how individuals' socioeconomic, demographic, and regional characteristics determine individuals' access to the internet (Table 5.1).

Internet access decreases as people age. It is significantly higher among individuals aged 15–24, with an average access rate of 65%. Individuals under 34 years of age are 18.5 percentage points more likely to have internet access than those aged above, which is statistically significant. This supports the notion that a digital divide exists between younger and older individuals, and the younger generation has more technology access.

There is a persistent gender gap in internet access in Bangladesh, with 40% of male individuals having access to the internet compared to 32% of female individuals. The data shows that being male is a strong predictor of internet access, with male individuals 18 percentage points more likely to have internet access than female individuals, indicating a significant digital divide between males and females.

Previous research recognized education as a key contributor to the disparity in internet access (Dimaggio et al., 2004; Katz & Rice, 2002; Van Dijk, 2005). This study also finds that respondents with a graduate degree or higher education have an internet access rate of 70%, while only 29% of those with below SSC/equivalent education do. The likelihood that someone with an education level of HSC or above has internet access is 40% more than someone who does not attend school. Higher internet access is therefore found to be correlated with higher education levels.

Economic status, specifically household income, is widely recognized as a major factor in internet access (Goldfarb & Prince, 2008; Katz & Rice, 2002; Livingstone & Helsper, 2007; Ono & Zavodny, 2007; Van Dijk, 2005). This is confirmed by our data: individuals belonging to the highest income group (above BDT 30,000) have the highest prevalence of internet access at 74%, a statistically significant difference compared to the combined average of all other income groups. Those in the highest income bracket also have a 28-percentage-point higher probability of having access to the internet compared to those having a monthly income of less than BDT 10,000.

Occupation is a significant determinant of Internet access, with students, unemployed individuals, and those involved in non-agricultural occupations having better access to the Internet compared to those involved in agriculture. Among the various occupation groups, students have the highest rate of internet access at 70%. On average, the likelihood of internet access is 15 percentage points higher for students and 9 percentage points higher for non-agricultural workers compared to agricultural workers.

Among different marital status groups, the highest rate of internet access is among the unmarried at 68%. The data confirms that unmarried individuals are more likely to have internet access than married individuals, and this relationship is consistent across age groups. On average, the probability of internet access is 11 percentage points higher for unmarried individuals compared to married individuals.

While most research defines the spatial digital divide as a difference between rural and urban regions, this study explores the digital divide within rural regions across eight divisions in Bangladesh. The survey includes all divisions in Bangladesh to provide meaningful comparisons. Respondents located in Chattogram (55%) and Dhaka (44%) have higher internet access than other locations. Using Rangpur as a reference division, as it is the most poverty-prone division with the least internet access, the study finds that the likelihood of internet access is the highest for the Chattogram division, followed by the Dhaka division. In fact, all divisions have positive and statistically significant coefficients, indicating a higher level of internet access compared to the Rangpur division. The probability of internet access is 27 percentage points higher for Chattogram and 20 percentage

points higher for Dhaka divisions compared to Rangpur.

To gain a better understanding of internet access in rural Bangladesh, it is important to consider these multiple interconnected factors. One such factor is age, as younger individuals are more likely to be students and unmarried, which increases their likelihood of having internet access. Additionally, higher education levels have been found to be a significant factor in internet access. However, individuals in the agriculture/farming occupation tend to have lower incomes, decreasing their likelihood of having internet access, according to the study findings. We have also observed a persistent gender gap where male individuals are more likely to have internet access than female individuals. Therefore, age, gender, education, occupation, and income are all important factors to consider when examining internet access in rural Bangladesh.

Table 5.1.   Probit Regression Results: Determinants of Internet Access

Variables	(1) Raw coefficients	(2) Average marginal effect
Age category (=1 if age <=34 and 0 otherwise)	0.730*** (0.048)	0.185*** (0.012)
Household size	0.024** (0.012)	0.006** (0.003)
Education category (Reference category: No schooling)		
Below SSC/equivalent	0.554*** (0.069)	0.132*** (0.015)
SSC/HSC/Equivalent	1.131*** (0.072)	0.302*** (0.017)
Above HSC	1.449*** (0.102)	0.399*** (.028)
Income category (Reference category: <= BDT 10,000)		
10,001 to 20,000	0.327*** (0.044)	0.085*** (0.011)
20,001 to 30,000	0.774*** (0.066)	0.211*** (0.018)
>30,000	1.004*** (0.090)	0.276*** (0.025)
Occupational category (Reference category: Agriculture)		
Student	0.594*** (0.088)	0.149*** (0.023)
Unemployed	0.661*** (0.080)	0.167*** (0.020)
Non-agriculture	0.376*** (0.060)	0.091*** (0.014)
Unmarried (=1 if unmarried and 0 otherwise)	0.426*** (0.065)	0.108*** (0.016)
Gender (=1 if male and 0 otherwise)	0.698*** (0.061)	0.177*** (0.015)
Division (Reference category: Rangpur)		
Barishal	0.578*** (0.089)	0.136*** (0.021)
Chattogram	1.063*** (0.076)	0.267*** (0.018)
Dhaka	0.816*** (0.072)	0.199*** (0.017)
Khulna	0.682*** (0.076)	0.163*** (0.018)
Mymensingh	0.508*** (0.089)	0.118*** (0.021)
Rajshahi	0.591*** (0.075)	0.140*** (0.017)
Sylhet	0.474*** (0.095)	0.110*** (0.023)
Constant	-3.593*** (0.125)	-
Pseudo R2	0.317	-
Observations	6,500	-

Note: dy/dx for factor levels is the discrete change from the base level; standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

5.4. Second-Level Digital Divide

5.4.1. Online Skills: Ability to Perform Tests

This section discusses individuals' online skills, also known as user know-how, by examining the tests allocated to assess the ability to navigate the internet and complete specific tasks within an allotted time. Only individuals with access to the internet were tested. The results, as shown in Figure 5.4, indicate a symmetric distribution of internet skills among individuals with access to the internet across the three tests used. Approximately 35% of respondents demonstrated internet skills, with minimal variation between the tests.

Figure 5.4. Online Skills: Ability to Perform Tests

The various factors that give rise to the second-level digital divide in terms of online skills are examined in what follows. Probit estimates for online skills reported in Table 2 show how explanatory variables determine whether an individual possesses online skills.

Age is a statistically significant predictor of online skills, with 38% of individuals aged up to 34 years having online skills compared to only 24% of individuals aged 34 years or above. For those aged 15–24, this figure increases to 40%. In fact, individuals aged up to 34 years are 8 percentage points more likely to have online skills than individuals aged 34 years or above.

As expected, there is a positive correlation between education level and online skills. Respondents with the highest level of education (graduate or higher) have the highest skill prevalence (56%). The analysis finds that the probability of having online skills is, on average, 20 percentage points higher for individuals with SSC/HSC/equivalent education and 36 percentage points higher for individuals with education above HSC level, compared to the reference category of no education. It is clear from this that individuals with lower educational levels have significantly lower online skills in rural Bangladesh.

While household income between BDT 10,000 to BDT 30,000 is found to be positively related to internet access, there is no such correlation for online skills. However, a positive association is found between household income higher than BDT 30,000 and online skills, suggesting that the likelihood of having online skills increases above a certain threshold of income. On average, individuals in the monthly income group of more than BDT 30,000 have a 7.5 percentage point higher probability of having online skills compared to those with a monthly income of less than BDT 10,000.

While students, unemployed individuals, and those employed outside agriculture have better internet access compared to those engaged in agriculture, this does not hold for online skills. The only significant finding is that students have a 10 percentage points higher probability of having online skills compared to individuals who are in the occupation of agriculture.

Gender plays a statistically significant role in determining online skills in rural Bangladesh, with 38% of male individuals having online skills compared to 30% of female individuals. Male individuals are 9 percentage points more likely to have online skills compared to female individuals, implying a strong gender digital divide when it comes to online skills.

Respondents from Barishal and Mymensingh divisions tended to have higher online skills than the other divisions covered: 55% and 45%, respectively. On average, the probability of online skills is 15 percentage points higher for Barishal and 12 percentage points higher for Mymensingh divisions when compared to Rangpur. However while the study found that individuals living in all divisions had more access to the internet compared to individuals located in the Rangpur division, this was not found to be the case for online skills. Sylhet division lags behind with a negatively significant coefficient, which shows that individuals located in this division are 19 percentage points less likely to have online skills than those in Rangpur. This indicates the presence of the second-level digital divide from the regional perspective.

The factors above illustrate that younger people, particularly those up to 34 years old, and who are students with higher education levels are more likely to have online skills. Moreover, respondents with a monthly household income of more than BDT 30,000 are also more likely to have online skills. Another notable finding is there exists a gender digital divide, where men are more likely to have online skills than women.

Table 5.2.   Probit Regression: Determinants of Whether an Individual Has Online Skills

Variables	(1)	(2)
	Raw coefficient	Average marginal effect
Age category (=1 if age<=34 and 0 otherwise)	0.240*** (0.0891)	0.080*** (0.030)
Household size	0.005 (0.0164)	0.002 (0.005)
Education category (Reference category: No schooling)		
Below SSC/equivalent	0.120 (0.185)	0.033 (0.050)
SSC/HSC/Equivalent	0.620*** (0.184)	0.200*** (0.050)
Above HSC	1.049*** (0.198)	0.362*** (0.057)
Income category (Reference category: <= BDT 10,000)		
10,001 to 20,000	0.088 (0.0721)	0.029 (0.024)
20,001 to 30,000	-0.009 (0.0909)	-0.003 (0.030)
>30,000	0.222** (0.108)	0.075** (0.037)
Occupational category (Reference category: Agriculture)		
Student	0.289** (0.127)	0.097** (0.041)
Unemployed	0.158 (0.132)	0.052 (0.042)
Non-agriculture	0.104 (0.114)	0.034 (0.036)
Unmarried (=1 if unmarried and 0 otherwise)	0.103 (0.0831)	0.034 (0.029)
Gender (=1 if male and 0 otherwise)	0.265*** (0.0815)	0.089*** (0.027)
Division (Reference category: Rangpur)		
Barishal	0.429*** (0.141)	0.153*** (0.050)
Chattogram	-0.118 (0.117)	-0.039 (0.039)
Dhaka	0.148 (0.114)	0.051 (0.039)

Variables	(1) Raw coefficient	(2) Average marginal effect
Khulna	0.117 (0.121)	0.041 (0.041)
Mymensingh	0.345** (0.146)	0.123** (0.052)
Rajshahi	-0.131 (0.121)	-0.043 (0.040)
Sylhet	-0.663*** (0.177)	-0.188*** (0.047)
Constant	-1.598*** (0.247)	
Pseudo R2	0.0931	
Observations	2,405	

Note: dy/dx for factor levels is the discrete change from the base level; standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

5.4.2. Internet Usage: Involvement in Internet Activities

To measure the level of usage, this study focuses on individuals with internet access. The results show that 31% of respondents with internet access did not engage in any of the nine online activities considered. This indicates that while having internet access is necessary for internet usage, it does not guarantee usage. About 15% of respondents were engaged in four activities out of nine. The distribution of usage among those who engaged in at least one activity is roughly normal, with the peak around four activities (Figure 5.5.).
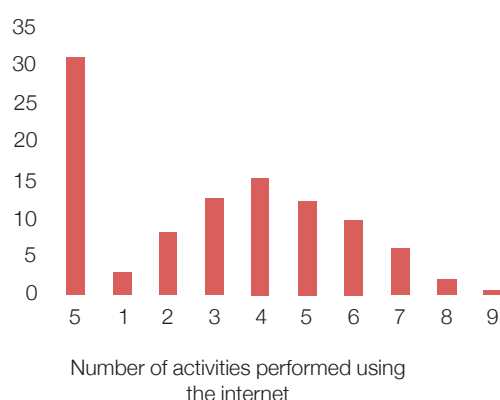

Figure 5.5. Internet Usage Pattern: Involvement in Internet Activities in Rural Bangladesh

The following explores the various factors that influence the second-level digital divide in terms of internet usage as identified through an OLS regression analysis (Table 5.3).

Younger individuals of age 34 years or less use the internet 0.5 times more on average compared to older individuals. This suggests that age plays a role in determining the level of internet usage, and a gap in internet usage persists between age groups in rural Bangladesh.

Education plays a role in determining internet usage in Bangladesh, and the results are consistent with those found for online skills. Individuals with higher levels of education, specifically above the HSC level, are more likely to have higher internet usage. Individuals with SSC/HSC/equivalent and above HSC level education use the internet, on average, 0.8 and 1.7 times more, respectively, than those who have not attended school. These two positive and statistically significant coefficients of education categories indicate that higher education is associated with higher levels of internet usage.

Households with a monthly income level of BDT 20,000–30,000 and above BDT 30,000 use the internet more compared to those with a monthly income of less than BDT 10,000. Their usage increases by 0.49 and 0.79, respectively. This

indicates that internet usage varies depending on income levels, implying the presence of a digital divide in internet usage across different income categories.

Occupation plays a role in determining internet usage in rural Bangladesh, with students and unemployed individuals having higher internet usage compared to those in agricultural occupations.

There is a significant difference in internet usage based on gender, with males using the internet more than females. Additionally, unmarried individuals were found to use the internet more than married individuals. Furthermore, an analysis of internet usage by division revealed that while

there was no significant variation across most divisions, individuals in the Khulna division had higher internet usage than those in the Rangpur division (Rangpur being used as the reference division just as in the previous sections). Conversely, individuals in the Sylhet division had significantly lower internet usage compared to those in Rangpur.

A consistent pattern is noticeable for internet usage, which was also seen for internet access and online skills. Younger individuals, those with higher education levels and income, and students tend to use the internet more. Males and unmarried individuals also tend to use the internet more than their counterparts.

Table 5.3.   OLS Regression: Determinants of Degree of Internet Usage

Variables	Internet usage (0–9)
Age category (=1 if age<=34 years and 0 otherwise)	0. 502*** (0.130)
Household size	0. 026 (0 .025)
Education category (Reference category: Not attending school)	
Below SSC/equivalent	0.044 (0. 244)
SSC/HSC/Equivalent	0.834*** (0.246)
Above HSC	1.684*** (0.274)
Income category (Reference category: <= BDT 10,000)	
10,001 to 20,000	0.116 (0.111)
20,001 to 30,000	0. 493*** (0.139)
>30,000	0. 793*** (0.168)
Occupational category (Reference category: Agriculture)	
Student	0.864*** (0.193)
Unemployed	0. 342* (0.198)
Non-agriculture	0.243 (0.168)
Unmarried (=1 if unmarried and 0 otherwise)	0. 391*** (0.129)
Gender (=1 if male and 0 otherwise)	0.920*** (0.128)
Division (Reference category: Rangpur)	
Barishal	0.086 (0.227)
Chattogram	0.313* (0.185)
Dhaka	0.134 (0.182)

Variables	Internet usage (0–9)
Khulna	0.452** (0.193)
Mymensingh	- 0.303 (0.233)
Rajshahi	0.331 (0.191)
Sylhet	-0.559** (0.245)
Online skills (=1 if individual with online skills and 0 otherwise)	1.421*** (0.093)
Intercept	-0.343 (0.353)
Observations	2,405
R-squared	0.305

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

5.5. Conclusion

This chapter aims to provide a better understanding of the two levels of the digital divide in rural areas of Bangladesh, drawing on the findings of the DLAP 2019 study. The first level pertains to internet access, and the second level involves online skills and internet usage. These factors contribute to evaluating the level of digital literacy in rural Bangladesh. The study reveals that age is a crucial predictor of digital literacy, with younger individuals having higher chances of internet access, better online skills, and usage. Younger individuals are more likely to be students and unmarried, contributing to better digital literacy among this demographic. However, even among students, higher educational attainment correlates with a higher probability of possessing advanced digital skills.

Another significant factor is household income, strongly associated with the digital divide. Higher-income individuals have higher chances of internet access, but this does not necessarily translate to better online skills. Only the highest income bracket shows a positive relationship with online skills. Therefore, individuals belonging t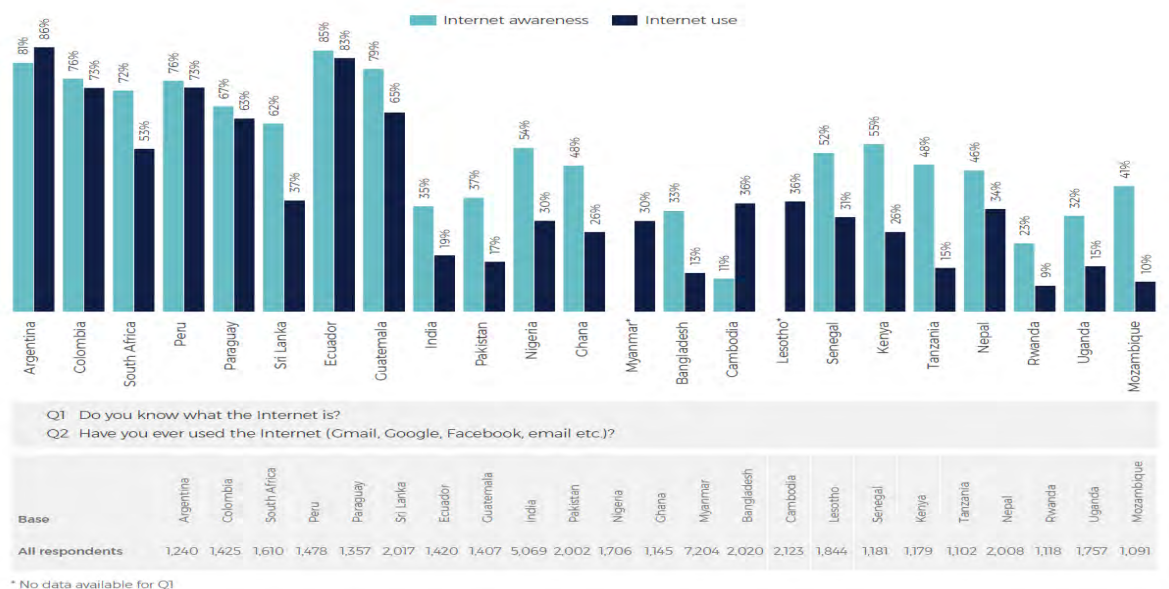o a considerably higher income bracket, such as those with a monthly income of BDT 30,000 or more, have a higher chance of possessing online skills.

Gender disparity is also a significant factor in internet access, usage, and online skills. Female individuals have a lower probability of having digital literacy compared to male individuals, as explained by the dynamics mentioned above. Location also plays a role, as the rural population of Chattogram and Dhaka has better internet access, but individuals in Barishal and Mymensingh perform better in terms of online skills. Hence, there are variations and nuances even between internet access and online skills. The results of this study highlight the need for further research, improved technology design, and policies to promote inclusive access to the digital platform for rural populations.
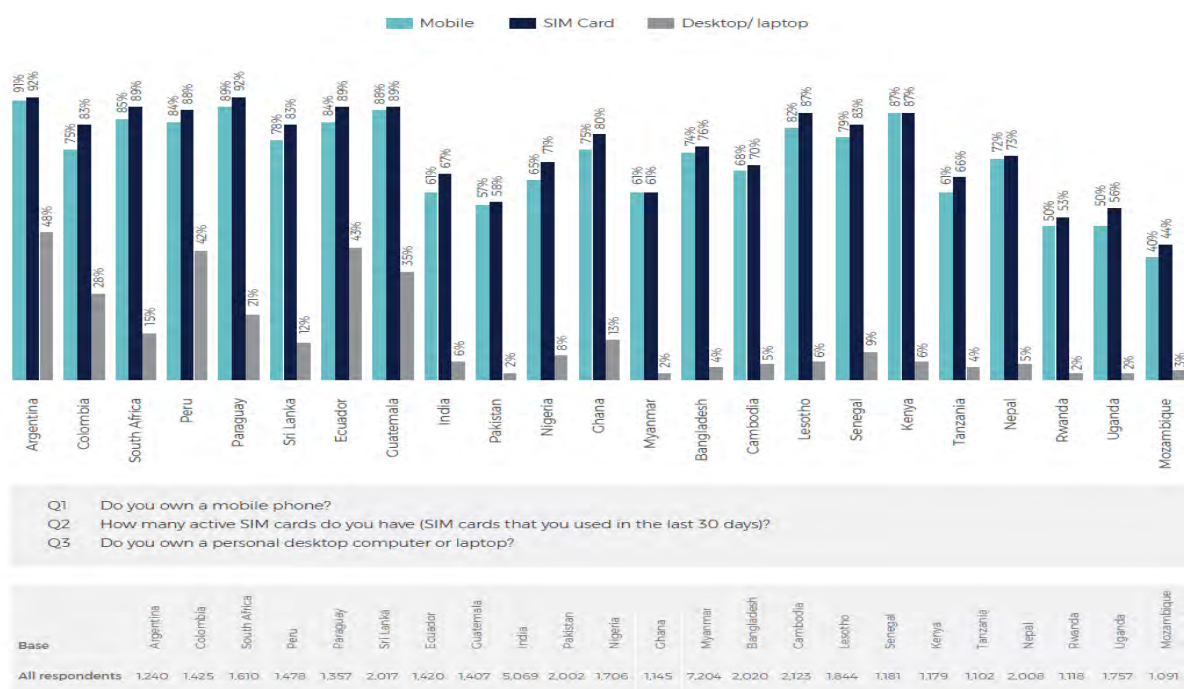
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Annexe

Q1 Do you know what the Internet is?
Q2 Have you ever used the Internet (Gmail, Google, Facebook, email etc.)?

Base	Argentina	Colombia	South Africa	Peru	Paraguay	Sri Lanka	Ecuador	Guatemala	India	Pakistan	Nigeria	Ghana	Myanmar	Bangladesh	Cambodia	Lesotho	Senegal	Kenya	Tanzania	Nepal	Rwanda	Uganda	Mozambique
All respondents	1,240	1,425	1,610	1,478	1,357	2,017	1,420	1,407	5,069	2,002	1,706	1,145	7,204	2,020	2,123	1,844	1,181	1,179	1,102	2,008	1,118	1,757	1,091

* No data available for Q1

Source: LIRNEasia (2018).

Figure A1.   Internet Awareness and Use Across the World (% of the Population Aged 15–65)

Q1   Do you own a mobile phone?
Q2   How many active SIM cards do you have (SIM cards that you used in the last 30 days)?
Q3   Do you own a personal desktop computer or laptop?

| Base	Argentina	Colombia	South Africa	Peru	Paraguay	Sri Lanka	Ecuador	Guatemala	India	Pakistan	Nigeria	Ghana	Myanmar	Bangladesh	Cambodia	Lesotho	Senegal	Kenya	Tanzania	Nepal	Rwanda	Uganda	Mozambique
All respondents	1,240	1,425	1,610	1,478	1,357	2,017	1,420	1,407	5,069	2,002	1,706	1,145	7,204	2,020	2,123	1,844	1,181	1,179	1,102	2,008	1,118	1,757	1,091

Source: LIRNEasia (2018).

Figure A2.   Mobile Phone, SIM Card and Desktop/Laptop Ownership Across the World (% of the Population Aged 15–65)
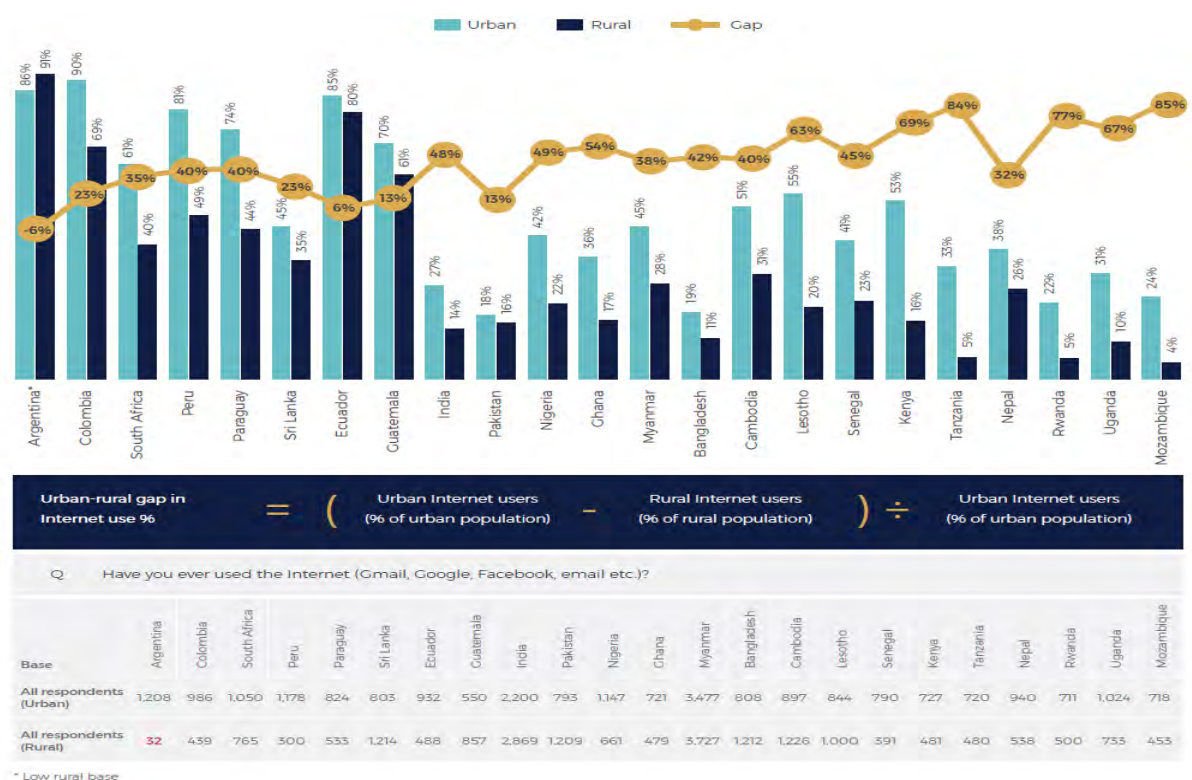
Source: LIRNEasia (2018).

Figure A3.   Urban-Rural Gap in Internet Use Across the World (% of the Population Aged 15–65)
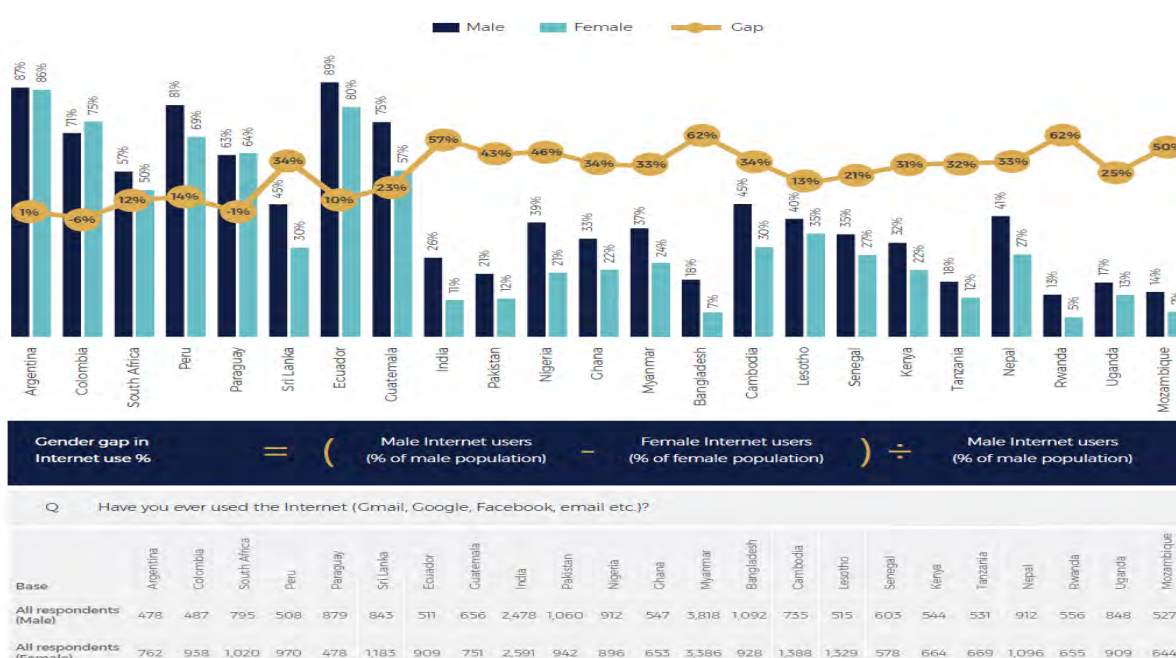
Source: LIRNEasia (2018).

Figure A4.   Gender Gap in Internet Use Across the World (% of the Population Aged 15–65)

Source: LIRNEasia (2018).

Figure A5. Gender Gaps in Mobile Phone Ownership Across the World
(% of the Population Aged 15–65)

Table A1. Binary Relationship of Background Characteristics With Internet Access, Online Skills, and Internet Usage

Background characteristics	(1) Internet access (access=1 & no access=0)	(2) Online skills (skilled=1 & not skilled=0)	(3) Internet usage (0–9)
Full sample	0.37	0.35	2.99
Age (in years)	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) = 0.000
Below 15	0.47***	0.39	2.61
15–24	0.65***	0.40***	3.52***
25–34	0.39*	0.34	2.67***
35–44	0.23***	0.25***	2.16***
45–54	0.10***	0.20***	1.44***
55–64	0.06***	0.25	1.75***
>=65	0.03***	0.00*	1.5*
Household size	Pr(X^2) = 0.000	Pr(X^2) = 0.400	Pr(X^2) = 0.394
1	0.09***	0.22	0.89***
2	0.21***	0.29	2.26***
3	0.35**	0.35	2.94
4	0.36	0.37	3.08
5	0.40**	0.38	3.06
6	0.45***	0.35	3.10
>=7	0.52***	0.32	3.04

Background characteristics	(1) Internet access (access=1 & no access=0)	(2) Online skills (skilled=1 & not skilled=0)	(3) Internet usage (0–9)
Education	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) = 0.000
Not passed any class	0.07***	0.13***	1.39***
Below SSC/equivalent	0.29***	0.22***	2.05***
SSC/HSC/equivalent	0.59***	0.42***	3.46***
Graduate/equivalent or higher	0.70***	0.56***	4.39***
Literacy	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) =0.000
Illiterate	0.09***	0.11***	1.32***
Literate	0.47***	0.37***	3.11***
Monthly household income (BDT)	Pr(X^2) = 0.000	Pr(X^2) = 0.153	Pr(X^2) =0.000
<=10,000	0.21***	0.34	2.75**
10,001–20,000	0.40***	0.35	2.85**
20,001–30,000	0.63***	0.33	3.22**
>30,000	0.74***	0.41**	3.66***
Occupation	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) = 0.000
Agriculture	0.17***	0.26***	2.20***
Student	0.70***	0.46***	3.99***
Unemployed	0.31***	0.28***	2.16***
Non-agriculture	0.35**	0.32**	2.78***
Marital status	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) = 0.000
Not married	0.68***	0.43***	3.74***
Married	0.27***	0.29***	2.30***
Widowed/divorced/separated	0.14***	0.26	2.31
Gender	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) = 0.000
Female	0.32***	0.30***	2.27***
Male	0.40***	0.38***	3.33***
Division	Pr(X^2) = 0.000	Pr(X^2) = 0.000	Pr(X^2) = 0.000
Rangpur	0.20***	0.41	3.28*
Barishal	0.31***	0.50***	3.08
Chattogram	0.55***	0.28***	2.94
Dhaka	0.44***	0.38	2.92
Khulna	0.40*	0.39*	3.36***
Mymensingh	0.27***	0.45**	2.55**
Rajshahi	0.37	0.32	3.20*
Sylhet	0.30***	0.14***	1.86***
n	6,500	2,405	2,405

***, **, * imply statistically significant at 1%, 5%, and 10% level, respectively.

Chapter Six

Gender Equality Through Digitalization
Women's Visibility in the E-Business Space

Iffat Jahan Antara, Pragyna Mahpara, Subaita Fairooz

6.1. Introduction

Despite the ongoing digital revolution, which has led to tremendous progress for many, a meaningful, quality digital experience remains elusive for a vast portion of the population, particularly impacting women and several marginalized, vulnerable communities. The substantial expansion in the number of internet users, unfortunately, has not translated into inclusive access to services. Instead, a digital divide in access and use has emerged, contributing to other disparities in society that have important gender and socioeconomic dimensions.

Yet, appropriately managed, digital development has the potential to become a decisive equalizing factor in the economic and social development of the country. It is in this context that this chapter examines the critical importance of equitable access to digitization as a significant determinant for equitable development. It emphasizes the influence of digitization and the delivery of e-services on gender equality and inclusive development while also considering the broader expansion of digital services, primarily focusing on the employment sector.

6.2. Digitization and the Digital Divide: The Global Scenario

The term "digital divide" is defined as the "gap between individuals, households, businesses, and geographic areas at different socio-economic levels," resulting from differences in "opportunities to access information and communication technologies and to their use for a variety of activities" (Organisation for Economic Co-operation and Development [OECD], 2001). It describes the inequality within the online community, whether between developed and developing countries, rich and poor, or men

and women (Norris, 2003). It is also a gap in the skillset to use technology and in its physical access. Developing the technical skills necessary for technology use depends on having access to it, but at the same time, without access to technology, it is not possible to develop these necessary skills, thus creating a dilemma where access and skill development are interlinked (Kularski & Moller, 2012).

Developed countries, such as the G20 nations, have achieved advanced levels of digitization, giving rise to the "mass adoption of connected digital technologies and applications by consumers, enterprises, and governments" (Sabbagh et al., 2012). This has translated into significant advantages for their economies, societies, and public sectors (Sabbagh et al., 2012). Notably, in developed countries, 87% of households have access to the internet and 82.3% have access to a computer, contrasting with 46.7% and 38.5%, respectively, in developing countries, and an even lower 11.8% and 9.5%, respectively, in the least developed countries (International Telecommunication Union [ITU], 2019).

The progress in technologies, while offering advantages, also poses challenges, potentially exacerbating existing gaps in access and use. Concerns arise as advancements in artificial intelligence (AI) and automation lead to job displacement, particularly in sectors where human labour is still essential. A legitimate concern is the potential bias in managerial decisions, favouring males over females based on preconceived notions about women's physical and intellectual abilities. The International Labour Organization (ILO) estimates that in the next two decades, the increasing demand for automation and information and communications technology (ICT) may jeopardize the employability of women, particularly those in jobs that require little to no science, technology, engineering, and mathematics (STEM) skills. Consequently, there is a risk that, within the next 20 years, around 180 million women will lose their jobs to automation. According to the Asian Development Bank (ADB, 2022), by 2030, 80% of jobs in Southeast Asia will require basic digital and applied literacy in ICT fields.

Many countries have initiated efforts to increase women's participation in the STEM sector. However, the outcome of this is expected to vary for several reasons, including sociocultural and psychological factors such as the patriarchal system, pedagogical and financial challenges, male dominance, and cultural myths and beliefs suggesting that science is complex and women are incapable of handling masculine activities. A lack of confidence, mainly shaped by their environment and insufficient family support, prevents female students from participating in STEM fields (Matete, 2022). Increased participation in STEM education has been shown not to guarantee a subsequent rise in the number of women pursuing careers in related sectors (Kasad, 2023). These are the main reasons why the digital revolution has bypassed many countries in the South-Asian region, some of which may also be overlooked by the Fourth Industrial Revolution. Limited participation and restricted access prevent them from actively contributing to this transformative era. This creates a vicious cycle wherein women's reduced access to ICT leads to fewer girls choosing STEM careers. While exceptions exist—such as Spain, which has achieved gender parity in internet penetration—globally, 62% of men use the internet compared to 57% of women, with the nature of usage also displaying variations (Radovanović, 2023). In African countries or the Arab States, the gender gap is even more pronounced.

6.3. Gender Gap in Digitization: The Bangladesh Context

6.3.1. Gap in the use of digital technology

Bangladesh has made commendable progress with regards to the United Nations Sustainable Development Goals (SDGs), with digitalization playing a pivotal role. The pursuit of a "Digital Bangladesh" has witnessed a substantial surge in tech involvement, exemplified by the number of mobile phone subscribers reaching 188.6 million in 2023 (Association of Mobile Telecom Operators of Bangladesh [AMTOB], n.d.). According to the Bangladesh Telecommunication Regulatory Commission's (BTRC) statistics, internet users have risen from 54.1 million in 2015 to 108.2 million in 2020 ('Internet users in Bangladesh double in the last five years', 2020). However, a digital divide persists between rural and urban populations. According to the Bangladesh Bureau of Statistics (BBS), of the increased internet users, only 37.1% are from urban populations (Zaman, 2023).

Digitization plays a vital role in promoting gender equality by offering new and unique avenues for the economic empowerment of women and expanding the scope of flexible work environments for all genders. It has the potential to increase women's access to education that is needed to upskill themselves, find jobs, or even start/own businesses, eventually paving the way to economic and financial independence. Despite these opportunities, a considerable gender gap in mobile internet usage exists in Bangladesh—the highest among ten low- and middle-income countries (LMICs) surveyed for the GSMA's Mobile Gender Gap Report 2022 (Delaporte et al., 2021). In 2020, this gap stood at 41% (Rakin-Uz-Zaman, 2022). Gender equality in digitalization is crucial because it ensures access to critical information and allows women and people of diverse sexual identities to play important roles in social,

economic, cultural, and environmental contexts.

The gender gap varies by class and location, with differences observed in the quality of access as well. Girls from middle and poorer socioeconomic groups have limited access to mobile phones and internet usage due to heavy parental restrictions, particularly in rural areas. Adolescents from higher socioeconomic classes tend to use the internet more because they have Wi-Fi at home and in most places they visit (Huq et al., 2021).

6.3.2. Women's work and IT

To appreciate the involvement and impact of digitalization on women in Bangladesh, it is imperative to understand the sociocultural and economic context of the country. Bangladesh ranks high in women's empowerment among South Asian countries, closely following the Philippines. According to the Global Gender Gap Index 2018, it ranked 48th out of 144 countries (Danish Trade Union Development Agency [DTDA], 2020). However, conservative gender norms significantly constrain women's labour force participation (ADB, 2017). Women's employment is predominantly concentrated in sectors with lower average incomes, such as education, health, social work, and hospitality. An Enterprise Survey from 2013 revealed that in Bangladesh, women were involved in ownership in only 13% of firms, compared to the South Asia average of 17%, and just 16% of full-time employees were women, slightly higher than the South Asia average of 13% (DTDA, 2020). Despite overall progress, certain sectors still lag in gender equality; the IT industry is one of them. One reason for the discrimination against women in the IT sector could be the misconception that it is inherently masculine due to its male-dominated nature.

Yet, companies with a more balanced gender composition not only gain a competitive edge but also tend to deliver slightly better returns (Montilla, 2020). Increased diversity in team leadership has proven to foster more innovation and better financial performance in both developing and developed economies. Involving women in the IT sector not only provides a better understanding of female-dominated markets but also often inspires the creation of websites, apps, or tech-support businesses tailored to the unique requirements of women. Ultimately, enhancing women's participation in the IT sector can help challenge the stereotype that technology is exclusively "man's work" (Ramos, 2021).

Women's participation in this industry has the potential to not only bolster the country's gross domestic product (GDP) but also enhance household spending, particularly in children's education, healthcare, and overall well-being. Unfortunately, while several studies have focused on the barriers women face in participating in IT and the digital space and suggested ways to increase their participation (Saifuddin et al., 2019; Tabassum, 2019; Yeganehfar et al., 2018), very few papers highlight the importance of women in this sector, as evident from the statistics. The absence of the female perspective in any sector holds several implications, not least in understanding their needs as consumers, including for IT products. In Bangladesh, the ICT sector comprises only 16% of women ('Of the ICT workforce, only 16% are women: Study', 2019), although by 2022, this number had increased to approximately 20% (M. Hasan, 2022), which compares to 25% worldwide (IDLC Monthly Business Review, 2022).

6.3.3. Online entrepreneurs

The ability of women to participate equally in all sectors of the economy, including the ICT industry, and their involvement as online entrepreneurs are essential pathways to women's empowerment.

Consistent trends in entrepreneurial motivations among both genders have been identified through surveys conducted in developing nations (Orhan & Scott, 2001). In 2020, the onset of the COVID-19 pandemic significantly impacted the job market, leading to widespread job losses, particularly among women. Women who owned businesses and shops also faced closures. However, amidst these challenges, there was a sudden rise in online businesses. Social media became a catalyst for women to start their businesses, requiring neither physical structures nor substantial investments. Indeed, while barriers to women starting businesses exist both online and offline, the internet removes certain constraints. Online businesses empower women, fostering a sense of autonomy and agency, thereby giving them a more equitable share of influence, decision-making authority, and control across social, economic, political, and personal spheres. The capacity to earn money to provide for the family plays a pivotal role in advancing this equality (Tabassum, 2019). Women's financial independence achieved through running their own businesses, without being accountable to any superiors, is also a great motivator for women in pursuing entrepreneurship.

Online entrepreneurs primarily operate on platforms such as Facebook (IDLC Monthly Business Review, 2022) but also on Instagram and even TikTok. These online platforms are easily accessible, as they do not require traditional educational qualifications or specialized skillsets necessary for other types of work. Moreover, online businesses are not very capital-intensive, allowing established brands to move their operations online while also facilitating the entry of new exclusively online businesses (Tabassum, 2019). Meta has reported that 70% of female-owned businesses were established through Facebook during the pandemic, while Instagram experienced an increase of over 65% in businesses owned by women. Since 2021, 40% of Facebook groups about entrepreneurship in

Bangladesh have been opened by women ('70% of female-led Facebook businesses in Bangladesh set up since pandemic: Meta', 2022).

In 2020, nearly 300,000 people in Bangladesh were reported to run online businesses, and about half of them were female-owned (Deutsche Welle, 2020). Many women turned to these online platforms to support their families following widespread job cuts during the pandemic. These businesses provide female-oriented services, such as home-cooked meals, sewing, and selling jewellery and clothes (Deutsche Welle, 2020). Thus, women can transform their existing skills into profitable businesses thanks to their access to the internet. It is also argued that women have a more diverse social media presence and are more socially active than men (Tufekci, 2008), which helps them reach a bigger audience and offer a wide range of products and services. It is clear from this that the IT industry and the internet are essential platforms for women to gain greater financial independence through direct employment or starting their own businesses and brands. Therefore, exclusion from this sector can deprive women of a real opportunity to be empowered.

6.3.4. Women with disabilities and online entrepreneurship

Among adult women with disabilities in Bangladesh, only 12.8% are employed against 47.6% for men (Bangladesh Bureau of Statistics, 2022). Efforts must be directed towards increasing this number to reduce discrimination, recognizing that aside from a few severely debilitating disabilities, the majority present no insurmountable barriers to active and meaningful societal participation. Unfortunately, businesses often perceive disabled women as liabilities and refuse to hire them. Initiatives such as those by Aspire to Innovate (a2i) and Access Bangladesh Foundation stand out, where the organizations have worked to enhance the capacities of

disabled female entrepreneurs, aiming to increase their engagement and participation in e-commerce ('Workshop held on capacity development of disabled women entrepreneurs'. 2021). Encouraging disabled women to start and manage their businesses through social media platforms can contribute to mitigating the discrimination and harassment they might face otherwise. This is a step towards their financial independence, increased participation in family life, and reduced risk of facing violence, as they do not necessarily need to venture into public spaces.

Content creators and social media influencers: Facebook, Instagram, YouTube, and TikTok provide an important space for content creators, commonly known as "social media influencers". While there is no available data on the ratio of male to female influencers in Bangladesh, women have begun to make their mark in this digital space, with varied types of content—ranging from food and makeup reviews to tutorials and lifestyle videos—watched by millions daily. This new trend has given rise to "influencer marketing," where influencers promote products or services to their follower base, thus saving brands considerable advertising costs. Instead of buying advertisement space on television or in newspapers, businesses collaborate with influencers to market their products or services and compensate them accordingly. Influencer marketing is now used by all kinds of brands, regardless of whether they sell women's products or women's services. Even businesses that traditionally operated offline have begun to use influencer marketing, a trend that peaked during the pandemic when people's movements were restricted. Female influencers have carved a niche for themselves, with many achieving high levels of success in this endeavour.

6.4. Constraints in Women's Involvement in the Digital Revolution

6.4.1. Lack of education and technical skills

The progress in women's employment in the ICT sector has been rather slow, and significant challenges persist. According to Plan International (2022), only 11% of tech start-ups have female chief executive officers (CEOs)—a concerning statistic given the global shift towards digitization and the proliferation of numerous tech start-ups. Female-owned businesses constitute merely 4.5% of all businesses, ranking Bangladesh ahead of only Egypt and Saudi Arabia (Mastercard, 2022). With just 19% of women in Bangladesh using the internet (Rakin-Uz-Zaman & Islam, 2022), many lack the structural support to start a business, as well as the educational qualifications and technical skills to work in IT. Women are also 30% to 50% less likely than men to participate in income-generating activities (IGAs) through the internet (Dabla-Norrish & Kochhar, 2019). Without adequate measures, it will be difficult to reverse the current situation.

For disabled women, options for freelancing in the ICT sector and their ability to run online businesses are particularly limited. This issue is crucial, given that employment opportunities for disabled women are paramount. When looking at the statistics, the scenario is not only grim but also disappointing.

6.4.2. Normative constraints

The Bangladesh Constitution (1972) proclaims equal status for all citizens, including women (Article 27), and prohibits discrimination based on "religion, race case, sex or place of birth" (Article 28, Section 1). However, societal expectations dictate that women carry out household chores or choose professions that are considered feminine and do not put them at risk of sexual harassment or harm their honour, such as teaching. Choosing the role of caregiver or work in a sector that seems less risky is a legitimate personal choice. However, concerns arise when such choices are imposed upon women by patriarchal figures or influenced by a patriarchal society, including by female members who consciously or subconsciously internalize patriarchal ideologies. Women need to have the agency to make choices for themselves, enabling them to take advantage of all work opportunities that exist, irrespective of gender-related limitations.

"Access, ownership and use of digital tools are not gender-neutral" (Egger, 2021). Rigid and discriminatory gender norms and roles make it extremely difficult for Bangladeshi women to participate effectively in the IT industry and the digital space. Marrying girls off at a young age means they cannot study or start their ventures. More than 50% of Bangladeshi women currently in their mid-20s were married off before they turned 18, and almost 18% were below the age of 15 (UNICEF, 2020). Women face obstacles in accessing and utilizing modern technology and services, with the difficulties further exacerbated in Bangladesh for several reasons. Parents may impose stricter controls on their daughters' use of mobile phones and the internet (ITU, 2019). There can also be preferential bias towards boys in households with limited access to digital tools or resources (UNESCO, 2020). Moreover, limited exposure to female role models in STEM programs hinders confidence and interest in these fields for many girls and women, discouraging them from pursuing STEM careers (UNICEF, 2020).

While entry into the e-commerce industry may appear simple and easy, there are hurdles female entrepreneurs have to face in both entering and sustaining their businesses. Bangladesh's highly patriarchal society struggles to recognize that women can be successful business owners, exhibiting discomfort with female heads or line managers and often looking down upon independent women. Men tend to dominate women in both public and private spheres (Chowdhury, 2009). Many in society and the online community cast doubts about a woman's character and her ability to run a business. Women in Bangladesh also often feel unsafe travelling alone (Islam, 2020), facing the risks of sexual harassment or physical assault; this can be a problem, particularly when it comes to procuring merchandise for their businesses. They can also find it difficult to garner the same level of respect from other businesses or individuals facilitating their business operations, such as delivery personnel responsible for delivering their products (Islam, 2020).

Establishing an online presence requires access to digital tools such as computers, mobile phones, and the internet. Yet, the lack of affordability of mobile phones is cited as the second most common barrier to internet usage (Delaporte et al., 2021). Women entrepreneurs also struggle to secure bank loans or funding for their businesses compared to their male counterparts (Islam, 2020). Additionally, they receive less digital training than men (OECD, 2018). As a result of these barriers, women-owned businesses usually remain small and unable to scale up.

Religion is sometimes used to legitimize and reinforce limitations placed on women (Chowdhury, 2009; Saifuddin et al., 2019). It is also employed as an excuse to harass female online content creators, with little to no policing done to protect women. Although cybercrime laws in Bangladesh are being reformed and have

provided relief to some women, their enforcement is primarily limited to serious crimes such as the dissemination of illicit images or threats to their lives. Nothing protects women from derogatory comments and being objectified or sexualized on the internet. The backlash women sometimes face in the digital space often demotivates them from using these platforms.

6.4.3. Violence in online spaces

Cybercrime and violence in online spaces are prevalent in Bangladesh. While anyone can face some form of harassment and violence, women and people of diverse gender identities and sexual orientations are specifically targeted. According to a study conducted by the Bangladesh Legal Aid Services Trust (BLAST) and BRAC James P Grant School of Public Health (JPGSPH), 73% of women internet users have reported cybercrimes (Zaman et al., 2017). The COVID-19 pandemic created a critical juncture in the use of the digital space. When the lockdown measures necessitated the transition of education, work, and everyday communication to the online sphere, the digital space and social media became an integral part of people's lives. However, as reliance on the digital space deepened, so did the prevalence of digital violence. A 2021 study by Action Aid found that one in every two women faced more online violence compared to pre-pandemic times ('63.51% women in Bangladesh face online violence: Study.', 2022, November 27). Most reported facing violence on Facebook and Messenger. In November 2020, the Bangladesh Police established a cyber support unit for women to address cybercrime and online violence. Within a year of its establishment, it had received 17,280 allegations of cyber harassment from women and 15 to 20 complaints of sexual harassment each day, most of which took place in cyberspace ('84% of women facing sexual harassment', 2021, May 1).

BIGD's 2021–22 study on online violence against women identified some common forms of violence, including sexually explicit hate comments, name-calling, labelling women celebrities/influencers (content creators) as characterless or shameless or worse, religious and moral policing, mocking and trivializing with the use of demeaning "haha reactions," delegitimizing posts advocating for women's rights, and threatening rape or posting digitally fabricated explicit photographs (Mahpara et al., 2022).

Other studies also found that common forms of online violence against women were threats to publish private photographs on social media, posting sexist or misogynist comments, unsolicited sharing of sexually explicit images, stealing someone's photo and merging them with pornographic content, and making unwanted sexual propositions (Ara, 2020). These forms of violence are the result of pre-existing social and physiological gender stereotypes, inadequate legal protection (Akter, 2018), and a lack of awareness and knowledge about the safe and respectful use of the internet. Women mostly refrain from taking legal action due to fear of social stigma (M. K. Hasan, 2016). Society's reaction to online harassment mirrors that of sexual harassment, leading to victim-blaming and discouraging women from reporting any violence (Choudhury, 2012).

These pervasive forms of violence cause immense psychological trauma. The violence often demotivates women and girls to continue their presence in cyberspace or prevents them from entering the digital space altogether (Mahpara et al., 2022). It poses a threat to women entrepreneurs and content creators, creating a barrier to their economic independence. It also affects Hijras and other gender-diverse people who want to enter the digital space, especially social media platforms such as Facebook,

depriving them of greater life opportunities. Unfortunately, there are no available statistics regarding the number of online entrepreneurs forced to leave the online space due to harassment.

6.5. Recommendations

Based on the analysis above, a number of recommendations can be made towards redressing the gender imbalance in the digital sphere:

6.5.1. Ensure digital inclusivity

A comprehensive understanding of digital inclusivity is essential, particularly in addressing barriers specific to marginalized groups, such as people with disabilities and those with diverse sexual identities. Women with disabilities face notably low rates of self-employment and are often perceived as burdens by their families. Similarly, people with diverse sexual identities, like the transgender community, encounter difficulties exacerbated by the COVID-19 pandemic. Enabling them to start online businesses or freelance in the ICT sector for income generation calls for initiatives from government and non-governmental organizations (NGOs) in the form of targeted training programs, including those offered on the National Skill Portal.

6.5.2. Address online gender-based violence

While the COVID-19 pandemic has contributed to increased internet and social media usage, research on online gender-based violence (GBV) is still in its infancy. A pressing need exists for deeper insights into the online harassment and abuse people face, along with the responses they receive. Known solutions to the problem of online harassment are limited. In Bangladesh, social media platforms such as Facebook lack the ability to detect harassment as the language is not

recognized. Law enforcement agencies maintain a cybercrime page but offer limited practical solutions beyond advising self-censorship, expressing uncertainty about how to handle this form of violence. GBV in online spaces needs to be better understood through adequate research and an appropriate legal framework. Bridging this significant gap requires training service providers and raising awareness about online GBV.

6.5.3. Guarantee accessibility and availability of e-services through partnerships

Oftentimes, people are unaware of the availability of government's e-services dedicated to addressing gender issues. Addressing this challenge requires efforts, including initiatives by a2i, and partnerships with relevant ministries, such as the Ministry of Women and Children Affairs, Ministry of Education, Ministry of Health and Family Welfare, and Ministry of Law, Justice and Parliamentary Affairs. These partnerships can encourage investments for greater outreach, quality, and accessibility of services. Collaborations with local government, community actors, NGOs, the private sector, civil society, research organizations, and service delivery institutions should also be fostered to bridge existing knowledge gaps and promote exchanges.

6.5.4. Strengthen monitoring of e-services

Developing monitoring mechanisms for e-services is crucial to ensure their accessibility and quality. While government agencies and NGOs encouraged access to online information and services during the COVID-19 pandemic, the need to monitor and track online traffic became apparent. This data is not only essential during crises such as the pandemic but also for expanding online access to diverse and more vulnerable groups, reducing costs and corruption, and ensuring confidentiality (Huq et al., 2021).

6.5.5. Update data and make it publicly available

One of the major barriers to understanding the gendered effects of digitization is the lack of publicly accessible data in general and sex-disaggregated data in particular. Government institutions collect data on education, labour force, health services, and legal matters such as violence against women (VAW). However, this data remains inaccessible to the public. It is crucial to enhance the capacity of government agencies to collect up-to-date and accurate data, notably to minimize discrepancies between official data and data produced by other sources (NGOs, research institutes, media, etc.). This requires present systems of data collection, recording, submission, and compilation to be reviewed, streamlined, and digitized so that data is collected and compiled in a timely manner. An open data source must be established and utilized by various stakeholders (NGOs, individuals, researchers, policymakers, etc.) to make these systems functional. Making National Human Rights Commission (NHRC) complaints or data from cyber tribunals publicly available would be greatly beneficial; however, several institutional capacity challenges at the national level need to be resolved for successful implementation.

6.6. Conclusion

Technology is a catalyst for progress. Yet without gender equality and inclusivity in the digital space, women, including disabled women, girls, and people from diverse sexual identities, risk being left behind and unable to avail the advantages that accompany the ongoing technological revolution. With Bangladesh's commitment to the SDGs, eliminating this "gender divide" is a step towards allowing women and marginalized communities to become critical actors in the social, technological, and cultural spheres and integrate them into the digital revolution. Thus, these groups need to be

empowered through training in e-commerce and other forms of IT so they can become freelancers. Providing loans can also support and help them to start a business.

Normative constraints, coupled with socioeconomic factors, dominate women's lives, including their education and work. Furthermore, as data emerges on the representation of disabled individuals in the workforce, the need for the government and other organizations to improve access to education for this group through online education platforms becomes evident.

The internet, breaking down physical barriers and providing safety through anonymity in business operations, is a potent tool for women to achieve financial independence. It facilitates entrepreneurship, as running an online business does not require specialized training or large amounts of investment. Moreover, freelancing allows women to earn income while staying at home and taking care of their families. However, online harassment is commonplace for women and people with diverse sexual identities, and a legal framework to protect them is urgently needed. Social media platforms such as Facebook and Instagram also need to develop mechanisms to detect harassment and ban groups responsible for such behaviour.

While considerable progress has been achieved in recent years through government initiatives regarding female online entrepreneurship, significant challenges remain in closing the "gender divide" in the digital space. Addressing these challenges will require comprehensive policy reforms and concerted actions at the community and individual levels.

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Chapter Seven

Digitalized Distance Education in COVID-19
Adolescent Experiences in Urban Bangladesh and Jordan

Silvia Guglielmi, Erin Oakley, Farhana Alam, Maheen Sultan, Sarah Alheiwidi, Sarah Baird, Nicola Jones, Betsy Kaeberle, Sabina Faiz Rashid, and Jennifer Seager

7.1. Introduction

The COVID-19 pandemic triggered an unparalleled educational disruption, unfolding with unprecedented speed and scale. At its peak in April 2020, over 1.6 billion learners across more than 190 countries faced the impact of school closures, implemented alongside other measures to curb the spread of the disease (United Nations [UN], 2020). On average, countries grappled with 20 weeks of full school closures, though the duration varied significantly. Bangladesh, for instance, witnessed one of the lengthiest periods of full closures, with educational institutions shut for 18 months (Giannini et al., 2022). A growing body of evidence from the ongoing pandemic and past emergencies reveals that school closures result in catastrophic ripple effects within and beyond education. These include increases in drop-out rates, learning loss, a decline in the quality of teaching and learning, heightened rates of social isolation and mental illness, and increased inequality within and between countries (Baird et al., 2020a; Banati et al., 2020; Jones et al., 2021; Jordan et al., 2020; UNESCO et al., 2020).

To mitigate these effects, governments and educational stakeholders mobilized to provide distance education to learners, operating on the premise that it would serve as a viable substitute for in-person schooling and maintain a degree of learning continuity (Ashlee et al., 2020; Dreesen et al., 2020; Hallgarten et al., 2020; Todd et al., 2020; UNESCO, 2016). Notwithstanding commendable efforts, however, the transition to distance learning often exacerbated disparities among learners, further marginalizing certain groups. Globally, approximately 500 million students, spanning early years through upper secondary school, lacked access to distance education—a reality that disproportionately affected the poorest learners in the most impoverished communities (Muñoz-Najar et al., 2022; UNESCO, 2021c; World Bank, 2022). Adolescent learners (aged 10–19) in low- and middle-income countries (LMICs) suffered—and

continue to suffer—the most severe and long-term negative outcomes from school closures. Not only have schools been closed for extended periods, but distance learning approaches have been of poorer quality in LMICs compared to high-income countries (HICs), including less monitoring of student progress, reduced personalized learning, limited teacher support, restricted access to technology, and diminished parental support (UNESCO et al., 2020). Within countries, disparities are equally evident, with the poorest learners facing challenges in accessing remote learning, relying less on parental support, and being more at risk of permanently dropping out of school (Bandiera et al., 2021; Global Education Evidence Advisory Panel, 2022; Wolf et al., 2021). Adolescent girls and those from poorer households, in particular, remained acutely marginalized in some contexts, especially with digitalized remote learning (Baird et al., 2021b; Crompton et al., 2021; Holzer et al., 2021; Jones et al., 2021).

This chapter draws on survey data from almost 2,000 adolescents and in-depth qualitative interviews involving more than 90 adolescent girls and boys, along with key informants in Bangladesh and Jordan. The research was conducted between April 2020 and March 2021, and the participants are part of the Gender and Adolescence: Global Evidence (GAGE) longitudinal study sample. We explore how distance learning during the COVID-19 school closures affected adolescent learners aged 10–19 in two LMIC contexts. Specifically, we investigate the extent of distance education uptake in urban contexts in Bangladesh and Jordan, and the role that gender, age, and household wealth play in shaping adolescents' access to it. We focus on adolescence as a crucial period between childhood and adulthood, marked by development, discovery, and growth across emotional, cognitive, and physical domains (GAGE Consortium, 2019). This growth

is influenced, in part, by education and the wide range of benefits it can bring (Burzynska & Contreras, 2020; Lloyd, 2009; Springer & Miller-Grandvaux, 2022; UNESCO, 2021a). These benefits, however, hinge on adolescents being (and staying) in school. During school closures, therefore, it becomes vital for parents/caregivers and children to understand the potential advantages of new, increasingly digitalized distance education modalities. Equally important is the understanding of its limitations to better prepare for prolonged periods of school closures during subsequent crises. Our mixed-methods data reveals that distance education has posed a range of challenges during the pandemic, highlighting digital divides in terms of gender, age, geography, and household wealth—all of which have shaped adolescents' access to education. Overall, the uptake of distance education appears to depend on teacher-student contact, in any form, rather than the implementation of internet portals, which remain inaccessible for many learners and rely on digital skills that many adolescents do not possess.

The chapter is structured as follows: We provide a snapshot of the literature on distance education, along with an overview of the educational measures implemented in Bangladesh and Jordan to mitigate the effects of COVID-related school closures. We then describe the research methodology, blending quantitative and qualitative data within an existing longitudinal sample. Subsequently, we present our findings and conclude by reflecting on their implications for inclusive digitalized distance education in LMICs in the future.

7.2. Literature Review

In recent decades, distance education has evolved into an accepted and indispensable component of global education systems. Distance education approaches—defined by spatial and/or temporal separation between the learner and the classroom space, and the use of media (including print, radio, television, mobile, online, and digital modalities) to mediate the learning process (UNESCO, 2020)—have gained traction for several reasons. Firstly, distance education aligns with the growing need for continual skills upgrading, including the ability to absorb content through digital means. Secondly, it can accommodate a greater diversity of student realities, recognizing that not all children can attend school during typical hours. Thirdly, educational disruptions, school closures, and emergencies, particularly the COVID-19 pandemic, have driven the expansion of distance education in this field.

Distance learning is typically categorized into three main types: no-tech, low-tech, and high-tech methods, which we will now explore in more detail. Dual or three-pronged approaches can also be used, blending a range of technologies and modalities (Muñoz-Najar et al., 2022).

7.2.1. No-Tech Approaches

No-tech methods comprise print and paper-based solutions, remaining a foundational approach for delivering low-budget remote learning to students. For learners who lack access to either the hardware, charging capacities, network connections, or technical literacy required for low- and high-tech interventions, paper-based materials can serve as either the primary resource or can be used alongside television (TV), radio, mobile phone, and other digital interventions where there is some access (UNICEF & Overseas Development Institute [ODI], 2020).

No-tech approaches require a degree of self-learning, which is typically supported by caregivers and siblings. Although many students may be first-generation learners, caregiver and sibling support is not only useful for content knowledge but also to motivate and encourage learners to adhere to a study timetable (UNICEF Regional Office for South Asia, 2020). While both stand-alone and blended no-tech approaches are useful in contexts with limited technological infrastructure, they are more successful when they include teacher presence. Interaction between teachers and learners is essential, whether through the submission, grading, and return of written assignments or by coupling paper-based learning with low-tech follow-up—via phone calls or texts (Coflan et al., 2020; McAleavy & Gorgen, 2020).

7.2.2. Low-Tech Approaches

Low-tech methods rely on some form of technology, most commonly radio, TV, or basic mobile phone technology to mediate learning. Evidence suggests that educational radio and TV programming can improve student learning outcomes in foundational subjects, including literacy, mathematics, and social studies, in low-income contexts when used to supplement formal classroom-based teaching or to target out-of-school children, conflict-affected children, and highly marginalized learners (Burns, 2020; Ho & Thukral, 2009; McBurnie, 2020; Morris & Farrell, 2020; Watson & McIntyre, 2020). Evidence from COVID-19, however, highlights the shortcomings of radio or TV educational programming, primarily due to the inability to monitor attendance, gauge student progress, or facilitate the two-way communication between teachers and learners that is so critical to the learning process (UNESCO, 2021c).

Basic mobile phone education programming has recently gained traction, given the widespread access to mobile phones in most households. The affordability of mobile phones, coupled with their increasing penetration into rural and conflict-affected areas—with nearly every person in the world living within reach of a mobile signal (International Telecommunication Union [ITU], 2018)—has made distance education more attractive everywhere (Carlson & JBD International, 2013). Basic mobile technology can enable the necessary two-way interaction critical for teaching and learning and can mitigate feelings of learner isolation during prolonged school closures (Hallgarten et al., 2020; Mundy & Hares, 2020). Leveraging existing SMS or phone call tutoring services can also promote learner continuity during emergencies and make high-tech environments adaptable to basic mobile technology (Angrist et al., 2021; Hassan et al., 2021). It is important to note, however, the constraints and opportunities related to access and equity of mobile phone use, which must be considered during program design. For example, girls are much less likely to have access to a mobile phone due to conservative social norms (Brossard et al., 2020; Jordan & Mitchell, 2020).

7.2.3. High-Tech Approaches

Internet-based, high-tech distance education approaches—including web portals, mobile apps, podcasts, and virtual conferencing portals accessed via computers, tablets, and smartphones—can most closely simulate an in-person classroom experience, allowing for student-teacher interaction and multi-modal content delivery that is student-centred and customized to learner needs (Dhawan, 2020). While these approaches can mitigate learning loss, equity and access to infrastructure remain significant hurdles (UNICEF Regional Office for South Asia, 2020). High-tech modalities have, in fact, created the remote learning paradox:

many governments prioritized online modalities during COVID-19 school closures, but most students lack the technology required to access such modalities (Aedo et al., 2020; Jones et al., 2021). Globally, 60% of national distance learning plans during COVID-19 relied on online platforms, while 47% of students were unable to access the internet (67% in South Asia and 81% in sub-Saharan Africa) (Aedo et al., 2020). In Jordan, while general internet usage is at 65%, use is plagued by slow and intermittent connection (Abdullah & Taddese, 2020). Further disaggregating statistics reveal even more profound digital divides: more men use the internet than women in about two-thirds of all countries, and rural households lag well behind. In Ethiopia, for example, four out of five rural children have never used the internet (GSMA, 2020; Morris & Farrell, 2020; Mundy & Hares, 2020). Notwithstanding increasing smartphone proliferation, high-tech distance learning continues to exclude large groups of already disadvantaged learners. Unless planned interventions address these access and equity challenges, high-tech learning will not be scalable in LMICs (UNICEF, 2022).

7.2.4. Bangladesh and Jordan: Educational Overview and Distance Learning Programming During COVID-19

In this analysis, we compare adolescent samples in two urban contexts: Dhaka, Bangladesh, and Amman, Irbid, Jerash, and Mafraq governorates in Jordan. These settings have been selected to examine how gender, age, and wealth impacted the uptake of digitalized education during COVID-19 in diverse geographies. We compare the strategies used and challenges faced by students to engage in learning during school closures in two middle-income countries— one upper-middle-income country with higher pre-pandemic connectivity (Jordan) and one lower-middle-income country with considerably

lower pre-pandemic connectivity (Bangladesh). As both locations have ongoing longitudinal GAGE research, the authors were well-placed to investigate these themes.

7.2.5. Bangladesh

Bangladesh has made notable progress in educational indicators over the past 30 years. In primary and secondary schools, net enrolment rates for girls and boys have increased and are closer to gender parity, student-teacher ratios have decreased, curriculum reform is underway, and increased opportunities for (and uptake of) professional development have begun to enhance teaching strategies (Kaye et al., 2020; Trines, 2019). The country's formal secondary education system is divided into three stages: lower secondary (grades 6–8, with adolescents typically aged 11–13); secondary (grades 9–10, with adolescents typically aged 14–15); and higher secondary (grades 11–12, with adolescents typically aged 16–17).

Despite these improvements, various factors, including poverty, age, and gender, hinder the progress of many learners. Socioeconomic background is a predictor of cycle completion, and across lower and higher secondary schools, the poorest students consistently have lower-than-average completion rates (Bangladesh Bureau of Statistics [BBS] & UNICEF Bangladesh, 2020). Age also impacts progression across school cycles: 83% of children (on average) complete primary school, 65% complete lower secondary school, and 29% complete higher secondary school. Among those completing higher secondary education, 50% are in the richest wealth quintile, and only 12% are in the poorest (ibid.). While girls have higher completion rates at the primary and lower secondary school levels, there is a notable deterioration in their completion rates in higher secondary school. Harmful gender norms and the risk of violence restrict their ability to attend school, perpetuating

gender inequality in educational access and attainment (BBS & UNICEF Bangladesh, 2020; Trines, 2019).

Against this backdrop, our research contributes to the evidence on the effects of COVID-19 on educational inequalities in Bangladesh (Amin et al., 2021; Baird et al., 2021b; Rahman & Sharma, 2021). Bangladesh's 37 million students did not have in-person schooling from March 2020 to September 2021, one of the longest periods of school closures globally, with schools closing again in February 2022 (UNICEF, 2022). The Government of Bangladesh quickly mobilized to provide distance learning options via a range of modalities, primarily TV, mobile phones, and internet platforms (Ministry of Primary and Mass Education & Ministry of Education, 2020). The state-run Shangshad Bangladesh Television was the first such initiative to be rolled out, broadcasting learning content in late March 2020 for secondary students and in April 2020 for primary learners (ibid.). However, reaching secondary students via distance education proved challenging due to a variety of infrastructure and other constraints. While approximately 56% of households in Bangladesh have access to a TV, less than 1% can access a radio, 5.6% have access to a computer, and only 37% have access to the internet (ibid.). Despite near-universal access to basic mobile phones at a staggering 95%, devices are often shared within the household, and learning content delivered via mobile phones may not necessarily reach all students. The government's education COVID-19 Response and Recovery Plan has, in fact, acknowledged that a significant proportion of students will be left behind in distance education efforts.

7.2.6. Jordan

The national education system in Jordan is well-developed. Formal education is divided into three stages: childhood education (kindergarten); basic

education (grades 1–6 and 7–10, with students typically aged 6–15); and secondary education (grades 11–12, with adolescents typically aged 16–17).

Jordan has achieved near-universal basic education for Jordanian boys and girls, performing well for both expected years of schooling (13.4 years for females and 12.9 years for males) and mean years of schooling (9.7 for females and 10.7 for males) (Ministry of Education, 2018). However, for Syrian refugees in Jordan, enrolment rates are significantly lower, with an estimated gross enrolment rate of 9%, 37%, and 15% for childhood, basic, and secondary education, respectively (Abdullah & Taddese, 2020; Ministry of Education, 2018). Thanks to more recent efforts, however, enrolment of refugee children has increased, now standing close to 58% at the basic level. This improvement is partly attributed to the double-shift system designed to accommodate the large number of refugee students, doubling the capacity for student intake. Although this has benefited refugee students, evidence suggests it has increased pressure on school infrastructure, decreased the number of hours of instruction for children in those schools, and led to a decline in the quality of education (Ministry of Education, 2018).

After identifying its first COVID-19 case in early March 2020, Jordan enacted one of the world's strictest lockdowns, resulting in severe economic repercussions. A World Bank/UNHCR study in December 2020 found that poverty increased by 38% among Jordanians and by 18% among Syrian refugees who were already highly disadvantaged and living below the poverty line prior to the pandemic (Joint Data Center on Forced Displacement et al., 2020). Jordan closed its schools in mid-March 2020, and although they partially reopened in September 2020, they were forced to close again following an increase in cases (Al-Khalidi, 2021a; Al-Khalidi, 2021b). In

response, the Ministry of Education, the Ministry of Digital Economy and Entrepreneurship, and private partners developed several remote education options (Blom et al., 2020). Among these were "Darsak," an official online platform for learners in grades 1–12 that was also hosted on dedicated TV channels, and another repurposed TV channel specifically for students preparing for examinations (Audah et al., 2020). A UNICEF assessment conducted in mid-2020 found that about 25% of households surveyed had children who were not accessing Darsak, mostly due to technology-related barriers (such as no data or no device) (Abbas et al., 2020). While platforms such as Microsoft Teams and classroom portals such as NoorSpace were promoted to facilitate student-teacher interaction, many teachers and students did not have the skills or technology to use these platforms, and (similar to Bangladesh) sharing of devices within the household was a barrier (Abdullah & Taddese, 2020).

7.3. Methods

We draw on two rounds of longitudinal, mixed-methods data collected as part of the GAGE program, which explores the lives of adolescents in LMICs (Baird et al., 2021b).

7.3.1. Quantitative Methods

The survey data we use consists of a panel cohort of adolescents in Dhaka, Bangladesh, and adolescents living among host communities in Jordan. In Dhaka, baseline participants first recruited during late 2017 and early 2018 constitute a random sample of adolescents living in three urban slum communities. In Jordan, although the baseline sample initially recruited from October 2018 to March 2019 consisted of adolescents from both refugee camps and host community settings, our analysis focuses on a subset of Syrian and Jordanian adolescents residing in host communities in Amman, Irbid,

Jerash, and Mafraq governorates (excluding those in refugee camps or informal tent settlements) at COVID-R2. Both samples also include purposeful sampling of adolescents with disabilities and girls who experienced early marriage.[46]

During the COVID-19 pandemic, the GAGE study collected data through two rounds of a quantitative phone survey in Jordan and Dhaka. The first round, COVID-R1, was conducted between May and July 2020 in both settings. The second round, COVID-R2, took place 6 to 10 months later, between November 2020 and January 2021 in Jordan, and between March and April 2021 in Dhaka. Aged 10–18 years at baseline, the adolescents were 12–22 years old in Bangladesh and 11–20 years old in Jordan by the time of COVID-R2. The survey instrument focused on adolescent experiences during the pandemic at each point in time, collecting information on topics such as education, health and nutrition, mental health, mobility and socialization, paid work, and overall community impacts of the pandemic (Baird et al., 2020a; Baird et al., 2020b; Seager et al., 2021). When possible, we also interviewed adolescents' adult female caregivers to gather more information about the impact of the pandemic on household economics and well-being.

The sample for the COVID-19 phone surveys comprises a convenience sample of vulnerable adolescents with phone access. The sample used in the present analysis consists of those adolescents who were interviewed at both COVID-R1 and COVID-R2 (n=1,497 in Jordan and n=442 in Bangladesh). In Jordan, the sample constitutes 62% of the original sample of Jordanian and Syrian adolescents living in host communities, with higher attrition among Jordanian adolescents and older adolescents (aged 15 and older). In Dhaka, the sample comprises 57% of the baseline sample,

with slightly higher attrition among younger adolescents (aged 14 and younger) and those not enrolled in formal school at baseline.

Table 7.1 presents the demographics of the quantitative sample. Adolescents were, on average, slightly younger in Jordan (15.4 years) than in Bangladesh (16.3 years). Furthermore, in Jordan, 73% of the sample was enrolled in formal school immediately before the pandemic in March 2020, while the corresponding share in Dhaka was just 66%.

Table 7.1. Sample Demographics

	Jordan	Bangladesh
Mean age at COVID-R2 (SD)	15.43 (2.57)	16.28 (2.54)
Younger cohort aged 11–14 (%)	792 (53%)	151 (34%)
Female (%)	797 (53%)	226 (51%)
Above-median baseline assets (%)	650 (43%)	208 (47%)
In-school in March 2020 (%)	1,094 (73%)	293 (66%)
Syrian nationality (%)	1,167 (78%)	-
Total sample size at both surveys	1,497	442

Descriptive statistics (means and standard deviations) are presented for details related to internet access, education, and remote learning during the pandemic. For outcomes related to internet access and internet-enabled devices, we present findings from the entire sample. For outcomes related to the continuation of learning during school closures, we focus only on those adolescents who were enrolled in formal schooling in March 2020. We focus on four comparisons of interest across settings: gender; age cohort (adolescents aged 11–14 versus those aged 15 and older); household assets (above- or below-median household assets based on an

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[46] (For further details of the sampling strategy for each country, see Jones et al. (2018).)

asset index created at baseline in each setting); and, in Jordan, nationality (Jordanian citizens versus Syrian refugees). When we compare differences by subgroup, the presented p-value is drawn from a regression comparing the means of the two groups, controlling for the other covariates of interest. Throughout the narrative, we focus on subgroup comparisons that are statistically significant. All statistical analyses were conducted using the statistical software Stata version 16.1.

7.3.2. Qualitative Methods

Complementing the survey data, we undertook two rounds of qualitative data collection in Jordan and Dhaka. COVID-R1 qualitative data collection was conducted between April and July 2020 in both settings, and COVID-R2 took place between September 2020 and January 2021. The qualitative samples were purposely drawn from the quantitative samples and were weighted towards older girls and boys, as the virtual data collection modality was best suited for adolescents aged 15 years and over. Table 7.2 presents the qualitative sample breakdown.

Table 7.2. Qualitative Research Samples at COVID-R1 and COVID-R2

	COVID-R1		COVID-R2	
	Jordan	Bangladesh	Jordan	Bangladesh
Younger cohort girls (aged 10–14)	6	3	2	3
Younger cohort boys (aged 10–14)	5	2	3	2
Older cohort girls (aged 15–19)	18	17	15	17
Older cohort boys (aged 15–19)	10	8	17	8
Key informants	15	4	4	4
TOTAL	54	34	41	34

Qualitative in-depth research instruments (see Małachowska et al., 2020) included interactive individual interview tools to elicit insights on factors that supported or hindered adolescents in achieving multidimensional capabilities during the pandemic, and where major risk factors and resilience opportunities lay. Key informant interviews (KIIs) with education, public health, and social services experts were also conducted in both rounds of data collection. Researchers were selected from partner organizations in each country that had built up prior relationships with participants in the GAGE research. The interviews were transcribed, translated, and coded largely deductively according to a thematic coding book drawing on the GAGE capability domains covered in the tools, using the software package MAXQDA 12. Research teams held debriefing sessions (during and immediately after data collection) to discuss emerging findings and capture country-specific issues, and these inductively derived codes were added to the codebook accordingly. During qualitative data analysis, care was taken to identify themes that resonated beyond individuals and across the cohort or specific subgroups of adolescents within it. The selected quotes illustrate these insights.

The quantitative and qualitative data was then triangulated to reveal both consistencies and inconsistencies across methods, with the qualitative data providing contextual nuance to the statistical findings.

7.4. Findings

7.4.1. Household Access to and Use of Devices and Connectivity

In both settings, household connectivity has either improved or remained stable between the two survey rounds (Table 7.2). While the percentage of households with internet access in Jordan did not change between surveys (89%), the proportion of households with internet access in Dhaka has significantly increased from 56% at COVID-R1 to 64% at COVID-R2 (p=0.01). Likewise, while the number of internet-capable devices in the household remained similar in Jordan (2 devices at COVID-R1 and COVID-R2), we note a significant improvement in Dhaka (0.8 devices at COVID-R1 and 1 at COVID-R2, p=0.007). Qualitative data from Dhaka shows that families acknowledged that internet-capable devices had positively impacted distance education, and those who could afford it bought phones for adolescents (boys especially) so that they could continue learning.

Findings on household connectivity are better understood when looking at differences between household wealth and, in Jordan, nationality. In Jordan, our data highlights that at COVID-R2, households with above-median assets were significantly more likely to be able to connect to the internet compared to households with below-median assets (93% versus 87%, p<0.001), and to have more internet-capable devices (2 versus 1.5, p<0.001). In addition to wealth, Jordanian households tended to have more devices compared to Syrian households (2.2 versus 1.6 at COVID-R2, p<0.001), representing another digital divide. In Bangladesh, COVID-R2 data shows that household wealth is an even stronger predictor of gains in internet access: above-median asset households were significantly more likely than below-median asset households to connect to the internet (77% versus 52%, p<0.001) and to

have more internet-capable devices (1.3 versus 0.7, p<0.001). Notably, households in Dhaka with lower baseline assets did not see a statistically significant improvement in internet access between survey rounds, and although the number of devices increased, the average number in below-median asset households remained less than 1 at COVID-R2 (0.7).

7.4.2. Adolescent Ownership of Internet-Capable Devices

At COVID-R1 in Jordan, 31% of all adolescents had an internet-capable personal device (Table 2). When looking at differences in ownership between adolescents, there are variations in almost all examined characteristics—gender, age, and nationality. Girls were significantly less likely than boys to have a personal device with internet connectivity (25% versus 38%, p<0.001), older adolescents were 67% more likely to have any personal device than younger adolescents (48% versus 16%, p<0.001), and Jordanian adolescents were more likely to have such a device than Syrian adolescents (35% versus 30%, p=0.01). Despite an overall increase in the percentage of adolescents with a personal device between COVID-R1 and COVID-R2 (31% versus 37%, p<0.001), all differences observed in personal device ownership between adolescents at COVID-R1 remained at COVID-R2, with the addition of differences by wealth. At COVID-R2, adolescents in Jordan from households with above-median assets were significantly more likely than those from below-median asset households to have a personal internet-capable device (44% versus 32%, p<0.001).

In Dhaka, COVID-R1 data shows that 25% of adolescents had access to an internet-capable personal device, and there are important differences by gender, age, and wealth. Girls were 50% less likely to have an internet-capable device than boys (17% versus 34%, p<0.001); older

adolescents were 80% more likely to have such a device than younger adolescents (35% versus 7%, p<0.001); and adolescents from households with above-median assets were 40% more likely to have such a device than adolescents from below-median asset households (32% versus 19%, p<0.001). Similar to Jordan, the overall percentage of adolescents with a personal device increased between COVID-R1 and COVID-R2 (25% versus 34%, p=0.002). While the percentages for each subgroup are different, all differences observed in personal device ownership between adolescents at COVID-R1 remained at COVID-R2. We note, however, a growing gender gap, with only 3% more girls gaining access at COVID-R2 compared to 15% more boys.

Qualitative data also highlights growing gender divides in Dhaka, and while all adolescents interviewed agreed that access to mobile devices is essential for distance learning, they acknowledged that boys have greater access to internet-capable mobile devices to help with their studies. Across data rounds, female respondents mentioned that their studies are being hampered mostly due to a lack of access to a mobile phone. A 14-year-old girl said, "I can only use my brother's phone when he is at home. Otherwise, I can't use a phone." Even though most boys do not own a mobile phone, their parents more readily provide access for them compared to girls. One of the reasons behind this might be parental fear and insecurity about their daughters using a phone to pursue a romantic relationship or contact men outside of their family. A ward councillor explained, "Guardians are giving girls less opportunity to use mobile phones. They don't want girls to be addicted to bad habits like talking or communicating with boys."

Across both samples, it is notable that the number of adolescents with a personal internet-capable device is significantly lower than 50%. Most cannot, therefore, freely go online to access internet-assisted distance learning. Moreover, sharing devices between siblings remained very common between COVID-R1 and COVID-R2—a strong finding in qualitative data from Jordan in particular. Qualitative data also shows that, as well as problems with the availability of internet-capable devices, digital skills are also a barrier. An 11-year-old Syrian boy in Jordan explained, "[I would study if there was internet] but I don't know how to, actually."

7.4.3. Digital Technology for Remote Education During COVID-19

The following subsections present findings from students enrolled in formal schools immediately prior to the pandemic onset in Jordan and Bangladesh (in March 2020).

7.4.4. Jordan

Across our outcomes of interest related to the continuation of formal schooling during COVID-R1, we note differences in gender among adolescents enrolled as of March 2020, such that girls are more engaged in high-tech modalities compared to boys. In terms of access to distance education, COVID-R1 data highlights that while rates of participation are high for boys and girls alike, girls are slightly more likely to be doing any distance learning activities during school closures (97% versus 94% of boys, p=0.01), and they are significantly more likely to use internet-based modalities as their primary method to continue learning (56% versus 46%, p<0.001) (Annexe: Table 3). This is interesting as they are less likely to own a personal internet-capable device compared to boys. We hypothesize that girls' greater participation in distance learning is linked to the generally better quality of schooling in Jordan for girls compared to boys. Previous GAGE research has found that this is at least partly due to better training and more commitment by female teachers who teach girls compared to male teachers who teach boys.

Qualitative data throughout COVID-R1 strongly highlights that although adolescents using internet-based platforms are advantaged, internet modalities are nonetheless incomparable to the benefits of in-person teaching and learning. A 12-year-old Syrian girl explained, "Our teacher has created a WhatsApp group for us; she gives us homework, we solve them then send them to her. [If] we feel that we don't understand, the teacher has started to make videos to explain the lessons and send them to us; we understand by this way but not as much as in-person school." A 14-year-old Syrian girl added, "Studying via the internet is good, but studying with teachers is better.… The teacher on the internet explains the lesson only once, but the teacher in the class explains the lesson two or three times and also gives us many illustrative examples."

COVID-R2 survey data from Jordan underscores new differences between girls' and boys' participation in distance learning as the pandemic continued into a second school year (Annexe: Table 4). First, significantly more boys reported no major challenges to learning compared to girls (22% versus 14%, p=0.001); second, girls are slightly more likely to report that the main challenge to learning continuity is not understanding homework or assignments (24% of girls versus 19% of boys, p=0.03). This is noteworthy when compared with COVID-R1 data, which showed that girls were significantly more likely than boys to report that their school was providing some support during closures (78% versus 61%, p<0.001) and significantly more likely to have had contact with a teacher in the week prior to the survey (57% versus 43%, p<0.001). Of those in contact with a teacher during COVID-R1, girls were significantly more likely than boys to be in contact over WhatsApp (85% versus 60%, p<0.001). Girls were also significantly more likely than boys to be given access to an internet-capable device by their family so that they could continue learning at home (78% versus 67%, p=0.002).

Analysis of qualitative data helps to explain these trends. During the earlier stages of the pandemic, schools and teachers were more directly involved in providing distance education, as well as scaffolding learning via WhatsApp through either one-to-one or small group interactions. This was beneficial to all students, but especially girls, since they were more likely to engage in WhatsApp interactions with their teachers. As the pandemic progressed, and following the brief return to school in September 2021, teacher-student contact diminished, and the Darsak online platform became the main distance learning modality. This switch was met with frustration, especially from girls, as a 14-year-old Syrian girl explained, "Teachers explain in the [online] portal. I watch videos over and over to [try to] understand. I talk to [my teachers] but they just tell me that everything is on the portal." While students in contact with a formal teacher during COVID-R1 had lessons delivered and homework assigned by their own teachers, this was not the case in COVID-R2, as an 18-year-old Syrian girl commented: "They [ministries] opened the [online] portals which I didn't like very much. There were many teachers on the portal who were good but I wasn't familiar with their methods as I don't know them. [My school doesn't provide classes;] everything is in the portal." Reinforcing this finding, we note that while 43% of girls were in contact with a formal school teacher in the week prior to the COVID-R2 survey, 57% of girls had reported the same in COVID-R1 (Annexe: Table 5). KIIs with community leaders confirmed that although teachers were free to continue forming social media groups, the Ministry of Education "was determined that school assignments and exams be through the Darsak platform."

At COVID-R1, 61% of all adolescents who were enrolled in school in March 2020 reported watching any TV-based learning programs provided by the Ministry of Education. Among boys and girls, 46% of adolescents in COVID-R1 reported that Ministry of Education programming

(either internet- or TV-based) was their primary method of learning, and boys were significantly more likely to mention this than girls (52% versus 42%, p=0.002). These gender differences were similar across Jordanian and Syrian nationalities. Again, we hypothesize that the high percentage of girls in contact with their teacher (57%) at COVID-R1, mainly over WhatsApp, were more likely to utilize teacher-based tailored distance learning materials, rather than Ministry of Education programming. Among girls and boys, COVID-R1 qualitative data highlights dissatisfaction with the Ministry programming, both in terms of quality and quantity. An 11-year-old Syrian boy stated, "School is my life. [But now] I study from the book sometimes and I don't study the other times. I don't watch the TV program because I don't understand it." A 12-year-old Syrian girl added, "Honestly, I saw it [the Ministry of Education program] and I didn't like it because I couldn't understand.… I saw it many times and I couldn't understand anything at all; even my siblings, none of them understood." And a 12-year-old Jordanian boy explained, "I do not understand anything from the TV.… [The program is too short], five or six minutes."

At COVID-R2, significantly more adolescents reported that Ministry of Education programming was their primary method of distance education (62% versus 47% at COVID-R1, p<0.001), and there were no significant gender differences—again indicating the increased presence of Ministry programming at later stages of the pandemic (Annexe: Table 5). Furthermore, the share of students reporting that their school was providing any support for learning during closures also decreased between survey rounds (70% versus 45%, p<0.001), as did the share who had been in contact with a teacher in the past week (50% versus 38%, p<0.001). While girls lamented the loss of teacher interaction, boys seemed more accepting of the limitations of distance learning, reflecting the widely recognized lower

quality of learning in boys' schools, as a 16-year-old Syrian boy commented: "I don't understand anything from distance learning! I haven't gotten any messages on WhatsApp; [all I try to use is] the online platform. I just do the assignments I understand. But the ones that I don't, I just don't do them."

Disaggregating our Jordan data from COVID-R1 by age, we note no significant differences in adolescent efforts to learn from home during school closures using any method (97% of the older cohort and 95% of the younger cohort), although older adolescents were significantly more likely to use an internet-based platform to continue learning (57% versus 48%, p=0.007). Qualitative data across both survey rounds indicates that older adolescents have priority in accessing the household device and are more likely to rely on internet-based platforms compared to both younger adolescents and younger siblings.

When assessing household assets as determinants of distance learning continuity at COVID-R1, we find no significant differences in efforts to learn from home between adolescents from above- or below-median asset households (96% versus 95%). That said, adolescents from households with below-median assets were significantly less likely to be supported by formal schools compared to adolescents from households with above-median assets (74% versus 67%, p=0.02). They were also less likely to be supported by their family to continue learning (91% versus 85%, p=0.003) and less likely to have been in contact with a teacher in the week prior to the survey (56% versus 45%, p=0.005). On this latter point especially, qualitative data highlights that internet connectivity is the major barrier to teacher contact for adolescents from households with below-median assets. A 17-year-old Syrian girl expressed her frustration with this situation: "Learning from a distance is really hard.… I did

not contact my teachers. They formed groups to contact, but I don't attend the groups. I don't have a phone or internet to contact them." Qualitative data is mixed as to whether adolescents and teachers understand the profound marginalization of adolescents without steady internet access, given that quality provision seems to happen between teachers and students on internet-based apps such as WhatsApp (primarily), Facebook, and YouTube. While a 16-year-old Jordanian girl stated, "I participate in the Facebook group.… [Everyone has a phone and internet here]," a 17-year-old girl highlighted the inconsistencies with internet-based distance learning: "It is wrong [to rely on the internet for studying], because my friends, for example, do not have the internet, and some of them have not started studying at all. They have no internet and they cannot communicate with their teachers. My parents had to buy me an internet router so that I could follow my lessons online."

Even though the share of students using any internet-based activities to learn from home increased between COVID-R1 (51%) and COVID-R2 (74%, p<0.001), problems with internet access and the quality of connectivity remained. At COVID-R2, when asked about the most significant challenge in continuing to learn from home, the most common response from students in Jordan was "lack of or unreliable internet access" (39%). Notably, this challenge was slightly more common among Syrian refugees than their Jordanian peers (42% versus 32%, p=0.03), although Jordanian and Syrian students were equally likely to engage in any internet-based activity to continue learning at home at COVID-R2 (74% and 75%, respectively).

Likewise, qualitative evidence demonstrates that connectivity problems persisted at COVID-R2 and were affecting studying, as a 16-year-old Jordanian girl explained: "[Sometimes] the portal would open, and other times it wouldn't. It

depends on the internet; sometimes we have it, other times we don't." Internet connection also depends on the ability to purchase credit—an option unavailable to some adolescents, as a 12-year-old Syrian girl noted: "Sometimes when the balance is zero, it's difficult to refill.… No one in my family works."

Overall, in Jordan, there was a small but significant decrease between the two survey rounds in the share of students attempting to continue learning from home using any method, with participation rates dropping from 97% to 94% for girls (p=0.008) and from 94% to 89% for boys (p<0.007).

7.4.5. Bangladesh

At COVID-R1, nearly the entire school sample in Dhaka was engaged in learning from home (97%) with no significant differences by gender, age, or household wealth (Annexe: Table 3). Interestingly however, only 7% of adolescents across genders and age cohorts reported using an internet-based device as the primary modality to continue learning, with significant differences by wealth (10% of adolescents from above-median asset households versus 3% from below-median asset households, p=0.03). At COVID-R2, while the percentage of adolescents engaged in distance learning of any type had remained stable (97%), we note a small increase in adolescents using the internet as their primary method of learning (10% at COVID-R2 versus 7% at COVID-R1, p=0.076), with no significant differences by gender or wealth status (Annexe: Table 5). It is clear that the prime method for learning, across survey rounds, did not involve using the internet. Qualitative data highlights that internet-based modalities remain out of reach for most adolescents, with notable differences in gender and wealth. At COVID-R2, a 19-year-old girl explained, "Before, I did not have Wi-Fi in my house, and a lot of money was needed to recharge to buy the internet packs.

Because you have to see the [online] tutorials over and over again. Even if you download them, it takes a lot of internet [data]. For boys, this is easy. Parents give them money whenever they want, but we don't get that."

Qualitative data also highlights that distance learning that uses a combination of methods was common in Dhaka, and students seldom relied on just one form of learning during school closures. At COVID-R1, most respondents mentioned reading and reviewing their books and trying their best to move forward according to the syllabus. They also followed their exercise books, and some completed worksheets provided in person via their coaching class instructors. However, some gender differences emerged, especially related to time management. An older girl commented, "There are some situations when I have to stop reading and go for household chores, then there is no more reading for that time."

Ministry of Education programming was one of the methods used for distance learning. While 40% of adolescents reported tuning into the Shangshad TV program across survey rounds, only 8% reported this being their primary method of studying at COVID-R1 and COVID-R2. More girls reported this than boys, 11% versus 4% at COVID-R1 (p=0.02), while means converged at COVID-R2 (Annexe: Table 4). Across data collection rounds, qualitative evidence highlights that while young adolescents reported being instructed by their school authorities to follow the Ministry's TV classes, some educational institutes started to provide online classes through Zoom and Facebook for older adolescents; yet both uptake of and satisfaction with these online classes were low. An 18-year-old girl noted: "The classes were not that good. But it was better to have something than nothing." Qualitative findings at COVID-R1 also highlight that adolescents stopped tuning into the TV classes for numerous reasons: not properly understanding the

lessons, loss of interest, and girls being busy doing household chores during lockdown. At COVID-R2, structural and technical problems associated with TV classes persisted (e.g., poor audio and video quality); as well as no classes being broadcast for college/Higher Secondary Certificate (HSC)-level students.

Less than one in five formal school students (16%) reported that their own school was providing support for learning at COVID-R1, rising to 37% at COVID-R2 (p<0.001). Similarly, while 24% of adolescents were in contact with a formal school teacher in the previous week at COVID-R1, we note a marked increase at COVID-R2, with 49% of adolescents reporting this across gender, age, and wealth (p<0.001). By far the most common communication between students and teachers was via phone call (77% mentioned this at COVID-R1), and 10% mentioned using social media or apps to contact teachers. Qualitative data sheds light on these changes. Most respondents at COVID-R1 mentioned that no one was able to help them study at home, and they were studying by themselves, studying less, and some even stopped studying due to no contact with teachers. An 18-year-old girl said, "Everyone needs a teacher for guidance [we] all have some difficulties understanding." There were notable exceptions though: some adolescents at COVID-R1 mentioned having contact with their teachers, who provided homework and instructions to study at home; and a few teachers even committed to a one-off home visit after lockdown. At COVID-R2, most students had begun going to school a few times a week to receive and submit their assignments; thus teacher contact increased. Mobile phone communication also increased, as a 17-year-old boy explained: "Our teacher gave us his personal mobile number. He told us to make a group of 5–6 students and call him if we have any problems. Then he will come and help us as much as possible." However, this modality remained out

of reach for adolescents without a personal or household mobile device to use.

7.4.6. Adolescent Preferences for Distance Education

Qualitative data across geographies highlights that frustration with distance learning intensified as time went on. Adolescents do not consider distance education a sufficient substitute for face-to-face learning, and by COVID-R2, most adolescents felt their studies had been hindered. A 17-year-old Jordanian girl said, "I feel lost, I study a lot, but I feel that I have not studied anything; I feel that I will not be able to finish my lessons before exams, I don't know what to do in order to finish my lessons." Similar sentiments were expressed in Dhaka, where students mentioned feeling severely penalized by school closures and distance learning. An older girl described, "My study was running well before; I had a phone and internet connection, but [after] it wasn't enough! [With COVID-19], problems [plagued] my family, economic problems, and my study suffered a lot. The amount of help we get in face-to-face school [is just not comparable to] social media. It's the same for the teachers; they have many problems too with [giving schoolwork] and with many other things." Generally, it was apparent that as the months passed, adolescents felt fatigued with distance learning; they were eager to try to continue learning initially, but their enthusiasm waned. When asked what would best help with distance learning and learning continuity moving forward, a 12-year-old Jordanian boy commented, "[The best distance learning method] would be books"—a view that resonated with other adolescents.

Some adolescents also alluded to wider losses, especially with regard to the social aspects of school life. Overall, as school closures continued, perceptions became increasingly bleak. A 17-year-old Syrian girl stated, "Honestly, no, I haven't coped with distance education…. All of it is wrong; there's nothing good." That view was echoed by a 16-year-old Jordanian girl, who said, "I like nothing about distance learning at all…. Mentally, I can't bear education through the phone; I like to have the teacher in front of me, to participate, elaborate, and ask her."

7.5. Discussion

Our findings from Bangladesh and Jordan paint a complex and evolving picture of distance education at two stages of the COVID-19 pandemic. It is worth noting that nearly all enrolled students in both contexts were trying to continue learning at the time of both survey rounds. While a degree of learning continuity was therefore maintained, our findings shed light on the need to develop a more nuanced, context-specific understanding of what is needed to implement effective and sustainable distance learning programs that reach all learners.

First, we note that ownership of personal internet-capable devices in both contexts remains below 50%, and is dependent on gender, age, nationality, and household wealth. We also see growing divides across time by household wealth in Jordan and by gender in Bangladesh. These findings are mirrored when analyzing household connectivity, with below-median asset households penalized in both Bangladesh and Jordan as time went on. In this sense, distance education provision and the increasing reliance on internet-based modalities (in Jordan, in particular) served to widen the gap between wealthier and poorer students. While it is well-documented that educational inequalities are often exacerbated in emergencies, including differences in learners' access to technology-facilitated learning material, the urge to leverage school disruptions and utilize them to kickstart an online pivot, remains commonplace.

Second, our findings highlight the critical nature of teacher-student interaction for adolescent learners. In Bangladesh and Jordan, mixed-methods data highlights that contact with a teacher was a key factor in both learning progression and student motivation. While teacher contact had increased significantly in Bangladesh by COVID-R2 (though remaining below 50%), this trend was inverted in Jordan, with teacher contact decreasing as the Ministry of Education's internet-based programming was rolled out. These findings underscore that distance education programming must be developed using principles of pedagogy—albeit remote learning pedagogy—and use modalities that better facilitate regular teacher-learner feedback.

Third, qualitative data highlights general dissatisfaction with distance education, particularly for Bangladeshi girls and students of below-median asset households in both settings, as well as Jordanian boys, who generally experience inferior-quality learning. While schooling progression, exam results, and learning outcomes remain strong priorities for learners, inequalities in internet access, family support, and school support risk turning distance learning uptake into an irreparable gap. It is imperative that multi-method distance learning options are provided that include books and print materials, as well as low-tech options such as phone calls and SMS texts for students who lack access to high-tech modalities—whether due to restrictive gender norms, poverty, or lack of infrastructure. Offering a range of methods will also support students who lack the digital skills needed to use high-tech methods.

7.6. Conclusion

Our mixed-methods data on digitalized distance education in urban contexts in Bangladesh and Jordan points to the following conclusions:

Teacher-student interactions are vital and must be seen as a core component of distance or blended education modalities, as well as part of future education strategies. BRAC schools, for example, tried supplementing distance education with phone follow-ups by teachers.

There are important gender differences that need to be addressed, but these should be based on country-specific analysis; gender disadvantages may manifest differently for girls and boys in different countries, so a "one-size-fits-all" approach should not be employed.

Investments in catch-up programming are essential given the significant loss of learning among students in lower wealth quintiles.

Our research focused on adolescents in urban areas; it is likely that inequalities are much greater for rural children. Also, the children in our research samples in Jordan and Dhaka probably have the highest levels of connectivity, as they needed to have access to a phone to complete the survey. Therefore, we expect that challenges to connectivity are likely underestimated in this analysis compared to the larger population of students in these countries, and even to the larger population of students living in Dhaka, Bangladesh, and in the four governorates of interest in Jordan (Amman, Irbid, Jerash, and Mafraq).

Teachers need more training on how to carry out and support distance education, particularly on helping students access and interact with online classes. This could include, for example, offering one-to-one or conference calls to help students

address any questions they have about the lessons that took place.

Students are accustomed to textbook learning. Distance learning should use textbooks as the foundation for learning and build digitalized components from there. In the future, textbooks should include learning guides or questions for students to address remotely, in order to practice different modalities.

Hybrid learning can be explored now that at least some children are familiar with online classes and distance learning modalities. This could help those students who are behind to catch up or help those with special interests pursue those interests more independently. Unless schools have a proactive culture of students taking charge of their own learning—at least partially—and practice distance learning methods, it is difficult to expect them to do so during an emergency.

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Chapter Eight

State of Bangla NLP

Umnoon Binta Ali, Kazi Rafat, Nabeel Mohammed, and
Mohammad Mamun Or Rashid

8.1. Introduction

Natural language processing (NLP), the intriguing confluence of computers and human language, is gradually carving a pivotal role in Bangladesh's economic landscape. As Bangladesh rapidly embraces digital transformation, integrating NLP offers unprecedented opportunities to streamline operations, enhance user experiences, and drive growth across multiple sectors. From bolstering e-commerce platforms with intelligent chatbots to refining customer interactions in the banking sector, NLP has been a beacon of innovation. Beyond mere technological wonders, its profound ability to understand and generate the Bangla language offers local businesses a competitive edge, potentially unlocking new revenue streams and fortifying Bangladesh's position in the global digital economy.

NLP represents the confluence of linguistics, computer science, and artificial intelligence (AI). It delves deep into the intricate dynamics between human language and computer algorithms, striving to endow machines with the prowess to decipher, generate, and respond to human language intricacies. Beyond simple tasks such as error correction, NLP is reshaping digital communication, creating pathways for innovations like linguistic artistry in the digital realm. Linguistic artistry refers to the skilful and creative use of language to produce expressive, aesthetic, and impactful communication. Despite the vast potential of NLP to impact the economy positively,

its significance might not be receiving the attention it deserves due to the rapid and visible advancements in image processing. Notably, by 2026, the voice recognition segment alone is poised to reach a valuation of USD 28.3 billion (Global Newswire, 2022).

NLP's advancement hinges on robust machine learning models acclaimed for recognizing patterns and data relationships. These models necessitate large datasets and considerable computing power, incurring high costs; for instance, training the GPT-3 model alone costs USD 10 million (Kurenkov, 2021). Such investment

challenges intensify for languages like Bangla, with its varied dialects and minimal digital resources. Despite Bangladesh's digital advancement, a noticeable void persists in AI research for its dominant language, Bangla.

However, as a rapidly developing nation, Bangladesh seeks avenues to diversify its economic portfolio, enhance its global trade competitiveness, and boost its information technology (IT) sector. NLP can significantly augment sectors like e-commerce, customer service, and digital marketing by fostering efficient digital communication. For instance, accurate language translation tools can help local businesses tap into global markets, while AI-driven customer support can enhance user experience and drive sales. Social science research can also gain in terms of more nuanced interpretations of large datasets and a deeper understanding of behaviour change. With a deep-rooted understanding of sociocultural nuances gained from social sciences, NLP can be tailored to resonate more with the local populace, thereby driving consumer engagement and spurring economic growth.

A comprehensive strategy that involves universities, technology enthusiasts, and government organizations is crucial. Collaborative endeavours can unlock the latent potential of NLP, not just as a linguistic tool but as a catalyst for Bangladesh's economic renaissance.

8.1.1. Overview of Natural Language Processing (NLP)

Tasks and Processes

NLP involves various tasks, from basic ones like finding words in a text to advanced ones like creating personalized chatbots that learn from user behaviour. These tasks usually follow a standard process: first, a large language model is trained on an extensive text set without specific labels. Then, data with specific labels related to the task is collected. Finally, the language model is adjusted to perform the task using this labelled data (Figure 8.1). Each step has specific criteria and requirements set by experts and practitioners (Table 8.1).
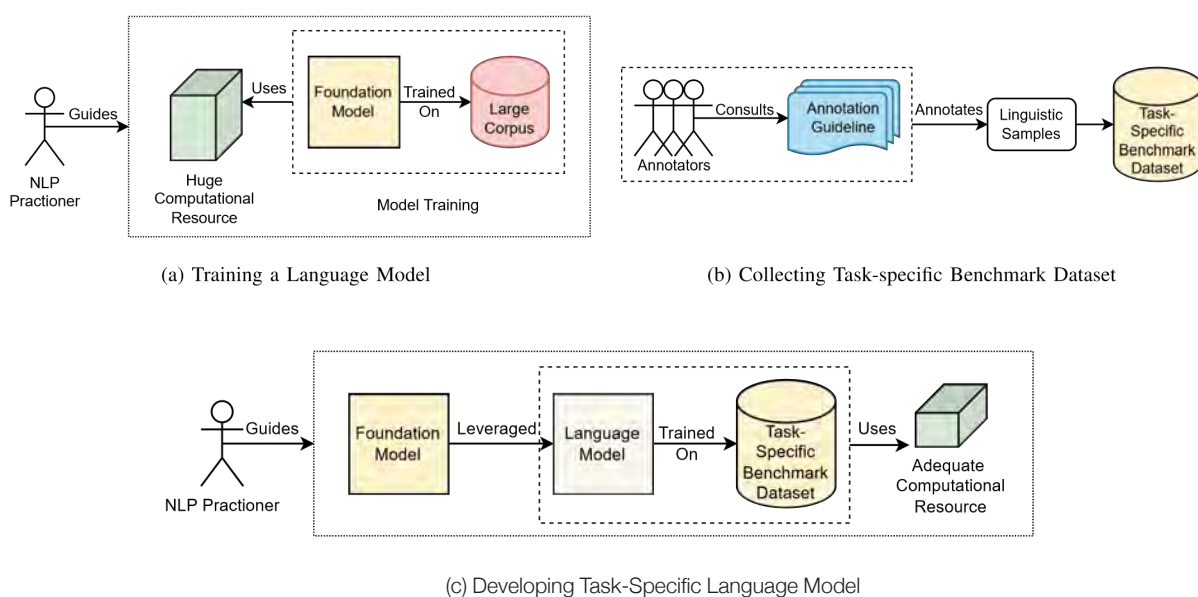

(a) Training a Language Model

(b) Collecting Task-specific Benchmark Dataset

(c) Developing Task-Specific Language Model

Figure 8.1. Commonly Used Steps to Develop an NLP Solution

Table 8.1. Requirements to Fulfil Significant Tasks of a Traditional NLP Pipeline

No	Training a Language Model	Collecting a Task-Specific Benchmark Dataset	Developing a Task-Specific Language Model
1	Obtain a large text corpus	Make an annotation guideline	Develop a foundation model
2	Develop language model	Annotate task-specific linguistic samples	Use a task-specific benchmark dataset
3	Complete training objectives	Recruit a skilled team of annotators	Manage adequate computation resource(s)
4	Manage adequate computation resource(s)	Make a system to keep track of annotations	Hire NLP practitioner(s)
5	Hire NLP practitioner(s)	-	-

Developing NLP models is undoubtedly a complex and resource-intensive process, requiring collaboration among linguistics, computer science, and AI experts. However, NLP technology's potential advantages and effectiveness far outweigh the challenges. NLP has already found its way into numerous devices and software applications, allowing Bangladesh to elevate its digital landscape.

NLP plays a pivotal role in information retrieval and communication. While its performance in Bangla may not match some other languages, it holds immense promise. Technologies like Text-to-Speech (TTS) and Speech-to-Text (STT) in Bengali could be transformative, enabling millions of monolingual native speakers to access information news and communicate more accurately. Accurate translation tools are equally critical, as much of Bangla's online content remains inaccessible. Effective translations can open a wealth of information to Bangla-only speakers, bridging the digital divide.

Recent advancements in NLP have introduced question-answering (QA) models that can directly provide answers to user queries. These QA models are in high demand for various tasks, from providing primary education to underprivileged Bangladeshis to assisting experts in their work and aiding individuals in their daily lives by providing valuable information. NLP technologies can significantly enhance writing and language skills, benefiting students, teachers, researchers, and professionals across sectors.

Moreover, Bangla voice assistants hold the potential to automate repetitive manual tasks both at home and in offices, contributing to partial automation in computers, mobile devices, and even vehicles. As the world increasingly relies on digital technology, these advances in NLP can empower Bangladesh to keep pace and excel in the digital era, unlocking new possibilities for education, commerce, and communication. NLP is a promising gateway to a more connected and informed society in this digital evolution.

Development Challenges

The deep learning research community has been increasingly interested in improving NLP systems. This includes research on building foundational models and gathering extensive collections of Bangla text (Bhattacharjee et al., 2022; Biswas et al., 2017; Islam et al., 2021; Karim et al., 2020; Kowsher et al., 2021; Sodimana et al., 2018; Sultana et al., 2021). However, the Bangla language models developed so far have significantly fewer parameters than top-notch English language models (Figure 8.2). For instance, the largest Bangla language model, Bangla GPT-2, was trained on 27.5GB of text, while the largest English NLP model, GPT-3, used a massive 45TB of data for training.

This difference in scale is due to financial limitations and because collecting a large amount of Bangla text data takes a lot of work. This presents a significant hurdle in advancing Bangla NLP, as large-scale data collection is essential for training more powerful models. Solving this problem is difficult, as it requires a substantial amount of data, which can be a limiting factor.
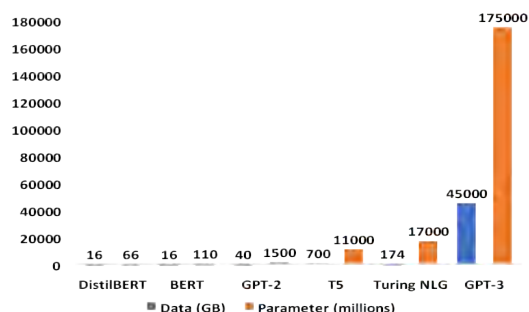
(a) English Language Models
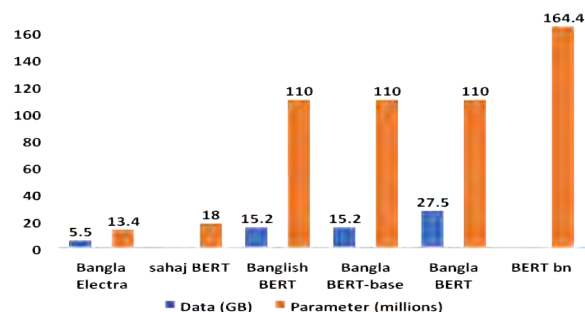
(b) Bangla Language Models

Figure 8.2. Number of Parameters and Training Data Size of the Significant Foundation Models for the English Language (a) and the Bangla Language (b)

The current landscape of Bangla NLP presents formidable challenges. Much of the textual data used in NLP applications is sourced from web crawling and websites, which predominantly employ Standard Bangla (Promito Bangla). While this formal style suits many contexts, it must encapsulate the full spectrum of linguistic nuances and complexities in everyday Bangla. Consequently, Bangla language models trained on such compilation tend to be heavily skewed towards standard Bangla. This inherent bias can impede the adaptability of these models when confronted with different language styles and variations.

Bangla exhibits a unique linguistic landscape, further complicating the NLP scenario. Many individuals employ a code-mixed language called Banglish, blending Bangla and English seamlessly. Additionally, various regional dialects coexist, each with its uniqueness. Bangla is also filled with homonyms—words with multiple meanings—and homophones—words that sound the same but have distinct meanings. These intricacies are essential to the language's rich tapestry but pose significant challenges for NLP models that strive for comprehensive understanding and effective communication.

Another critical issue is the need for well-established benchmark datasets for evaluating NLP models in Bangla. In contrast, English boasts robust resources such as the General Language Understanding Evaluation (GLUE) dataset, comprising nine tasks with meticulous annotations. GLUE is a set of tests to check how well language models understand text. These benchmarks are common goals for the NLP community, fostering innovation and competition. However, such resources are scant in the Bangla NLP domain, hindering progress and making it challenging to gauge the effectiveness of language models accurately.

Despite the efforts put into Bangla NLP research, it has yet to replicate the success achieved by language models in dominant languages. Most Bangla language models are developed primarily for research purposes or academic publications, with limited practical marketability. This is due, in part, to the substantial resources required for considerable model training, such as significant

computational power. For example, training a BERT-Large model with 330 million parameters necessitates a cluster of 64 Tensor Processing Units (TPUs), each costing approximately USD 4,000 to USD 5,000, running continuously for four days.

Language models are instrumental in text-based digital solutions and in enhancing the quality of speech-based solutions. Achieving truly inclusive Bangla speech-based solutions, accommodating various dialects and styles, hinges on the foundation of robust language models. Therefore, there is an urgent need for concerted efforts to amass extensive and inclusive textual corpora. Such endeavours are necessary for the Bangla NLP landscape to stay caught up, perpetuating the existing gap and impeding progress in this vital field.

Issues of Artificial Intelligence and Its Solutions
AI has made remarkable progress in improving various aspects of human life. However, it has also sparked concerns related to its social, economic, and ethical implications. While strides have been made to address technical issues like bias and improve AI systems based on user feedback, many challenges still exist. AI was initially developed to simplify complex tasks by mimicking human intelligence, and in some cases, it has replaced human involvement entirely. Yet, most AI models currently in development serve as tools to assist humans in performing laborious tasks and rely on human input for their development and maintenance.

For instance, AI tools like spell checkers and quiz analyzers can aid teachers and examiners in their work. In manufacturing, AI can handle repetitive tasks such as packaging and sealing, allowing humans to focus on more creative and critical responsibilities. Skills like creativity, intuition, initiative, and critical thinking remain uniquely human and are unlikely to be replaced by AI

anytime soon. Moreover, humans bring essential soft skills to businesses that are difficult for AI to replicate.

To mitigate concerns about job displacement, educational institutions must prepare students for roles that AI is less likely to assume. While fears of machines replacing humans have existed for decades, this scenario has not fully materialized. NLP chatbots, for instance, can support human customer service agents in routine tasks, enabling humans to provide personalized and intuitive customer care. The introduction of ATM booths has created opportunities for maintaining and improving these machines and offering more specialized customer service.

It is essential to recognize that AI, including NLP, is increasingly prevalent in today's economies. This not only benefits users but also benefits shareholders and concerned employees. Society and governments must adapt to AI's presence and explore ways to harness its potential for the betterment and progress of society.

The "Enhancement of Bangla Language in ICT (EBLICT)" project, operating under the umbrella of the Bangladesh Computer Council (BCC) within the Information and Communication Technology (ICT) Division, is dedicated to propelling Bangladeshi society into the digital age through the advancement of NLP. EBLICT is crucial in developing various language resources, datasets, and models across multiple NLP-based sub-projects. EBLICT is the primary government-backed initiative focusing on improving Bangla NLP.

Beyond practical applications, EBLICT nurtures a broader vision that encompasses support for ongoing research and the continual evolution of Bangla NLP. To this end, the project aims to create expansive and diverse benchmark datasets covering an array of NLP facets. These datasets

encompass foundational tasks like part-of-speech (POS) tagging, which involves identifying different parts of speech within the text, and more intricate endeavours such as QA.

Table 8.2 provides an overview of the comprehensive list of datasets that the EBLICT project intends to curate. Through its concerted efforts, EBLICT is poised to play a pivotal role in advancing the use of the Bangla language in ICT, contributing to the digitization and development of Bangladeshi society.

Table 8.2. List of Corpora and Benchmark Datasets to be Collected Under the EBLICT Project

Context and Linguistic Representation		
Dataset	Feature	Size
Bangla National Corpus	Non-duplicate and clean text	40GB
Bangla Treebank	Processed text and running words	10M
Banglish Dataset	Real word data	2M
Lexical Data	Structured data	0.2M
Language Aid and Question Answering		
Dataset	Feature	Size
Spell-Checker	Correct erroneous words	1.5M instances
Grammar-Checker	Correct erroneous sentences	0.1M sentences
SentiWordNet	Find synonymous words	25k words
QA Dataset	Answer questions	0.2M sentences
Conversion		
Dataset	Feature	Size
STT Dataset	Text aligned with speech	10k hrs
TTS Dataset	Text aligned with speech	600 hrs
MT t1	Bangla to English	5M sentences
MT t2	Bangla to other languages	30M sentences
Sentiment and Others		
Dataset	Feature	Size
SD t1	Document-level	25k documents
SD t2	Paragraph-level	70k paragraphs
SD t3	Sentence-level	100k sentences
IPA Dataset	AI assistance data	0.1M sentences
Sign Supported	Text with sign image	5k headwords

SD=Sentiment Detection Dataset; TTS=Text-to-Speech dataset for text-to-audio conversion; STT=Speech-to-Text dataset for audio-to-text conversion; MT=Machine Translation that converts one language to another; IPA=Intelligent Process Automation dataset for machine automation.

As part of the EBLICT project, one of the notable datasets is the Bangla National Corpus. This extensive dataset comprises 40GB of raw text, encompassing diverse text categories, such as informal and formal, imaginative and informative, scripted and unscripted, subjective and objective, and materials from various periods, including precolonial-colonial to contemporary times. It also incorporates linguistic dialects and complexities. The corpus will continually be enriched with new data through ongoing web crawling and scraping capabilities.

Another significant dataset within this project is the Bangla Treebank, which undergoes several primary data processing steps, including data cleaning, normalization, tokenization (splitting text into individual words), POS tagging (labelling words with their parts of speech), NER (identifying named entities in sentences), and shallow parsing (grouping words into meaningful phrases).

To ensure the successful completion of this project, substantial funding is essential. This encompasses the collection of datasets, the development of language models, and the utilization of computational resources. Additionally, recruiting teams of linguistic experts and NLP practitioners is crucial for effective resource utilization and progress.

The EBLICT project aims to promote Bangla NLP, focusing primarily on Modern Standard Bangla and its variations for the benefit of most Bangladeshis. However, despite its efforts, more work still needs to be done in NLP development, especially concerning different dialects, which warrants further research. Given the growing importance of AI, government funding for AI projects and the integration of AI technologies into education are also vital steps for the future. The EBLICT project holds immense value in the realm of Bangla NLP, and its success could mark a significant leap forward in modern Bangla NLP progress.

8.2. Other Notable Endeavours

While the EBLICT project has not yet made its findings accessible to the general public, various other groups have made substantial strides in advancing the field of Bangla NLP. One of the standout contributors is the CSE NLP group based at Bangladesh University of Engineering and Technology (BUET). This group has been profoundly impactful by dedicating itself to training and providing large language models for free use. They are responsible for creating a model known as BanglaBERT, which has significantly influenced how the NLP community utilizes language models. Additionally, the group has released several benchmark datasets geared towards tasks like Natural Language Inference (NLI) and Natural Language Generation (NLG). While these benchmarks may not encompass the full spectrum of Bangla language diversity, their impact on Bangla NLP research and development is undeniably substantial.

Another noteworthy contributor is Bengali.ai, an organization driven by volunteers. Bengali.ai has garnered recognition for its efforts in curating extensive benchmark datasets and organizing numerous nationwide competitions. These competitions have proven inspirational, generating exceptional solutions within Bangladesh and the global community. Areas covered by these competitions include recognizing isolated handwritten characters, speech recognition, and identifying spelling errors, all of which have piqued significant interest within the NLP community.

The Computer Science and Engineering Department at Shahjalal University of Science and Technology has also played a pivotal role in advancing Bangla NLP research. They were responsible for the development of Pipilika, a Bangla search engine. While Pipilika is currently not operational, it profoundly impacted building

the knowledge base and fostering community development in the realm of Bangla NLP. Moreover, this department has made recent contributions in the form of mature datasets for speech recognition and TTS synthesis. Notably, their TTS synthesis dataset includes a practical working solution.

These groups and their contributions have significantly propelled Bangla NLP research and development. While the EBLICT project's outcomes are eagerly awaited, these initiatives have already made substantial headway in advancing the field, ensuring that the future of Bangla NLP is bright and promising.

8.3. Conclusion

NLP is undeniably crucial for improving digital inclusion and fostering technological advancements in less widely spoken languages. However, the current advanced NLP solutions heavily rely on technologies that demand vast amounts of data for effective learning, making the progress of Bangla NLP still in its early stages. The lack of substantial benchmark data, which serves as the foundation for NLP solutions, has been a significant obstacle in this field.

The quality of linguistic representation in existing datasets and foundational models is often subpar. Many NLP developments are conducted hastily, resulting in models and datasets lacking significance and practical value.

The EBLICT project aims to contribute to the development of Bangla NLP by collecting high-quality linguistic data, which can be used to train foundational models and develop task-specific NLP tools. However, EBLICT has not fully addressed widely spoken dialects, possibly due to the convenience of data collection.

Despite this, the EBLICT project marks a significant step toward building linguistic resources for Bangla NLP. Initiatives like EBLICT are pivotal in advancing modern Bangla NLP and should be recognized and encouraged for their valuable contributions. They play a critical role in paving the way for the future of Bangla NLP, ensuring that it reaches its full potential in enhancing digital accessibility and technological development.

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Chapter Nine

Ride-hailing and Delivery Workers in Dhaka
Dimensions of Affective Labour and Precarity in the
Platform Economy

Mohammad Tareq Hasan

9.1. Introduction

The platform economy, also referred to as the gig economy or the sharing economy, has become a prominent topic of discussion in the contemporary world. Many businesses utilising web-based platforms have laid the foundation for the sharing-based economy. While companies like Uber and Airbnb have reached a global scale, locally developed digital platforms such as Pathao, Obhai, Sheba.xyz, Shohoz, have also gained popularity in Bangladesh and serve as intermediaries between consumers and workers (who are skilled, have the necessary tools, and are willing to work as freelancers). A key feature of these digital platforms is that they allow workers to choose work hours and duration.

In the platform economy, ride-hailing and delivery services are expanding sectors and have arguably revolutionised the transportation/service system at the global and national levels. Ride-hailing platforms started operating in Bangladesh in 2016, and raised certain expectations for potential customers and workers. Customers were promised an experience akin to riding their own car, while drivers were assured the feeling of being their own boss (see, for instance, Pathao, 2017a). Through the technological revolution, digital platforms have provided a logistical solution to the transportation problems in Dhaka.

They also introduced certain forms of labour, sociality, mechanisms of control, and disjunctive temporalities that may inform our understanding of contemporary technology. Overall, affective labour is highly integrated into the ride-hailing platform service. Michael Hardt defines affective labour as work that produces "a feeling of ease, well-being, satisfaction, excitement, passion— even a sense of connectedness or community" (1999: 96, see also Dyer-Witheford, 2001; Yanagisako, 2012). Affective labour is generally thought of as what one may call "immaterial labour." This form of labour has assumed

a dominant position in the global capitalist economy, as evident in digital platform work. In today's work environment, workers must engage in affective labour that results in no material and durable goods but produces immaterial outcomes such as comfort, ease, feelings, etc. The digital platform Pathao for example, urges its workers to consider the passenger's perspective (Pathao, 2017a). Affective labour is also critical as competing brands strive to maintain their market shares and a public image. An example of the importance of affective labour in digital platform-based ride-hailing is provided in Box 1.

The chapter aims to explain how collective subjectivities and sociality are produced and reproduced in the production and reproduction of affects, which are directly exploited in the labour process facilitated by digital platform. While understanding the aspects of affective labour in digital platforms is crucial, investigating the nature of precarity and mechanisms of control in new work arrangements is equally important. Hence, the following sections present, firstly, the methodology of the research and an overview of the platform economy, its features, and its role as a catalyst for change, encouraging affect in its services. Secondly, the chapter describes the features of the digital platforms that attract people to its work ecosystem—the use of socio-cultural ethos like independence and the promise of a new identity and profit. Thirdly, workers' testimonies on bonuses offered by these platforms illustrate the nature of affective control. Fourthly, the chapter discusses the linkages between digital platforms' affective regimes and how the workers form unity to overcome the lack of institutional support. Fifthly, by comparing ride-hailing jobs with similar non-platform jobs, the chapter identifies the issue of affect and ratings of services as a mechanism of control. Finally, the chapter examines the tension between the promised future and then uncertainty and precarity encountered by the workers of digital platforms.

9.2. Methodology

In exploring the nature and dynamics of affective labour in digital platforms, this narrative-based study utilises data collected from ride-hailing and delivery platform workers over thirty days between August 2020 and February 2021. The data collection relied on unstructured interviews following a thematic guideline with the platform workers. A total of 50 interviews were conducted. Platform workers who had been working for at least three months prior to the interviews were incorporated into the study. To minimise potential selection biases, research participants were chosen from four parts of Dhaka: Panthapoth/ Dhanmondi, Rampura, Kawran Bazar, and Jatrabari. At times, bikers and auto-rickshaws were approached at road crossings or traffic signals, while car drivers were identified by scanning the ride-hailing applications. Drivers and bikers were also identified for interviews by hailing a ride and using personal contacts (snowballing). Delivery personnel were approached while scouting popular restaurants in different parts of Dhaka, namely, Gulshan, Dhanmondi, and Jatrabari. The study collected narratives through purposeful interviews and relied on ad hoc conversations with drivers and delivery persons while riding or after ordering food via the platforms.

9.3. An Overview of Ride-hailing and Delivery Platforms

Digital platforms purportedly empower consumers to access services that may otherwise be unavailable, such as finding adequate transport (a car, a motorbike, or an auto-rickshaw) with doorstep pick-up and fare estimation before the trip. Additionally, ride-hailing, food, and parcel delivery platforms have created employment

opportunities for thousands. For instance, in 2019, Pathao had more than five million registered users and over 200,000 drivers. In 2020, the Pathao ecosystem included more than 300,000 drivers, food delivery, and courier agents, over 25,000 e-commerce merchants, and more than 5,000 restaurants (Elius & Ahmed, 2020). While serving both potential workers and customers, digital platforms promote affective labour in their business model.

9.3.1. The Business Model

These platforms operate as intermediaries, facilitating contracts between individuals in need of services with those who can provide them, i.e., consumers and those able and willing to work part-time or freelance. For example, ride-hailing platforms allow individuals with a car to "share" rides with others for payment while travelling to their destination, creating a mutually beneficial arrangement. Platform companies hire workers as "independent contractors" whose services are requested via the digital platform. These workers are not full-time salaried employees on a payroll but are compensated for completing tasks. They can decide when and how much they work with predictable pay for each job. In turn, passengers can request rides as needed without the need for a full-time driver or a vehicle.

Platforms serve as efficient mediums for exchange. This business model enables platform companies to operate and expand without owning or leasing vehicles or employing drivers. Instead of just providing a traditional service, they connect customers and drivers through their platform, creating a dynamic marketplace that connects links workers with job opportunities. Workers on these platforms are independent contractors, exempt from employment and labour laws (Collier et al., 2017). By categorising workers as contractors, digital platforms legally avoid offering employment benefits . Consequently,

platform workers are not entitled to overtime pay, leave, social security provisions, or the collective bargaining rights. While platforms introduce flexibility, they shift the responsibility for maintaining services onto the workers (Bajwa et al., 2018). However, in the context of Bangladesh, one might argue that platform work represents a step beyond informal work which is characterised by oral contract-based arrangements. Additionally, ride-hailing platforms have significantly enhance transportation efficiency, reducing commuting times for many people(Kamal & Ahsan, 2018; Tarek & Amit, 2019). Affective labour has become a vital component within this working relationship of digital platform work.

9.3.2. Promotion of Affective Labour

The ride-hailing platform enforces and promotes a "personal conduct" regime for drivers. They are expected to smile, drive safely, share necessary information, help customers with luggage and other needs, and even adhere to cultural obligations such as honouring guests. While these expectations may not seem imperative, the platform's rating system which documents customer satisfaction (as discussed later), makes "affective labour" an essential aspect of the daily routines in the ride-hailing industry.

Drivers on ride-hailing platforms are not only expected to drive but must also engage with their customers with courtesy and care. Training videos provided by these platforms promote specific features that drivers must uphold, and various mechanisms are in place to ensure compliance (Pathao, 2017b; 2017c). For example, if a driver refuses a trip request or asks passengers to cancel a trip because he does not want to go to a particular destination, and a passenger complains, the platform issues a warning to the driver. Drivers are informed that repeated occurrences of this type may result in no future trip requests or account suspension. To enhance

the passenger experience, drivers are urged to complete all trips. If they do not wish to drive, they are told to use the "stop request" feature.

Platforms continuously introduce new features to improve user experience and encourage drivers to follow the rules. Drivers are instructed not to request passengers to cancel their trips if the pick-up location is far. Drivers receive frequent reminders from the platform to smile while talking with passengers—even when they are rude—telling them that this will earn them a better rating, enhancing their trip requests. Complaints of driver misbehaviour by passengers will result in a warning from the platform (see Pathao, 2017d). These different measures by the ride-hailing platforms are aimed at grooming and shaping how the drivers may interact with the passengers, thereby promising the passengers an experience they would not get otherwise.

9.4. Why do Workers Choose to Work for Digital Platforms?

9.4.1. Flexibility in Working Conditions

The perceived flexibility of work hours and an apparently less hierarchical structure, with "no figure of a boss," are major pull factors for workers. Abul Bashar worked as a house driver for two years before joining a ride-hailing platform. He started to work via Uber because it gave him a flexible work schedule. In his previous job, he had to work long hours, did not get breaks when he wanted, and sometimes could not eat or pray on time because his employer needed to be driven somewhere. He says:

"Uber has given me the opportunity to be my own boss. Even if I must drive the entire day, no one will ask me to rush or demand anything."

> In any other job, there is no end to a workday until one achieves the day's target. There is no pressure here. I can choose my work hours as per my wish.
>
> —Islam Shaheen, an Uber biker, agrees.

> There is no pressure in our job. We come to work, take the parcel, and as soon as we finish, we can go back after submitting the cash to the office.
>
> —A Pathao delivery person adds.

Thus, digital platforms use a standard narrative of "independence" that is attractive to many.

9.4.2. Ease in Operation and Quick Return from Investments

A quick return from a small investment is also an allure to the job, as pointed out by Zwick and Spicer (2019). An Uber bike rider points out:

> In other businesses, you have to invest much more for a smaller profit. Here, with a small investment, you can start getting profit in no time at all.

Platforms' ability to scout passengers also significantly reduces the time needed to find passengers. Rafiqul Islam, an auto-rickshaw driver, started using the Obhai platform two years ago. For him, the benefit of using the platform is that it has made finding a passenger very

convenient. He explains:

> Sometimes, after dropping off a passenger, we cannot wait there due to a lack of parking space, but with the app, we get a request for a ride as soon as we finish one.

9.4.3. Apparent Inclusiveness

The COVID-19 shutdown forced many to take up platform work of ride-hailing or food/parcel delivery. For instance, Ridoy Mahmud started working for Foodpanda after having to close his business. He knew about this opportunity from a social media platform. He said he needed to have an Android phone and a bicycle or motorcycle to start the work. Already owning a phone, he began by buying a bicycle for BDT 4,000 and later invested BDT 25,000 in purchasing a motorbike. "Joining Foodpanda has rescued me from unemployment," he says.

Indeed, digital platforms provided income opportunities for people in economic distress as they allowed them to earn income using tools they already had (e.g., a car, motorbike, auto-rickshaw, bicycle, smartphone, internet access, etc.) or by investing in such tools.

Box 9.1.
Affective labour in ride-hailing

A promotional video published by Pathao starts with a scene where a woman who apparently has returned from abroad after several years, is waiting for her ride. A Pathao driver gets down from a car, greets her, and requests her to sit back while he takes care of her luggage. The trip starts, and they engage in light conversation. A voiceover states, "Whenever you need to go anywhere, we are here." During the ride, the woman orders food from the Pathao app and the driver collects it for her. On arrival, the driver again assists with her luggage, and when the woman reaches for her purse to pay, the driver says, "No, no, please, you are my guest; let today's ride be a gift." The woman thanks him, and the driver leaves, saying, "Welcome." [The driver asked the passenger not to pay since she was visiting the country after a long time, and he treated her like a guest. By offering the free ride to a guest, the driver was also promoting the platform's effort to give passengers an experience that would not be possible otherwise]. The voiceover continues: "With time, the city has transformed, but people have not changed a bit" [indicating Bangladeshi culture of treating guests with care and affection]. Nonetheless, the woman completes the payment digitally via the Pathao app, and the driver receives a notification. The final scene shows him distributing books to underprivileged children in a school. The voiceover concludes: "With thousands of such young men, the country is progressing, new dreams are built, the future of a new generation is secured. This journey of development should continue on the safest platform. Pathao, moving Bangladesh" (Pathao, 2018). This video establishes a professional identity for drivers and outlines how they should treat passengers, offering a glimpse of the level of service passengers can expect when using Pathao.

9.5. Work Hours and Bonuses in Ride-hailing and Delivery Platforms

Though the ride-hailing platforms are designed to allow drivers to choose their hours of work, the platforms also encourage them to work longer hours with bonus payments. An Uber bike rider described the bonus system:

> If during the working days of the week, a rider can complete 13 trips from 8 a.m. to 12 p.m., he will get 700 taka as a bonus. Afterwards, if the rider can complete another 15 trips between 12 p.m. and 9 p.m., he will get an additional 600 taka every four days or three days a week. These targets vary depending on the peak and off-peak hours.

Besides, in Pathao, drivers and bikers get weekly and daily "quest" targets. For instance, in the Pathao bike service, weekly ride quests from 21–27 November 2021 offered bonuses of BDT 400 to BDT 2,000 if they could complete 50 to 100 bike rides between 7 a.m. and 11:59 p.m. To fulfil the quest targets, the riders must work longer hours. Workers receive rewards for referrals of new drivers/bikers on the platform. When referring, drivers receive a bonus of BDT 2,000 if the new driver completes ten trips within five days of registration. Existing drivers are requested to visit service points to refer to their friends as new drivers. This "bonus for referral" feature induces a particular kind of affective labour as existing drivers help recruit new drivers and do so by introducing the platform and its features to their friends and family. In doing so, the platform can access the personal networks of people that conventional promotion or marketing strategies would not have reached otherwise.

The platform is organised to lure workers into working extensive hours: longer hours mean more income and bonuses for workers. Concurrently however, the app often restricts workers' options. For example, they are not allowed to choose to travel to their preferred destination. This is quite common in ride-hailing services, leading to frustration (Nastiti, 2017). Besides, workers expressed their dislike of the revenue-sharing aspect. Md. Abdullah, an Uber bike rider, said,

> I registered on the app expecting a lot of profit. But once I started, I experienced that they were taking away 20–25% of the income, although I invested money and bear all the running costs.

Delivery personnel can work around the clock in two to three hours—sometimes even longer—shifts. They are compensated based on the number of deliveries completed, with earnings of up to BDT 44 per delivery. Their monthly earnings depend on which batch they are in, in the delivery ecosystem. There are six levels, and the payment rate increases if they perform better—in terms of acceptance rate, actual vs planned work hours, work in special hours, and total work hours—and rise up the performance ladder. A person starts from the sixth tier (lowest batch/level) where they earn BDT 22–35 for an order. To be included in a higher tier, they must accept all requests, make prompt deliveries, and work during the special hours (12 p.m. to 3 p.m. and 6 p.m. to 10 p.m.). The bonuses and modalities of platform work indicate that while the platforms promise flexible working hours, they also place systematic bonus structures that keep workers continuously working. It may be argued that it is the workers' decision to work, but this also highlights their precarity as they remain dependent on platform work due to lack of other earning options.

9.6. Negotiating Digital Platforms' Affective Regime Experience of Ride-Hailing Workers

Drivers or bikers frequently face a challenging behaviour from passengers. As an Uber bike rider, Md. Abdullah recounts:

> The platform estimates the fare, but many passengers do not want to pay if the fare rises above this. Sometimes, passengers request a ride but do not show up or receive our calls after we reach the pick-up location. The company does not do anything in such cases.

Passengers may ask drivers to wait at the pick-up point or make an extra stop during the ride. Occasionally, they may request a pick-up or drop-off location that is inaccessible by road, which can lead to the driver getting stuck, resulting in loss of working time or being late to pick up the next passenger. In cases where drivers decline to wait, passengers can be rude, and occasionally, drivers encounter legal action for parking infractions. As Md. Abu Taleb points out:

"When we complain about such issues [rude behaviour or delays], platforms often disregard them, and sometimes even claim they have implemented a solution, which [for the passenger], has no impact. [When drivers contact the platforms for updates about their complaints, they say they have penalised the passengers. But the drivers believe the platforms always side with the passengers and thus never take any actions against them]."Furthermore, platform workers reveal they must comply with passengers' demands as they rate the services afterwards (discussed in the next section). One Uber received the following message from the platform regarding complaints about his behaviour with passengers: 'As Uber is committed to ensuring a safe, respectful, and comfortable experience for both the drivers and passengers of the platform, it takes the matter seriously if something happens that hampers its standard.' He was carefully monitored, and after several warnings, the platform decided to suspend his account permanently. The driver argued that the platforms always make one-sided decisions and never consider drivers' situations or check whether complaints are true.

9.6.1. Experience of the Parcel and Food Delivery Workers

Delivery workers must interact with customers while bringing their food or parcels. Since they mediate for restaurants or parcel senders, they must face the customers and take responsibility for any discrepancies even though they were not involved in preparing or packaging. Phone numbers used to order are sometimes switched off. Ridoy Mahmud, a delivery rider for Foodpanda, explains that if a customer does not respond or accept the food delivery, the delivery riders must pay a penalty fee (demurrage) if they mistakenly confirm on the application that the food was delivered. When customers do not receive the order, the riders are supposed to return the undelivered food to the platform's office. In these situations, the workers are not compensated for the time or distance it they took to pick up, deliver, and return the food.

Sometimes, customers request delivery worker to buy items from a different shop after picking up the food from the restaurant from which they ordered, burdening them with additional tasks that require extra time without extra pay for which they are not paid. The workers feel obligated to consider such requests which are usually for small items from local shops or cigarettes.

One issue that parcel delivery personnel often encounter is the inability to verify the products they deliver. If the seller sends the wrong or faulty item, the delivery person bears the brunt of the repercussions. Payment for product deliveries is usually made upon receipt, and customers generally inspect the package before making payment. If the order is incorrect, the customer's frustration and anger are directed at the delivery person; sometimes, customers refuse to take the deliveries and pay. Thus, workers are asked to assess the context and are advised to deliver promptly without interacting with customers for too long.

9.6.2. Overcoming the Lack of Institutional Support

Overall, platform workers feel that the digital platform companies prioritise customers' needs, with most support given to users rather than to service personnel.

> Even if we complain about a rider being rude or hitting the driver, the office people just say that they will look into the matter but never come back to us with any solution.

> Sometimes, passengers flee without paying. In such cases, platforms do not help the driver. Rather, they go on deducting their share based on the fare calculation by the app.

Seeking aid from the platform is onerous for drivers and riders:

> For any need, if we call the contact centre, we do not get to talk immediately; sometimes, ten taka is lost before we can even start talking. So, many times, we ignore problems about pick-up, waiting time, or fare disputes.

Platforms have established a system of complaint registration through the app, which replaces the hotline number, but this is cumbersome for many drivers and bikers, preventing them from lodging complaints. The overall system discourages workers from seeking help from the platform. Facing such a lack of institutional support, the drivers of the ride-hailing platform have developed their own platform to help each other in times of need. The Dhaka Ride-sharing Drivers' Union (DRDU) also runs an "emergency group" that drivers or delivery agents contact when needed (for instance, if caught in an accident). Members of that group will go to help the person in need. In addition, they sometimes broadcast such incidents via Facebook Live to attract more drivers into their union. Similarly, if they face a problem, food and parcel delivery workers seek help by sending messages to WhatsApp or Facebook groups, and some of their colleagues will always come to support them.

In digital platforms, while affects manage and control the workers, we find workers using the affects in their favour as well. Thus, while Aneesh (2006) claims that workers in affective regimes may experience "social death," they also develop specific forms of sociality. The relations of sociality surrounding platform work extend beyond the company itself. Many drivers join a particular company either with a friend or because a friend was already working there. Even though workers are required to compete aggressively, they often develop a bond with their co-workers. An analysis of affective labour reveals that labour regimes may generate forms of alienation and intimacy that are complicated rather than in opposition to each other.

9.7. Affective Labour and Rating as a Mechanism of Control

In digital platforms, workers' job performance is primarily evaluated based on customers' satisfaction scores (see Mankekar & Gupta, 2017). The flexibility in the work environment—there is no direct supervision and there is apparent freedom of choice—substantially generates new affective requirements for the workers. A comparison of the features of platform and non-platform jobs (ride-hailing versus traditional jobs as drivers for private employers) is presented in Table 1 to illustrate the significant changes that ride-hailing platforms have introduced.

Table 9.1. Features of Platform and Non-Platform Jobs

	Platform jobs (ride-hailing)	Non-platform jobs (as drivers)
Requisite for getting a job	Platform application	Social capital and network
Work hours	12 hours ++-- (it depends on the drivers themselves)	Around 12 hours
Flexibility of work hours	Somewhat flexible	Low
Breaks during workday	Up to the driver but likely to be few because more work means more money	Moderate possibility
Weekend leave	Up to the driver but pressure not to take leave since more work means more money	One day
Control over the destination	Some control, but it takes around three trips before receiving a trip request of the desired destination	None, but predictable
Stress over providing service	High, because preferences are different for different customers	Less, due to predictability of preferences of the owner
Performance rating	Formalised	Informal
Stakeholders to be engaged with	The platform, every customer and sometimes vehicle owners (if not own vehicle)	Mostly the owner or employer
Possibility of disputes	High	Low
Investment needed	Must manage everything	None
Income	It depends on the amount of work done	Fixed
Possibility of monetary loss	Extremely high	None
Possibility of social support	None (since workers are not regarded as employees)	Moderate to high (from the employers)

Compared with non-platform jobs, e.g., driving for a private employer, platform workers are more stressed as they need to adapt to different customers' varied preferences with every new trip. As the customers' needs and preferences are diverse, disputes are also more frequent. Drivers stress that passengers often claim that they are only asking for minimal consideration. Moreover, the rating system is de facto a technology of control that governs workers. For non-platform jobs, the possibility of a dispute is comparatively low because drivers must only address the more predictable demands of their single employer. Waiting and other requests and issues, such as vehicle maintenance, parking facilities, and fines for illegal parking, do not translate into monetary loss for the driver—they are the responsibilities of the owner or employer.

Platform workers may choose to invest in purchasing vehicles, unlike traditional employees who are not required to own the vehicles they use for work. Despite this investment, platform workers' income can fluctuate significantly, especially if they cannot work long hours for any reason. In contrast, traditional drivers typically earn a fixed income. It is important to remember that there is always a risk of investment loss in platform work. For example, during the COVID-19 pandemic, many drivers became indebted because they could not repay their vehicle loans. Some had to take out additional loans to make ends meet, as they did not receive any financial support from the platform companies. The pandemic also revealed that platform workers have minimal access to social support since they are not legally classified as employees. Due to this, platform workers did not receive any government support during shutdowns. Although many traditional drivers also lost income and/or jobs during the pandemic, they did not face the same risk of indebtedness as platform workers. This is because, on the one hand, they had no loans to repay for their investment in a vehicle.

On the other hand, many of them received support from their employers. Thus, it appears that platforms are set to create more precarious employment and create an illusion of freedom (Zwick, 2017; Zwick & Spicer, 2019). The illusion of freedom that the platform ecosystem creates is illustrated in a comment from a delivery worker:

" The food delivery option has given an opportunity to survive, but it is not incredibly beneficial. There are many problems in this sector. First, the area manager misbehaves. Besides, there is no support or insurance coverage for the delivery persons. If we make any mistake, then we are penalised. Sometimes, technical errors show us active while we are not working. Hence, not delivering any product decreases our rating during that time, and we are deprived of the bonus.

These situations reveal the contradictions inherent to the "sharing" platform economy within the confines of capitalism (Mason, 2015)—the exploitative and coercive labour process in this system is not as clearly observable as it is with industrial workers (Booth, 2015; van Doorn, 2017). Additionally, ranking and rating have become powerful social devices of coercion (Appadurai, 2011; Guyer, 2010). In the regimes of affective labour of ride-hailing platforms, drivers' possibility of a higher rating depends on culturally appropriate affects in interactions with their clients. The drivers are expected to adopt particular affective repertoires—courtesy, familiarity, friendliness, helpfulness, and, above all, caring—thus underscoring the centrality of certain modes of affect to their self-constitution and self-regulating labouring subjects. Workers must labour to please their customers without any control over the consumers' contexts and preferences. Since affective labour depends on interactions, the "output" is always uncertain,

even less so than the worker's control over actual driving. In this respect, all rating-based service sector work is different from working in a factory producing any sort of material product.

One can readily identify the alienation of the contemporary work process; stringent monitoring produces a form of alienation. Platforms automatically record the times drivers log in and out of a platform. Depending on their services, they are graded on a scale of 1 to 5. If a worker consistently receives a low rating, he misses out on different benefits, and if a complaint is lodged against him, his account is suspended. Platforms' time discipline means that drivers have to meet strict hourly or daily targets; at the same time, because customer satisfaction is paramount, they hesitate to rush through a trip; finally, if a passenger has made the driver wait, he still needs to adopt the right affect so as not to upset the customer.

9.8. Promised Future Vis-à-vis Uncertainty and Precarity

Digital platforms have attracted many with a promise of steady income and inclusiveness. They constituted a shift from oral contract-based arrangements for transport towards a more formalised arrangement where the destination and price of the trip are set before the passengers and drivers meet. It also promises a more stable life for workers and a new identity, as promoted by stickers on the vehicles [distinctive brand markings on the the cars operating for the ride-hailing platforms], and in some cases, uniforms. However, this shift from uncertainty towards stability does not always materialise: instead, drivers experience disjunctive temporalities.

During the three-month shutdown in Dhaka that began on 26 March 2020 due to the COVID-19

pandemic, platform drivers were left without work. For many, the ride-hailing platform was their main source of income. However, in the initial weeks of the pandemic, platform services were only permitted for parcel or food deliveries, preventing many people from earning an income.

R. Ahmed, a third-year student at a public college in Dhaka, worked as a driver for a ride-hailing platform for two years. During the first six months, he rented a car to drive for the platform. Subsequently, he took a loan with interest from a private bank and bought a motorbike. He earned around BDT 50,000 per month using the ride-hailing platform. He usually worked from 8 a.m. till 6 p.m. every day. From that income, he paid back BDT 10,000 each month for his loan. With the rest of the money, he took care of his family. Then, the COVID-19 shutdown came, and he told a journalist (Tipu, 2020):

> I am now without any work, and my savings are almost gone. I am living a woeful life right now. I am depressed thinking about the instalment payment of the bike and other things.

Ride-hailing workers had to borrow money from relatives to survive the shutdown days. A few other comments reveal the extent of desperation faced by the platform workers during the COVID-19 shutdown.

> Everyone [not in platform jobs] received salary and other benefits during the shutdown period. However, we did not get any support from anyone. And if we ride in contact now [own arrangement bypassing the app; they wait at the road intersections for passengers and haggle a price for the ride], we are penalised [fined by the police for making their own arrangement with customers and/or for violating the COVID-19 guideline to avoid passengers on a motorcycle].

Another Uber driver reported:

> During the shutdown period, we did not get any support from the platforms. We had to take out a loan to survive these three months. Now, after the service is resumed, the platforms take 25% of the income. They continuously ask us to deposit the dues [in Uber's digital/mobile banking account]. If we do not clear the dues, there is a possibility they might suspend our accounts. On top of this, we must spend more money on maintaining health guidelines. [In November 2021, Pathao reduced its commission for bike trips to 10% during peak hours (8 a.m. to 11 a.m. and 5 p.m. to 8 p.m.) and 15 per cent during off-peak hours (Hasan, M., 2021)].

Therefore, the digital platform's promise of bringing better days for workers has not materialised for many. As previously mentioned, digital platforms do not only promise point-to-point transport but also an experience of luxury and comfort. Based on the service, customers rate the drivers. Additionally, the platforms give targets of different magnitudes that the drivers must complete in the stipulated time. Because of the rating system and targets of the platforms, drivers must work during the so-called peak hours, and to achieve their targeted number of trips within particular times, they must continuously work. This means that sometimes they work while their families are asleep, and, conversely, they rest when their families go about their daily lives.

Many platform workers, such as drivers and delivery persons, do not envision themselves working for the platform in the long term. Instead, they aspire to save enough money to start their own small business. Their desire to move on from platform work is mainly influenced by their

experience in this line of work. A driver reflected that:

> If anyone works for a company [government or non-government], they get service benefits when changing jobs or retiring. However, in the platform economy, even though we will work for many years, retirement benefits are not provided.

These responses remind us that every work arrangement has possibilities of "derangements" and "rearrangements" within its own functioning (Povinelli, 2014). As we have seen throughout the chapter, when new technical innovations allowed a new form of work arrangement, it continuously used and created affective performance of various sorts—as an important feature of the service and as a mechanism of control. The flexibility that initially appeared as a benefit has made them vulnerable to different forms of disruption (Bailey, 2016; Berg & Johnston, 2019). Hence, it can be argued that the "democratisation of work" has, in fact, stripped workers of many of their rights.

9.9. Conclusion

This chapter delves into the ways technology uses and shapes affective features within the contemporary labour process. The affective labour undertaken by workers and its evaluation is, quite literally, mediated by information technology. The assertion is made that the production and modulation of affects in the service sector, mediated by digital platforms, play a crucial role. The distinction between digital platform (service) workers and workers in other sectors lies not in one being affective and the other not, but in the different positions that affect occupies in each production process. In contrast to the work of factory workers, agricultural labourers, and artisans, where the production of affects is not at the core of the process or its end product, digital

work environments focus on managing affect and achieving "customer satisfaction."

Analysing digital platform work through the lens of affective labour allows us to discern the convoluted temporalities generated by the labour process and the imposed work discipline. Furthermore, conceptualising the work of digital platform workers as affective labour highlights that social values and affects are not just epiphenomena but intrinsic to the productive process in the contemporary world. In essence, emphasising the affective labour of platform workers underscores the institutionalisation of the production of affects (Mankekar & Gupta, 2016). To sum up, it is crucial to scrutinise how labour manifests affectivity in diverse cases, especially in labour contexts shaped by information technology. Thus, the chapter posits that the affective regime gives rise to forms of alienation and intimacy that are co-implicated rather than mutually exclusive. Additionally, it traces how relationships of affect are constructed through labour processes, prompting a reevaluation of the relationship between affective labour and technology in contemporary times.

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Acknowledgements

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BIGD is a social science research and post-graduate teaching institute of BRAC University.

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