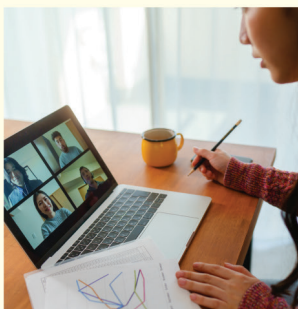
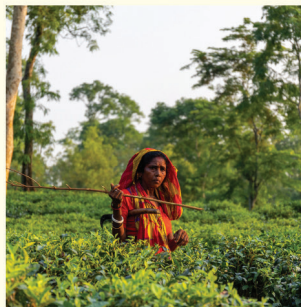


"THIS VOLUME, IT IS EXPECTED, WILL BE A PATHWAY FOR YOUNG MINDS TO INNOVATE AND REIMAGINE THE FAST CHANGING WORLD, WITH JUSTICE, OPENNESS AND DIGNITY."

EDITORS
AMENA MOHSIN & NILOY RANJAN BISWAS



FES BANGLADESH PRESENTS

TECHNOLOGY, INNOVATIONS AND WORK: POLICY OPTIONS FOR BANGLADESH

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Technology, Innovations and Work: Policy Options for Bangladesh

Technology, Innovations and Work: Policy Options for Bangladesh

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Dhaka, November 2021

Contents

About the Contributors	5
Acknowledgements	9
Foreword	11
Introductory Remarks	13
<i>Amena Mohsin</i>	
<i>Niloy Ranjan Biswas</i>	
1. Women and Technological Changes in the Agriculture Sector of Bangladesh: Adaptability and Policy Options	25
<i>Shah Muhammad Salahuddin and Syeda Tanzia Sultana</i>	
2. Business Processing Outsourcing (BPO) Sector and Its Role In The Future of Work For Women	51
<i>Omor Ahmed Dhali</i>	
3. Automation, Apparel Industry, and Female Employees: Current Conditions and Future Strategies	75
<i>Shuvro Sen</i>	
4. Participation of Women in the Information and Communications Technology (ICT) Sector of Bangladesh: Low Participation and Policy Options	105
<i>Md. Rafiqul Islam</i>	
5. Impact of the Internet and Organisational Innovation on Labour Productivity: Firm Level Evidence from Bangladesh	125
<i>Sharif Md. Essa</i>	
6. Policy Innovations and Practice in Solid Waste Management: A Study on Households and Waste Cleaners in Dhaka City	143
<i>Abdul Fattah</i>	

7. Water Transit and Its Challenges and Opportunities in Bangladesh 171
S. M. R. Arfanul Alam
8. Growth, Export and Domestic Demands in Bangladesh: The Road to the New Phase of Development 185
Syed Ashikur Rhaman
9. Impacts of Trade Liberalization Policy on Reversing Gender Differential Income: Evidence from Selected Ready Made Garment Industries in Bangladesh 207
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Amena Mohsin

Niloy Ranjan Biswas

Dhaka, November 2021

Foreword from FES Bangladesh

When we look back at the formation of Friedrich-Ebert-Stiftung (FES) in Germany and its original goals, then we see it started as a sort of scholarship fund to promote education and participation of young people, back then mostly from the working class. From then onwards, FES has traditionally been putting a special focus on the roles of young people in strengthening democratic institutions and ensuring equitable and sustainable development. FES believes in young people's new ideas and potentials as future leaders in different strata of society.

More than 33 percent of Bangladesh's total population represents youth aged between 18-35 years, and thus Bangladesh's dependency ratio is low for having large working-age population. On the other side, the country is facing challenges of youth unemployment – that was 11.9 per cent in 2019. But the COVID19 pandemic has made the situation worsen – youth unemployment was expected to go up to 20.5 per cent in 2020. In addition, the numerical advantage lies in the potential to influence the political direction and support socioeconomic development. In this context, government, businesses and all other sectors are repeatedly telling to get the most out of the demographic dividend, though the full potentials of the younger generation remain mostly untapped. Against this background, FES Bangladesh has been supporting young people to be engaged in policy making and to campaign in contemporary issues for the society and economy.

With this Economy of Tomorrow (EoT) Fellowship for the students and young researchers, FES wants to encourage young people to develop policy proposals and thereby disseminate their new ideas and innovative thoughts with a wider audience including policy makers. Through this process they have been learning to contribute to policy discussion for creating a

democratic and socially just society. Their passion and strong motivation to propose changes have also been reflected in their policy papers. Therefore, we are publishing this volume entitled “Technology, Innovations and Work: Policy Options for Bangladesh” in order to share their papers with a larger community.

We hope the readers and concerned stakeholders will find inspiration and new ideas on contemporary issues, such as of digitalization, automation, informal economy and futures of work.

We are really grateful that the EoT Fellows updated their papers for this publication. Their efforts would not be complete, if we had not received support and cooperation from Prof Amena Mohsin and Dr Niloy Ranjan Biswas of the University of Dhaka. We are indebted to them for their time and intellectual input. We also remember our colleague Kazi Arifur Rahman who tirelessly supported to the Editors and EoT Fellows as well as worked on the formatting to make this book in this shape.

At the end, we are thankful to all other contributors of this book. We are open to receive any kind of feedback from our valued readers and supporters.

Felix Kolbitz
Shadhan Kumar Das

Dhaka, November 2021

Introductory Remarks

Technology has a circular relationship with human beings. It is generally seen, and perhaps, quite rightly so, as an embodiment of human advancement and progress. But with the 4th Industrial Revolution (4IR) in the offing; developing countries like Bangladesh have to factor in the challenges and opportunities that the 4IR brings in its wake. Bangladesh with a leverage of population, which is deemed as a resource base, as Bangladesh's economic development is largely premised on the ready-made garments sector (RMG) and the migrant labour force, both of which are based on the human resources. However, with projections that the 4th Industrial Revolution will see the replacement of humans with technology, the challenges it set forth for countries of the global south are understandable. Here, we bring forth our argument of the circularity of the relationship between technology and humans.

Joseph Stiglitz's seminal work on, *Globalisation and its Discontents* (2002), in many ways explicates this circularity. His treatise on the trade regime may be applied to the technology regime, efficiency, destruction of jobs for the creation of efficient jobs, create risks mostly for those who are least able to cope with them. Exposure to risks outmatches the ability to create institutions for coping with the risks. This results in, if we may borrow from Feldman et.als ed., what is termed as, *Accumulating Insecurity Violence and Dispossession in the Making of Everyday Life* (2011), the state of rightlessness of everydayness tends to normalise the state of rightlessness. This perhaps holds true for many societies and communities across the globe, but then not all societies and states are equally situated, nor are its people. The rightlessness and disproportionality have strong gender and class dimension to it.

The impact of the digital divide (read technological) was most acutely felt at the backdrop of the Covid-19 pandemic. As the

world struggled to come to grips with the economic shockwaves of the pandemic, the virtual virtualisation of the world, often characterised as the ‘new normal’ exposed the fault lines of the dominant paradigms of development and as Maria Mies (2006: 150-157) argues the catching-up theory of development is a myth and this myth is based on an evolutionary, linear understanding of history. In the circular and often cyclical nature of things one may inject the malleable and contextual nature of the principles of freedom, social justice, rights, options and choice. Without going into value judgements, we argue that the malleability and contextuality of the above categories subject them to human subjectivities, the intervening variables being the structure and agency. The latter, we argue is a key variable in challenging the hegemonic. The capabilities, capacity and knowledge based on wisdom, experience drive humans towards innovations, strategisation and adaptation in the material and the cognitive spaces. At this point, the disconnect and connect between the macro and micro is critical to understand and problematise, as each of the category or principles referred to, is interwoven with life and livelihood and indeed work.

Work indeed is as much loaded term with important political, economic and sociological ramifications. The gendered division of labour/work has brought in the binaries of ‘formal’ and ‘informal’ with men supposedly occupying the formal spaces and women being delegated to the informal; what is most problematic about this binary is the hierarchy and value associated with the two categories. The formal is privileged over the informal, this has implications on the power relations between men and women in the society. The digitalisation of the world has also made substantial inroads into the work sector; taking a cue from the capacity and agency approach we argue here that women have adapted themselves here through the virtual platforms of e-commerce and social commerce. But again, the caveat here is the class. Indeed, to make a difference the binaries between the formal and informal, and policy

interventions taking into cognisance the principles of justice, rights and dignity are critical.

This edited volume which comprises of nine chapters, authored by young scholars of Bangladesh, who had received the Economy of Tomorrow (EoT) fellowship from the Friedrich-Ebert-Stiftung (FES), Bangladesh is an endeavor towards making this difference.

The EOT Fellowship

FES has been offering this fellowship from 2015 till to date and encourages Bangladeshi young early career researchers to investigate the transformative trends of social and economic development, technological and social innovations, factors of social balancing, ecological sustainability, and gender equality. These policy studies also aimed to investigate the challenges and propose guidelines for a transformational economy, like Bangladesh, to avoid running into any “middle-income traps” in the coming days. The following is a brief summing up of the FES fellowships.

In 2019, FES offered fellowships on Women and the Economy of Tomorrow in Bangladesh. It has addressed the progress of Bangladesh as one of the top performers in ensuring gender equality in South Asia. Innovations in technology have the potentials to influence gender relations and work. It is also evident that a significant number of working women is engaged with the informal sector. Agriculture continues to be the largest sector of employment for women. Still, there has been a steady increase in female employment in the industrial, service, and manufacturing sectors in recent years. In the era of ‘emerging Bangladesh’, ‘middle-income country’, ‘developing country’, or ‘demographic dividend’ roles and participation of women are quite indispensable for shaping up the economy of tomorrow. The fellowship, therefore, promoted a few critical sub-themes. These were:

- a) Automation in industries and employment.
- b) Digital inclusiveness for promoting women's work in service and manufacturing industries.
- c) Digitalising the RMG sector and preparedness and adaptability for female workers.
- d) Technological changes in the agriculture sector.
- e) Emerging information and communication technology and business processing outsourcing sectors.

In 2017, FES offered fellowships on the debates on automation, growth and employment in Bangladesh's evolving digital economy. Innovation and technology imports are critical factors in the industries, especially in the ready-made garments (RMG) sectors. The studies examined the role of the vital stakeholders, such as the government, business sector, trade unionists, and civil society, envisage the automation process to influence socially just, resilient and green dynamic growth for the Bangladeshi community. Furthermore, studies also traced challenges in the contexts of labour participation in the less diverse industries, slow growth of employment and over-concentration for profit in the selected economy sectors of Bangladesh.

In 2015 and 2016, FES offered fellowships for young scholars on the political economy of policy changes in Bangladesh. The scholarship encouraged the researchers to probe the priorities in economic policies and the challenges of their implementation in producing a just, resilient and sustainable society in Bangladesh. It has attracted in-depth policy studies on various reform proposals in the socio-economic sectors, prioritisation challenges, and implementation of development proposals.

The Economy of Tomorrow (EoT) commissioned studies to focus on three crucial policy questions on stakeholders' models, discourses, and coalitions. First, what would be a development model to serve as a 'compass' to overcome

the current economic, ecological and social crises? Second, what would be a convincing new narrative that provides both vision and orientation for upcoming socio-political debates and struggles about a new development path and serves as an alternative to the dominant neo-liberal discourse? Third, who are the stakeholders for a network of reformers and progressive forces to form a broad-based societal ‘rainbow coalition? In a nutshell, the EoT papers offered alternative strategies in their respective areas of investigation and proposed the formation of inclusive platforms to foster the implementation of a future economy. This edited volume has culled out nine write-ups from the reports authored by the recipients of the fellowship over the years. The following is a snapshot of the chapters.

Chapters at a Glance

Shah Muhammad Salahuddin and Syeda Tanzia Sultana (Chapter 1) examine the influence of new technologies on women farmers in the agriculture sectors of Bangladesh. Women’s roles have changed in agriculture with the advent of new technologies. Despite comprising half of the workforce in the agriculture sector, they raise the critical question of accessibility; and whether or not women have equal access to these modern technologies. Women’s adaptability to modern agricultural technology has suffered due to the patriarchal hierarchy of society and a lack of connect between societal values and science. Woman’s adaptation to technological changes is an integrated process. The factors that matter here include gender sensitivity, awareness of women’s rights and responsiveness to the new technologies, and several other socio-cultural factors, which include patriarchal social structures, public-private dichotomy, education, technical literacy, land ownership, time management, and women’s roles in income-generating activities. The chapter highlights the necessity of mainstreaming gender roles in agriculture extension services and relevant capacity-building endeavours. Furthermore, the authors pressed for women’s access to technology, opportunities for employment and training on technological developments all through the agricultural

employment and work sector. The chapter also suggests several programmatic interventions at the community and institutional levels with both state and non-state actors.

Omor Ahmed Dhali (Chapter 2) studies the potentials of the Business Processing Outsourcing (BPO) sector in enhancing women's work opportunities in Bangladesh. Bangladesh has experienced rapid growth in information and communication technology (ICT) sectors and has become an attractive location for global and regional business hubs. However, the BPO industry has progressed steadily at its formative stage with some voice-based services in the domestic market, such as telecommunication, bank, consumer electronics, and healthcare services. This chapter highlighted several challenges for women in this sector; the cultural barriers for women working in the BPO sector are one of the biggest challenges. Moreover, the study also identified discrepancies at the wages with men, long working hours, high-stress work conditions and lack of security in the dwelling places as critical obstacles for women in this sector. The write-up raises the important question of whether and how women are discouraged from working during the night shift due to societal and cultural norms and lack of security in public transports and roads. The study stresses upon micro and macro-level interventions, including export strategy formulation, direct incentive scheme, new capacity development plans by the government and concerned private sector stakeholders to promote the growth of the BPO sector. The author argues that this sector should be able to create more jobs for women in the future.

Shuvro Sen (Chapter 3) discusses the present conditions of women in the apparel industry of Bangladesh and proposes some strategies to cope with the advent of automation in this industry in Bangladesh. Bangladesh has progressed significantly in the apparel sector, positioned as the second-largest exporter in this trade. This trade faced a sharp decline of female workers from 80% to 60% in the last decade. As identified by other studies,

one of the reasons is the rapid automation that popped out semi-or-unskilled women labours from this sector. The author in this chapter examines the policy options for supporting female workers in preparing themselves to face automation challenges. Sen argues that, the strategisation requires more importance to be given to the vocational education policy of the government; and the government may need to ensure more access to education for women. It is to be noted that only by transforming unskilled women into skilled human resources, apparel sectors can accommodate more women. The prejudice on gender roles still exists and the author emphasises that, educating women with appropriate knowledge on digitisation and technology can eradicate the darkness here. Automation may need to be consistent with the social realities, and it can only benefit the economy when both social contexts and automation are mutually constitutive.

Md. Rafiqul Islam, in his study (Chapter 4), raises the critical question on women's participation in the ICT sector: Can any woman work or own an ICT industry in Bangladesh? His empirical interventions demonstrate that the near non-existence of women in the ICT sector is evident in three stages: students, professionals, and entrepreneurs. This paper has highlighted the connecting factors between lower admissions of female students in ICT courses at the tertiary educational institutions, which is reinforced due to lack of interest in similar job opportunities for women. The author also argues that long work hours, job-related stress, lack of day-care facilities for children and overall patriarchal mindset of the decision-makers act as critical determinants of barriers for women in this sector. The study proposes multi-stakeholders' roles in promoting women's equal work rights and opportunities through nationwide campaigns. Corporate sectors should consider gender equity in their human resource policies. Both the government and corporate sectors may need to promote a strict no discrimination policy in offering financial compensations for male and female experts.

Sharif Md. Essa (Chapter 5) discusses the influence of internet technology on organisational innovation and labour productivity in business firms. In the 21st century, the internet has become a significant variable and a critical mode of productions in an economy. Bangladesh is not an outlier here. This paper used the World Bank dataset of nine hundred and thirty-seven firms of Bangladesh and utilised the linear regression model to test the impact of using the internet on labour productivity. The findings demonstrate that organisational innovation significantly increases the internet's effect on labour productivity. The author advocates for the policymakers to consider the lack of the internet as a competitive disadvantage for existing and new firms. Internet technology usage may need to align with the organisational innovation strategy, which would significantly impact labour productivity.

In compliance with the United Nations' Sustainable Development Goal (SDG), Bangladesh is committed to transforming its cities into inclusive, safe, resilient, and sustainable living places for human beings. An efficient waste collection and disposal system is, as Abdul Fattah (Chapter 6) describes in this study, a significant necessary feature of the solid waste management system in Dhaka city to achieve SDG goals and ensure a sustainable economy for tomorrow. The author discusses the perceptions of the households and waste cleaners on solid waste management (SWM) and probes for policy interventions by analysing the challenges of the existing system. Fattah argues that the public remained unaware of waste management practices and the government's national strategy for waste management. In addition, the findings also highlight that waste cleaners were untrained, unskilled, and unequipped, living in a marginalised community under poor socio-economic conditions. It is of utmost significance that the government reviews its solid waste management policy through innovations in ideas and practices. This further requires programmatic interventions, such as capacity development of workers, health facilities and other incentives for their efficient services.

S. M. R. Arfanul Alam (Chapter 7) examines the state of water-based transits and its various challenges in Bangladesh. This chapter describes the circumstances relating to the water transit agreements, existing facilities, and future directions to benefit from the system. The author argues that, a lack of infrastructure facilities make the existing ports 'underdeveloped' for forthcoming business volumes. There are loopholes in the bilateral agreements on water transit issues that may not have served the national interests of Bangladesh. Significantly, Bangladesh should focus more on developing a good number of riverine ports and collaborate with neighbouring countries. The author finally proposes that Bangladesh should formulate a comprehensive policy framework for its water transit facilities. In addition, fixing the existing problems at the ports should not exclude the plight of the individual stakeholders, such as fees, ecosystem and preventing anti-dumping and anti-pollution activities.

Can a neo-liberal growth only model describe the patterns of development of a state? Syed Ashikur Rahman (Chapter 8) answers the question in the context of Bangladesh's nearly five decades' history of growth. Bangladesh's journey of growth and development had undertaken discursive paths in which it had emphasised export-friendly national strategies. Questions have always been raised from different quarters, whether or not a neo-liberal policy suffices the need of a country, such as Bangladesh, in a turbulent world system; as the author addresses in this chapter, the challenges to this system highlight anti-globalisation movements, financial crisis, the rivalry between powerful states, north-south divisions, and the like. Bangladesh had not yet attempted to prepare an alternative pathway towards economic development. Until it does so, it might not be prepared to overcome future constraints towards growth and achieve sustainable economic development. The author proposes a dual-track strategy, in which the export demands for goods, such as ready-made garments, will be supplemented by the

demands for other domestic goods and services. Diversification of comparative advantage is a necessary policy intervention for Bangladesh. It will reduce the vulnerability of Bangladesh in times of external economic shock.

Liberalisation of international is a crucial feature of national and global economies in contemporary times. Pro-liberal have argued about equal rights who would enforce liberal regime. How did gender differences exist in a liberal trade system? Mahbuba Khadija Kanta (Chapter 9) studies the impact of trade liberalisation on gender-based differences in wages with a particular reference to RMG sectors in Bangladesh. For sustainable development, the chapter argues that the domestic economic infrastructure should create scopes for greater market access for our products to be exported to more affluent nations through a global partnership. For Bangladesh, the RMG industries have shown persistent promising features in export-oriented trades and business. It is making significant contributions to our export income and the economic development of our country. The need for a cheap and flexible workforce has led to the concentration of female workers in the RMG sector. The recent global pandemic has had catastrophic consequences for many workers in the RMG global supply chain, including Bangladesh. It further explores the welfare effects of Post Trade Liberalization employment on gender wage equality conditions in Bangladesh's RMG Sector. This chapter conducts a wage decomposition analysis and demonstrates that a gradual increase in school enrollment rate, work experience, skill training programmes and positive attitude towards female workers have created an inverse scenario regarding their monthly earnings and economic empowerment. Female empowerment needs to be unpacked with appropriate policies, institutions and financing.

This volume is, as stated earlier, is a pathway for young researchers and young minds to make a path way for a fast-changing world in which to innovate, imagine and reimagine

a world of dignity and equality and it is expected that the concretisation of the process would make a difference.

Amena Mohsin
Niloy Ranjan Biswas

Dhaka, November 2021

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CHAPTER 1

Women and Technological Changes in the Agriculture Sector of Bangladesh: Adaptability and Policy Options

Shah Muhammad Salahuddin
Syeda Tanzia Sultana

Introduction

Agriculture can be considered the backbone of the economy of a developing country like Bangladesh. After independence, the country has made substantial progress in agriculture production. However, the agriculture sector has made less contribution to the fiscal years (FY) compared to the industrial and service sectors. To upgrade the contribution of this sector, different modern technologies and methods, particularly in irrigation, have been introduced in response to the Third Agricultural Revolution after conducting several grassroots research. According to the Ministry of Agriculture (MoA), Bangladesh has produced 415.74 lakh metric tons of grain cereal during FY 2018-2019 (Finance Division, Ministry of Finance [MoF], 2019), which amounted to 180.8 lakh metric tons in FY 1994-1995 (MoF, 2005). The grain cereal production grew almost 235% between 1994 and 2019. The Bangladesh Bureau of Statistics (BBS, 2020) data shows that the agriculture sector contribution to the GDP was 14.23% in FY 2018-19. These facts pointed out that due to the adoption of technology, the country has become self-sufficient in producing food and getting maximum output from the land.

Indeed, a vast segment of the country's population is dependent on this sector. The agriculture sector employs 40.60% of the total workforce (Ministry of Planning [MoP], 2020). In rural areas, more than 50% of females are engaged in this sector (Food and Agriculture Organisation [FAO], 2011). From pre-harvesting to the post-harvesting period, they are involved in a

wide range of activities. Over the years, in the harvesting process, various agricultural technologies like axial flow pumps, low lift pumps, deep and shallow tube-wells, along with fertilizers and pesticides are promoted to increase yields and incomes, save time, ensure nutritional security, empower women and increase their participation. However, women do not have equal access to these technologies (Rahman, 2000; Parveen, 2008; Munmun, Sarkar, Haque and Kabir, 2015; Quisumbing, Roy, Njuki, Tanvin and Waithanji, 2013; Mamun-ur-Rashid, Kamruzzaman and Mustafa, 2017). Women producers can perform as efficiently as their male counterparts, if served with equal access to different technologies, training, and services. An estimation of the Food and Agriculture Organisation (FAO) states that if women enjoyed the same access to productive resources as men, they could enhance yield on their land by 20-30%. This increase could uplift the total agricultural output in developing countries by 2.5-4% and trim down the number of starving people in the world by 12-17% (Mamun-ur-Rashid, Kamruzzaman and Mustafa, 2017).

Considering the importance of women's access to different productive resources, Bangladesh has tried to promote women's access to modern technologies through various policies, strategies, and activities. However, these undertakings are yet to derive benefits for women. Against this backdrop, the chapter argues that women's adaptation to agriculture technology is a holistic and integrated process that depends on diverse variables. In this regard, the chapter purports to find answers to three questions: How do different variables influence women's adaptability to technological change? How are women adapting to modern agricultural technology in Bangladesh? How can Bangladesh ensure women's equal adaptation to technological change in the farming sector?

The overall research followed a qualitative method. Data has been collected both from primary and secondary sources. These included (a) Literature Review for qualitative/textual data;

(b) In-depth Interview; (c) Key Informant Interviews (KIIs) with practitioners, academics, and analysts. Literature was collected from various sources, e.g., government and non-government documents, academic journals, books, and newspaper articles. In-depth interviews were taken over the phone between July-September 2020 from twenty-two respondents (sixteen females and six males) who are currently involved in the agriculture sector of Bangladesh. All the persons interviewed were from Naogaon, Bangladesh. With an area of about 3,435.67 square kilometres, 80% of the district is under cultivation. More than 74.29% of the population depends on agriculture for survival. Currently, it is the top listed district in terms of rice production (BBS, 2013). Interviews were taken from four upazilas of Naogaon district viz Badalgachhi, Manda, Mohadevpur and Raninagar where four types of cropping patterns, e.g., single cropped area (SCA), double cropped area (DCA), triple cropped area (TCA) and quadruple cropped area (QCA) are observed. The expert interviews were also taken to balance the data found in the fieldwork. Though the chapter intended to collect micro-narratives, due to the unprecedented COVID-19 situation, it was not possible. Moreover, KIIs were also conducted virtually.

Understanding women, agriculture and technology: International and national perspective

It is evident from the existing literature that the role of women in agriculture has changed, and participation in various activities has dropped. According to the FAO, 42.2% of the agricultural workforce in developing countries is women (Dossa, Meinen-Dicka, Quisumbinga and Theisa 2018). However, the transformation of the conventional cultivation system to a high yielding cultivation system has a widespread impact on the participation of women.

According to eco-feminists, with the interventions of technology, the role of women in managing agriculture systems has shifted from being primary producers to subsidiary workers (Shiva, 1988; Sontheimer, 1991). Hence, Western models of the

Green Revolution eroded sustainable indigenous agricultural knowledge and methods which were acquired by women for centuries, as argued by Sobha (2007), Sachs and Alston (2010), Satyavathi, Bharadwaj and Brahmanand (2010), and Kaur and Sharma (1988).

Ignoring women as agriculture producers and resource managers hinder sustainable agricultural production in developing countries. Thus, it is essential to analyze different variables that play crucial roles in adapting women to these technological changes. Satyavathi, Bharadwaj, and Brahmanand (2010) highlighted the intra-household allocations of labour, income, and access to land as factors determining women's ability to benefit from the change. In contrast, Kingiri (2013) identified time and mobility, socio-cultural constraints, workload, and representation in agricultural groups as important forces to implement the newly developed technology. Umeh (2016) argued that women's adaptability largely depends on gender responsiveness of agricultural technology development, design, compatibility with physiology, and generation and transfer.

Bangladesh has already adopted numerous technologies—(i) Agrochemical technology and (ii) Agro-mechanical technology—in response to the Green Revolution (Kashem and Faroque, 2010). Focus on agriculture development is further amplified by adverse impacts of COVID-19 in the industry and service sectors. However, sustainable growth of the agricultural sector highly depends on equal adaptation to technology amongst all agriculture workforces. More than 50% of women are directly engaged in agricultural activities. Women participate in almost all stages of the crop production cycle.

Although women are crucial parts of crop production and the food security system in Bangladesh, according to Meghna Guhathakurta and Sanzidur Rahman, despite these, women tend to be unrecognized and undervalued in the agricultural sector of Bangladesh, owing to the prevailing cultural norms that

value female seclusion. This devaluation is further amplified by introducing modern technology that has changed the nature of work for women farmers. For instance, earlier *dheki* were used by women to thresh rice, but now rice is threshed in the mills (Rahman, 2000; Guhathakurta, 2018). Hence, it is evident that they have limited access to modern technology.

Consequently, through different policies, strategies, and activities, Bangladesh has tried to promote women's access to modern technologies and extension services. DAE formulated the New Agricultural Extension Policy (NAEP) in 1996, the National Agriculture Policy (1999), the National Agriculture Policy (2018), and two strategic plans (1999-2002, 2002-2006) to mainstream gender in the agriculture sector. Besides, the National Women's Development Policy, 2011 and Seventh Five Year Plan also emphasize innovating and importing women-friendly technology. Despite these initiatives, women in Bangladesh remain largely unreached by agricultural technology (Haque, 2010).

Technological changes affect women in two ways, e.g., workload has been increasing for women of farm families, and they are being displaced from the hired labour market (School of Environment, Resources and Development [SERD], 1997). Studies found that the number of working women members is negatively associated with agricultural technology and skewed in favour of men (SERD, 1997; the State of Food and Agriculture [SOFA], 2011; Quisumbing, Roy, Njuki, Tanvin and Waithanji, 2013; Sraboni, Malapit, Quisumbing and Ahmed, 2013). For example, 43% of women have no access, 25% rarely have access, 18% occasionally have access, and 11% frequently have access to modern technologies (Parveen, 2008). Also, most women do not even know much about government extension services (Karim and Noman, 2018).

Identification of the variables is crucial to bridge the gender gap in crop production. Though the study on the effect

of the Green Revolution in Bangladesh is widely available, factors determining women's adaptation to new technologies are absent. From the existing literature, it is evident that scholars who researched gender and technological changes in agriculture, identify intra-household allocations of labour, access to land, time and mobility, socio-cultural constraints, workload, gender responsiveness of agricultural technology development, and representation in agricultural groups as important variables in determining women adaptation to the technological changes. However, these determinants are context specific and varies from country to country. Hence, the present chapter attempts to consider only those factors that are of great importance in determining the adaptation of women to latest agricultural technologies in the context of Bangladesh

Major findings

The study found that women's role has changed significantly with the adoption of technology in the agriculture sector. In some cases, they become subsidiary agriculture workers; in other cases, they become equipment managers or primary producers. Moreover, women involved in agriculture use different ways, such as exchanging knowledge, sharing reproductive work and managing time, to adapt to these changes. However, these roles and ways vary from person to person, depending on a diverse set of variables. Hence, the chapter based on prior evidence-based research, KIIs, and in-depth interviews, identify the patriarchal social structure, public-private dichotomy, education, technical literacy, land ownership, time management, and women's triple roles, mainstreaming gender in training and agriculture extension services, employment opportunity, technologies' compatibility with women physiology, modern agricultural knowledge and compatibility with indigenous technical knowledge as important variables determining women's adaptability.

Patriarchal social structure

In Bangladesh, the patriarchal social structure reinforces a stereotype in which technologies, such as combine harvesters,

wheat threshers, harvester, tractor, are for the most part, identified with masculinity. Some specific manual labour, e.g., hand pounding, maize shelling, and hand threshing, are synonymous with femininity (Karim and Noman, 2018). This perception certainly creates a negative attitude in society to accept women into operating a machine, thus, discouraging and demoralizing women to adapt. One of the female farmers stated:

“A paddy thresher!! Men mostly use it. What will people say if I operate it!” (Authors’ interview with a women farmer, 05 July 2020, Naogaon, Bangladesh)

Another female farmer stated,

“Being born and brought up in a wealthy peasant family, I have been introduced to most of the machinery that my husband uses; I know how to operate, but I do not manage those.” (Authors’ interview with a women farmer, 12 July 2020, Naogaon, Bangladesh)

The interviews found that most peasant women do a significant proportion of the work involved in pre-and post-harvest operations that are done in the home compound rather than in the field. While hired women agriculture workers go for harvesting activities, such as irrigation, due to the use of the water pump, many women are not involved in such activities nowadays. Consequently, women’s role shifts from primary producer to subsidiary workers.

Public-private dichotomy

The patriarchal culture has created a public and private divide for women that identify the domestic sphere as a woman’s place. Such division also restricts women from going to the public domain. Again, this public-private dichotomy of women is accelerated by gender protection norms. According to Bangladesh Peace Observatory (BPO, 2019), gender-based violence increased by 69.49% in 2019 compared to 2018. From the interviews, it is found that being subjected to threats on the way to work by the miscreants and street dwellers, by the bus

passengers sitting nearby, are common. Due to these insecurities, often, females are not directly confined but discouraged from going outside and to training centres. One of the female farmers stated: “When I wanted to go with my husband to the training centre, he rejected it due to the risk of harassment by having inappropriate contact with other men.” (Authors’ interview with a women farmer, 12 July 2020, Naogaon, Bangladesh)

A spokesperson from Bangladesh Mohila Odhidoptor, stated, “In the context of the rural agricultural society of Bangladesh, gender discrimination itself is a mindset by which women are exploited and given unequal opportunities to facilities. (Authors’ interview with a gender expert, 17 August 2020, Dhaka, Bangladesh)

On the other hand, an exceptional case has also been found where a woman farmer, went to the training centres accompanied by her father-in-law. Explaining patriarchal social structures, a gender expert from the University of Dhaka stated, “To what extent these patriarchal social norms and beliefs influence women’s adaptability also depends on education, technical literacy, and women’s land ownership.” (Authors’ interview with a gender expert, 17 September 2020, Dhaka, Bangladesh)

Education

No education or less education is a barrier to the development of the agriculture sector. Illiteracy refrains rural women from adapting to technology. Women farmers who have at least completed primary or secondary level education add more value to this sector than illiterate women. The husband of a female farmer stated, “I cannot even sign properly, but my wife can read and write. She helps me to buy the right medicine and mix them up to apply to the fields.” (Authors’ interview with a male farmer, 25 July 2020, Naogaon, Bangladesh)

Women who even have a primary level of education are adapting to new technologies swiftly though they are very few. A female farmer who studied up to class ten said she gets

invitations often from several training programmes. Therefore, she knows about most of the modern agricultural technologies introduced in their area. In this regard, a gender expert from the University of Dhaka stated, “Education is essential for the development of the agriculture sector. It is not the primary factor for women’s adaptation to technology.” (Authors’ interview with a gender expert, 17 September 2020, Dhaka, Bangladesh)

Technological literacy

Technological literacy and adaptation to agricultural technology have close linkages. There is a strong association between motivation, opportunity, and technical literacy. Farmers who have no or less technological literacy do not try to adapt to new technologies. Instead, they prefer traditional tools and techniques. A female farmer stated:

“We cultivate a vast amount of maize; it takes a lot of time to shell those. I know a maize sheller can reduce my effort, but I am fearful of the sound and vibration of the machine.” (Authors’ interview with a woman farmer, 28 September 2020, Naogaon, Bangladesh)

Sometimes, women farmers and agriculture workers try to bridge the technological literacy gaps through sharing knowledge and experience. There is a female agriculture worker who is also illiterate but adapted herself to a maize sheller easily, and her role has been shifted from subsidiary worker to equipment manager. It was possible because her husband shared his knowledge and experience and bought her a maize sheller machine.

Land ownership

Land ownership is closely linked with the adaptation to agricultural technologies. In Bangladesh, ownership of land is governed by the “religious personal law”. However, these laws are profoundly discriminatory towards women. Due to these long, widespread practices, all the decision-making powers

have shifted into men's hands. Besides, agricultural extension programmes select farmers based on land size, excluding many women agriculture labourers from extension services. A spokesperson from Research Initiative Bangladesh said:

“In Bangladesh, brothers systematically take all properties from their fathers. Thus, women do not have the entitlement of property ownership, which further adds to the list of reasons that make them vulnerable and unable to get ahead.” (Authors' interview with a gender expert, 21 September 2020, Dhaka, Bangladesh)

A spokesperson from the Bangladesh Institute of Labour Studies said, “Gender discrimination is a process by which women, because of their sex, do not get equal inheritance rights.” (Authors' interview with a gender expert, 30 September 2020, Dhaka, Bangladesh)

The study found a widow who did not know anything about agricultural technology before her husband passed away. Now, she has become the primary producer on the family farm, as well as a user of agricultural technologies.

Management of time and women's triple roles

In the rural society of Bangladesh, women's work includes reproductive role, productive role, and community managing role, while men primarily undertake productive and community political activities (Mamun-ur-Rashid, Kamruzzaman and Mustafa, 2017; Aliyu, 2016). Although both men and women perform multiple functions, through in-depth interviews, it has been found that men typically play their parts sequentially, focusing on a single productive role, while women usually have to perform multiple roles simultaneously, balancing the demands of each, within their limited time constraints. Despite having the eagerness to learn and use technology, lack of time due to these multiplicities of roles and the training programme schedule, reduce the opportunity for women to participate in agricultural extension services (Mamun-ur-Rashid, Kamruzzaman and

Mustafa, 2017; Alliyu, 2016). The interview also found that the timings of these training programmes was mainly from 10 a.m. to 2:00 p.m. During this time, women are busy with their household and family roles. A female farmer stated, “When I asked my husband to take me with him to the centre, he refused because if I went there at this time, there would be no one to finish the cooking” (Authors’ interview with a female farmer, 17 September 2020, Naogaon, Bangladesh)

In contrast, managing time and sharing triple roles help women to get enough time to participate in agricultural extension training programmes and remain informed. One female farmer described:

“My husband pulled a rickshaw in Dhaka. We have a piece of land where we cultivate crops. Last year I joined an extension programme. My sisters-in-law took care of household chores and the children.” (Authors’ interview with a woman farmer, 12 September 2020, Naogaon, Bangladesh)

Rural women and girls spend almost 13-14 hours per day collecting firewood and biomass. Without electricity, other household tasks such as food processing are far more complicated and time-consuming. Lack of access to energy and water dramatically increases the triple burden borne by women. Due to these burdens and time schedules, most female farmers remain in a disadvantageous position to optimize the use of modern technology.

Mainstreaming gender in training and agriculture extension services

Agricultural training is one of the significant components to educate and motivate women who are involved in agriculture. Though government and non-government Organisations have undertaken different programmes to improve agricultural extension, most women have, until recent years, remained secluded from them.

On the one hand, women have been an inconsequential element in most of the programmes. On the other, these programmes mainly centred on insufficient understanding of the concrete dimensions of women's role in agriculture. For example, the National Agricultural Technology Project (NATP), aided by the United States Agency for International Development (USAID), to support the government's strategy to improve the national agricultural technology systems, aims to benefit about one million farmers directly. Of these beneficiaries, 30% of the adopters of new technology and farming practices would be women (World Bank, 2020).

Though gender staffing plays a crucial role in eliciting the participation of women, the number of female extension agents is minimal (Mamun-ur-Rashid, Kamruzzaman and Mustafa, 2017). For instance, among all the DAE extension agents and the Agriculture Information Service staff, only 7% and 12% were female in 2018 and 2019, respectively (MoF, 2019). As a result, women feel uncomfortable attending training programmes. One of the women farmers who participated in a training programme said, "Once, I went to an agricultural training programme; all around me, there were just men and men. That was a three-day programme, but I did not continue after the first day." (Authors' interview with a female farmer, 22 September 2020, Naogaon, Bangladesh)

Employment opportunities

Traditionally, landless women got employed for agricultural production. However, their employment opportunities are becoming thinner day by day because of the high adoption of modern technology with agriculture and less adaptation to women. A mid-aged woman who previously worked as hired labour expressed, "No one hires me now to thresh the paddy anymore, but once, I was the top thresher. I am still able to do threshing, but they offer me very low wages! And why won't they? When there are machines available." (Authors' interview with a female farmer, 22 August 2020, Naogaon, Bangladesh)

Another female agriculture labour complained, “We are landless and cannot buy modern technologies. It seems that operating those machines is not a big deal, but how can we learn if no one hires us? Thus, there are no other options left for us but to look for other work.” (Authors’ interview with a female farmer, 25 August 2020, Naogaon, Bangladesh)

As the practice of hiring female labour is gradually going down, they are trying to adapt either by selling their labour at a cheap rate or by changing their traditional job.

The compatibility of technology with women’s physiology

From the perspective of the machinery’s physical characteristics, for example, tractors are large, strong, big, heavy, greasy, and noisy, and it is not very compatible with women’s physiology. Also, the hand sprayers, widely used for fertilizers and pesticides, weigh about 30-35 kilograms. Regarding the physical characteristics of the hand sprayer, one of the female farmers stated that, “My husband usually fertilizes our land. Once I tried to lift the sprayer, but it was too heavy! I had no idea it would be that heavy!” (Authors’ interview with a female farmer, 07 August 2020, Naogaon, Bangladesh)

The compatibility of technology with women’s physiology also depends on how women’s strategic needs are incorporated during the development of these technologies. However, the involvement of women in the research and development is negligible (MoF, 2019). Due to the underrepresentation of women in these research institutes, most of the technologies are not gender-friendly. As a result, women face obstacles to adapt to these changes.

Modern agricultural knowledge compatibility with indigenous knowledge

In Bangladesh, the practice of different indigenous knowledge is prevalent (Kashem and Islam, 1999). For example, as a natural pesticide, birds are allowed to perch in the fields, and neem and leaves of ‘bitter mehedhi’ plants are used to reduce the number of

insects naturally. Ash, cattle wastes, cow dung, and decomposed manure, are often used as fertilizers. For seed conservation, seeds are stored in earthen pots, which are indigenous drum-like containers made of bamboo and sealing the mouth of the pot's containers by mud-layers to make them air-tight (Kanak, Gao and Uddin, 2015). Due to the rise of hybrid rice varieties, the practice of seed conservation and storage has also declined. Hybrid seeds are usually brought to the market and dried in polythene or sacks (Guhathakurta, 2018). However, women farmers prefer applying indigenous knowledge instead of modern scientific methods and remain the conveyor. One female farmer expressed, "We do not buy vegetables from the market as these are already produced; I cultivate plants in my homestead using cattle waste. (Authors' interview with a female farmer, 09 August 2020, Naogaon, Bangladesh)

Organic farming is not only about organic compost but also about maintaining balance in the environment in a natural way. Hence, women's adaptability to new agriculture knowledge requires its compatibility with indigenous technological knowledge.

Policy recommendations

The section broadly categorized the recommendations into two parts 1.) Policy Intervention and 2.) Programmatic Intervention. Policy intervention involves any course of action or activity taken or mandated by national authorities. Programmatic intervention refers to any programme, strategy, activity and service implemented by state and non-state actors in a community setting.

Policy intervention

In-depth gender consideration in policies

Policies related to agriculture have considered women's technology needs in a limited way. In this respect, the Planning Commission can follow the path of Nigeria by formulating a "Gender Policy in Agriculture" to address the gender gap in agriculture development. In formulating such a policy, the Planning Commission can undertake the following steps.

- Firstly, setting the agenda, raising the necessary level of awareness, and sensitization about women's technological needs.
- Secondly, coordination in formulating the policy which includes the participation of multi-stakeholders including agro-corporate sectors and NGOs.
- Thirdly, building national ownership for the policy formulation process.
- Fourth, addressing all relevant sectors while identifying high-priority sectors.
- Fifth, implementation of policy through developing a plan of action and mobilizing resources.
- Finally, setting up a monitoring and evaluation framework to assess the implementation progress.

Recognition, redistribution and reducing unpaid care work

National Agriculture Policy 2018, as well as the different ministries of the government, need to address unpaid women careworkers who are involved in agriculture through proper intervention.

- The Ministry of Finance should incorporate care work into the conceptual framework of GDP. They can include Household Satellite Accounts to measure women's unpaid care work to the GDP within two years.
- BBS can complete a survey to incorporate unpaid care contributions to GDP like the Uganda Bureau of Statistics.
- In their agriculture development strategies and plans, the Planning Commission and the Ministry of Agriculture need to focus more on increasing female labour participation in paid agriculture work to redistribute unpaid care work. In addition, local governments, through public-private ventures at the community level, can undertake initiatives to establish community nurseries for childcare.

- Public-private partnerships (Ministry of Science and Technology along with home appliance making companies like Walton and RFL) are required to introduce and popularize labour-saving technologies to reduce the burden of reproductive work.
- As a means of saving time, the Ministry of Education, can expand pre-school education to four-to-five-year-old children as alternatives to public daycare like Kenya.

Mainstreaming gender in training and education extension service

To enable farm women to quickly adapt to technology, MoA and DAE with the supports of NGOs like BRAC, Shakti Foundation, VSO, etc., need to mainstream gender in their policies related to training and education extension services. In this respect, they can consider the following initiatives:

- Incorporating gender and sociological perspectives in the framework of agricultural extension programming and maintaining the gender ratio of farmers.
- The selection of women should be based on experience, regular time spent in agriculture activities, and proven expertise in agriculture rather than land ownership.
- Facilitating a two-way dialogue between extension personnel and women who are involved in agriculture. Depending on the context of the community, it can be useful to offer learning opportunities for women and men separately and, at the same time, bring both groups together so that they can exchange experiences.
- During the preparation of the different programmes, they can follow the “24-hour activity calendar” method. In this method, men and women jointly reflect on how they allocate their time between different activities for over 24 hours. This gender-sensitive planning method also allows planning activities that will suit men and women who are involved in agriculture equally.

- Promoting rural women's representation by recruiting a significant number of women as the extension and advisory staff. In this respect, they can also conserve quota for women.

Integrating gender variable in agricultural technology research and development

Women's adaptation to agricultural technology also requires the development of gender-friendly technology. In this connection, research and development institutes, e.g., Bangladesh Jute Research Institute, Bangladesh Rice Research Institute, Bangladesh Wheat and Maize Research Institute, Bangladesh Agricultural Development Corporation, Bangladesh Agriculture Research Council, Bangladesh Agricultural Research Institute, and Barind Multipurpose Authority and agro-corporate sectors like Bangladesh Agro-Processors' Association (BAPA), National AgriCare Group, Getco Agri-Technology etc., can follow the Indian Council of Agricultural Research, which developed gender-friendly technologies like hanging type grain cleaners, three-row rice transplanter, four-row direct paddy seeder. In addition, they can:

- Integrate gender analysis into the process of technology generation and dissemination. It can be brought about by creating channels of communication through participatory research and development.
- Assess impacts whenever technology is being introduced to rural women who are involved in agriculture.

Ensuring women's safety

A women-friendly agricultural work sphere also needs to incorporate the policy of law enforcement agencies, the Ministry of Agriculture and DAE, and NGOs like Bangladesh Women's Foundation (BWF), Nari Uddug Kendra, Awaj Foundation, etc. In this respect, they can:

- Introduce agriculture policing and a rapid action system, especially for agricultural fields, to ensure the safety of females involved in agriculture.
- Provide supportive facilities, such as transportation, that can be a significant incentive in persuading women involved in agriculture to attend the extension services.

Incorporation of indigenous knowledge into modern technical knowledge

Women farmers not only rely on using ancient methods and materials, they also experiment and develop new techniques to improve seeds, better manage pests, and conserve food. Therefore, Bangladesh Jute Research Institute, Bangladesh Rice Research Institute, Bangladesh Wheat and Maize Research Institute, Bangladesh Agricultural Development Corporation, Bangladesh Agriculture Research Council, Bangladesh Agricultural Research Institute, and Barind Multipurpose Authority and prominent companies like Bangladesh Agro-Processors' Association (BAPA), National AgriCare Group, Getco Agri-Technology etc., must consider the following steps:

- Women farmers' knowledge must be taken into account before any agricultural technology is developed and disseminated.
- They should continue research on women farmers' indigenous technical knowledge.

Programmatic intervention

Mass media sensitization

The government broadcasts programmes on modern agricultural practices through sixteen community radios. Similarly, Bangladesh Television (BTV), along with satellite TV channels, are telecasting programmes on agriculture and technology. However, these community radios and TV programmes are yet to address women's unmet needs and patriarchal norms related to adaptation to agriculture technology. Thus,

- The Bangladesh NGOs Network for Radio and Communication (BNNRC) can request the Ministry of Information to establish specialized radio for women farmers like African “Her Farm Radio”.
- The Association of Television Channel Owners (ATCO) can advocate the Ministry of Information to establish specialized agriculture-based television channels like ATN News, Gaan Bangla, Duronto TV, Bijoy TV.
- Besides, Agricultural Information Service (AIS) can support agriculture-based specialized TV channels to incorporate women’s strategic needs in their training guides, newsletters, radio, TV programmes, films, etc.

Arranging motivational programmes

The importance of arranging motivational programmes besides extension services is a crucial requirement for Bangladesh. In India, a motivational programme known as the “Digital Green Model” which demonstrates good farm practices to women through videos. The programme currently reaches about 3,300 women farmers in some 60 villages in Maharashtra. Likewise, the Department of Women Affairs of the Ministry of Women and Children Affairs, with the help of DAE, BRAC, BRAC, RIB, Shakti Foundation, VSO, etc., can arrange such programmes to ensure women’s access to technology.

Promoting E-agriculture Service

To provide necessary agriculture information and technology support, the government has undertaken e-Krishi Vision 2025 and launched several e-agriculture services. However, these are yet to reach the rural farmer, particularly women. To promote and support the use of ICTs by women,

- Ministry of Information, MoA, in cooperation with BRAC, RIB, Shakti Foundation, VSO, etc., can establish an extraordinary women’s network under the agriculture extension service of DAE. In this connection, it can follow the path of Uganda, which developed a network titled

“Women of Uganda Network (WOUGNET)” to promote the use of mobile phones as a means to have access to information about best practices and technologies.

- Both state-owned and private mobile operators like Teletalk, Banglalink, Grameenphone and Robi can introduce specialized SIM packages for women involved in agriculture like Oporajita, which will charge a minimum to call help centres.
- With the help of the Bangladesh Telecommunication Regulatory Commission (BTRC), the Information and Communication Technology (ICT) division can establish toll-free agriculture-based helpline centres for women.

Ensuring credit facilities

Even though the government fixed farm loan targets for the current fiscal year at Tk 24,124 crore and the annual Agricultural and Rural Credit Policy and Programme for the current fiscal year gives priority to women in receiving farm credit, women’s access to credit is difficult as they are not asset holders, which is a prerequisite for lending agencies. In this regard,

- Rajshahi Krishi Unnayan Bank and Bangladesh Krishi Bank, along with four state-owned banks, can quickly remedy this situation by providing loans at a lower rate to buy agriculture technology and introducing a longer loan payback period.
- Private Banks and non-financial institutions, e.g., BRAC, Proshika, ASA, BURO-Bangladesh, BEES, CODEC, SUS, TMSS, Action- Aid, etc., can play a vital role in the disbursement of agricultural credit.

Conclusion

This chapter, based on prior evidence-based research, KIIs, and in-depth interviews, found that women’s access and adaptability to these technological changes depend on gender sensitivity, awareness, responsiveness of these revolutionary technological changes in crop production, as well as many other socio-

cultural factors associated with technological developments throughout agricultural methods. Women's adaptation to agricultural technology is a holistic and integrated process that depends on diverse sets of variables. Hence, different ministries, research institutes, along with NGOs, need to undertake a holistic approach to intervene at the operational level to ensure women's adaptability to modern agriculture technologies. Such an approach will develop women's adaptability by intervening at three levels—individual, community, and institutional. At the individual level, interventions include motivational programmes, training programmes, establishing female farmer hubs, which leads to changes in skills, behaviours, and attitudes of the women. At the institutional level, the intervention consists of those measures taken to improve the overall policy, structure, and capacity of the training and education extension services of the DAE and Ministry of Agriculture. At the community level, intervention comprises initiatives undertaken to facilitate infrastructure, public services and raise awareness through media in the society.

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CHAPTER 2

Business Processing Outsourcing (BPO) Sector and Its Role in the Future of Work for Women

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Introduction

Bangladesh has been experiencing robust economic growth since the early 2000s—constantly greater than 6% which positioned the country as one of the vibrant economies in the region (Selim Raihan, 2017). At the same time, the growth is heavily driven by the readymade garment (RMG) sector, which needs systematic diversification to achieve an 8-10% growth over the foreseeable future. The economy is still beset by underemployment and the female labour force participation remains significantly low—women still comprise less than 30 percent of the total workforce in the country. Therefore, Bangladesh needs to focus strategically on diversifying the economy through investing in emerging sectors beyond readymade garments (RMG), as well as promoting inclusive workplaces where these new sectors can create more work opportunity especially for women.

The growth in the ICT sector of Bangladesh has been maintaining a double-digit figure for the last 10 years. Export earning crossed \$ 1 billion in FY 2019-20 and expected to be five-fold by 2025 (Rimax International, 2018). The growth rate is significantly higher compared to established peer locations such as India and the Philippines and even emerging peer locations such as Vietnam. The government of Bangladesh has an ambition to take the industry to a \$5 billion market by 2021. Business Process Outsource (BPO) is one of the key sub sectors which can help Bangladesh achieve its vision. IT service demand in the domestic market is driven by customized software across banking, telecom, manufacturing and few other service sectors.

On the other hand, government procurement has the potential to generate around \$6 billion per annum. The sector has created a wide pool of IT professionals totaling up to 400,000 (IT and ITes industry overview, 2019).

Bangladesh BPO industry has achieved a steady growth, which was only possible due to significant improvement in four core pillars—legalization (company registration), IT infrastructure (hi-tech parks, internet submarine cables, tier-4 data centres), sizeable human resource, and international business development (Ahmed, 2019). The market, sized at \$300 million in 2018, has grown almost 25X compared to that earning in 2012. The sector also generates employment opportunities for women. Recently the government has taken initiatives to empower women in ICT through ‘She Power Project’, where 10,500 women from rural areas will be trained as call centre agents (Kamal, 2018). According to BACCO, the apex trade body of BPO companies, the sector can create 40,000 new jobs if the ‘service sector’ and ‘financial sector’ can be included. Given this backdrop, the BPO sector also faces numerous challenges related to export growth, human capital development, gender diversity, decent work environment, etc.

The purpose of the study is to explore the effort made by the government, understand the private sector dynamics, the role of the trade association and understand the challenges and future opportunities in creating more jobs for women. The findings of the study will help to articulate policy recommendations, which will accelerate the development of the sector in order to support the growth of the economy. The study has the following specific research questions:

- To what extent can the Business Process Outsourcing sector generate more jobs for women?
- To what extent can the current legal and policy framework help sectoral growth, gender balance and sustainability?

- What are the challenges women are facing in the BPO industry?

The chapter is structured as follows. The section A highlights the state of women in the BPO sector peer economic country where BPO is considered as an established sector and contributing in large employment generation. Section B highlights Bangladesh's BPO sector and its role in the future of creating more jobs for women. Section C derives policy and pragmatic intervention to accelerate the sectoral growth. Lastly, section D concludes the chapter.

Methodology

This study was conducted through mix method research designed on three key segments: desk analysis, stakeholder interviews, and a round of focus group discussions.

In the first phase of the desk review, a brief analysis was conducted through reviewing relevant literature to understand the nature of challenges faced by women in peer countries. In the second phase, a policy analysis was conducted through descriptive content analysis to illustrate the policy landscape of Bangladesh's ICT industry and its influence to drive the BPO sector.

Secondly, stakeholder interviews were conducted to understand the market pulse on women's involvement in the IT/ITES sector and identify the sector growth dynamics, challenges and tangible solutions.

Lastly, rounds of Focus Group Discussions (FGD) were conducted with the women working in BPO companies to understand the hidden challenges of women working in the sector and identify potential solutions.

Women and BPO Sector: Challenges and Dynamics

Participation of women in the ICT field is increasing significantly. In the global BPO market, around one third of the workforce

are women. This section has jotted down findings to understand the nature of the challenges faced by women in countries where BPO is considered as an established sector and contributing towards large employment generation. Women choose to enter this sector as it provides white-collar job opportunities with comparatively high salary structure, gender-agnostic work policy relied on knowledge-based profession, and less physically demanding work process with comfortable indoor environment (Patil & Kumar, 2017). Typically, BPO jobs are more lucrative as it requires extremely low to no prior work experience. Many employees ended up in the sector as call centre agents, after failing to find a suitable job in other service industries due to severe competition.

However, women are facing a number of difficult issues while working in the sector. According to (Begum, 2013), night shift work hours for women do not comply with existing labour regulations in India. Hence women workers cannot join any labour unions to raise voice about their rights. In India, more than 45% of the workforce in BPO are women and companies maintain strict security rules, which encourage the families to go beyond the social stigma and motivate women to pursue careers in the BPO profession. A study conducted in India pointed out that working women in BPO sector of Mysuru found it difficult to balance between work, household and child care (Bavya, 2018). Many women workers reported about the high stress and repetitive work environment and how the overload of work affected their personal life. Another study on social and cultural impact of outsourcing in India revealed that working as call centre agents is still considered to be a less dignified profession due to odd work hours (Pradhan & Vinoj, 2005). BPO workers are sometimes labeled as low skilled workers, since a call centre agent neither possess the necessary skills to be employed in the high-end roles in the sector value chain, nor the skills to get other professional work. Gender-based stereotyping also exists in the BPO sector (Remesh, 2008). For

example, 'feminine' qualities such as sweet tone in the voice, patience, and convincing attitude are considered ideal skills for call centre jobs. Women are also chosen heavily for carrying out monotonous repetitive work. The study also revealed that women can afford to continue in a position with low salary margin since they are mostly supporting income earners in the family. Hence, they do not switch jobs as frequently as men. In terms of leadership role in the BPO sector, the study revealed that gender-based stereotyping often cater to the company-wise decision in terms of sharing work responsibility. Men are mostly selected as team leaders, as they are deemed more suitable to do extra work hours to meet the specific deadline. The study also quotes from a BPO HR manager. "They [men] can run around, come early in the morning or continue till late nights. We need not bother about how they commute and when they reach home. Also, they are more confident and comfortable to handle such tasks" (Remesh, B.P., & Neetha, N., 2008. p.5).

In terms of choosing the BPO profession as a prosperous path in career, very few women question whether call centre jobs will have much prospect in their future careers (Babu P. Remesh N. N., 2008). Some of the respondents in the study said they treat the job as an interim earning source till their marriage. They choose BPO sector due to its convenience and desk-based work nature. Thereby, a large chunk of women in the industry are not actively looking for promotion or progress in the career. Many call centres in India have a working condition, like traditional sweetshops and workers being treated as 'Cyber Coolies (Babu P Ramesh, 2004)'. Workers are monitored through high tech surveillance system, which are sometimes referred to as the digital prison of the twenty first century. The study survey data concluded that a notable portion of women workers prefer to continue the job at the lower tier of the hierarchy and do not progressively seek upward mobility. This acceptance of low-tier career aspiration among women is seen mainly due to their commitments to the family and household.

Bangladesh Business Process Outsource (BPO) sector and its role in the future of work for women

The Policy landscape of Bangladesh ICT industry

The policy landscape of Bangladesh ICT sector had started to take shape since the current government undertook the vision of building ‘Digital Bangladesh’ back in 2008 as a key manifesto in the general election. ‘Digitization’ and ‘Improved Connectivity’ were chosen as the two mantras in the Vision 2021 goal that eventually built the base where our ICT industry becomes one of the thrust sectors, helping to achieve the middle-income country status. The government showed tangible efforts in crafting several policies and initiatives to attract local and foreign investment in the sector. The seventh five-year plan immediately recognized the need of diversifying the export where ICT-led business ecosystem must grow strong. Several policies were made to bridge the gaps and help the private sector thrive. As a result, a number of qualified entrepreneurs have started venturing into the ICT sector over the last decades, however, most of them are trapped in ‘small size’ and ‘low growth’ situations due to a number of constraints.

Besides, the companies were struggling due to lack of fund and skilled workforce, which made their cash flow often erratic and cyclical, and not favorable to long term strategic planning to thrive in the international market. Many experts believe that growth of ICT sector is still below expectation level due to inadequacy in entrepreneurial dynamism, limited overseas marketing budget and absence of government level initiatives in promoting the country as ICT destination brand. Fast forward to 2020, where government has taken the global technology transformation ‘industry 4.0’ into consideration and reflects some of the transformational challenges in the forthcoming policies as well.

To address these challenges, the government tried to come up with a number of policies to help the sector grow. The policies can be grouped into three categories

<i>Policies driven by the vision ‘Digital Bangladesh’</i>	• ICT policy 2009, 2015 (amendment), 2018 (draft) Digital security act 2018 • Cyber Security policy 2010 • Hi-tech Park authority acts 2010 • National digital commerce policy 2018 (draft) • LICT and Access to Information (a2i) initiative
	• Guideline for electronic utility bill payment • Rural connectivity policy guideline 2010 • E-Krishi policy • Mobile banking policy guideline • National Data centre guideline 2019 (draft)
<i>Forward looking policies driven by Industry 4.0</i>	• National Blockchain Strategy Bangladesh • National strategy for Artificial Intelligence Bangladesh • National Internet of Things Strategy Bangladesh

Table 2.1: Policies that support the growth of ICT industry in Bangladesh

Source: Author’s own research

In 2009, the government took up a vision to establish a thriving BPO sector aiming to generate one million jobs. The main objective was to promote the private sector through various policy support. Policies were made to create an enabling environment in the country that would enable foreign buyers to consider Bangladesh as their priority offshore destination. Firstly, it is important for the BPO companies to operate in a lower cost compared to peer countries. Second, the government focused in taking initiative to utilize the large pool of human resource,

which can offer low-cost labour. Lastly, the government wanted to create a conducive environment to attract foreign direct investment. The following table summarizes the policies that influenced export and job creation in the BPO sector.

<i>Policies that have influenced export and job creation in the BPO sector</i>
National ICT policy 2018 (draft)- Strategic objective 6.3: Ensure cost effective business environment for IT and BPO companies • Access to finance- IT and BPO companies will get low interest loan to buy physical assets and collateral free working capital loan • Enhance productivity and doing business - Launch one stop service for business permits where an IT foreign entrepreneur will get all regulatory permit in one aggregated platform. Strategic objective 5.2: Human resource development in IT and BPO sector • Develop and implement Labour Market Information System (LMIS) • Ensure 50% participation of women workforce in the IT sector through strengthening private sector • Establish an international standard dedicated centre for BPO training • Establish ICT desk in all the Bangladeshi consulates located abroad
<i>Bangladesh high-tech park authority act 2010/private software technology park guideline-</i> • 100% corporate tax exemption till 2024 and 80% VAT exemptions on the rentals and utilities • 50% personal income tax reduction for foreign employees up to 3 years • Full repatriation of capital and dividend and no restriction of foreign equity holding

Bangladesh Export Policy 2018-21

- Government announced 10% cash incentive on the total IT export revenue
- Priority plot allotment in Bangladesh Economic Zones

Table 2.2: Summary of the policies that have influenced export in the BPO sector

Source: Author's own research

Analysis of growth, employment and status of women in the sector

Business Process Outsourcing is defined as the performance of a company's non-core business tasks such as Customer support, IT supports, Payroll management, Telemarketing, etc., through a third-party service provider model. Depending on the level of specialization and deals, there are mainly two types of outsourcing—i) 'Voice', performing all sorts of business task while directly communicating with company's customer base (e.g., tele-marketing, customer service, etc). ii) 'Non-voice' tasks that refers to all sorts of back-office support related to finance, accounting (i.e., book-keeping) and human resource management (i.e., payroll processing). Most of the BPO works remain labour-intensive and countries with high number of graduates and modern IT infrastructure are taking advantage by offering cost effective services.

Over the last ten years, with the increasing share of service sector in the Bangladesh economy, BPO emerged as an important sub-sector in the ICT industry. Being at the forefront of digital revolution, it (the BPO sector) showed promise to hold a key stake in the export basket. The sector valued at US \$300 million in FY 2018-19, where the export earning contributes around 20%. With the direct facilitation from the government's top-level leadership, it has grown almost 25X in just 10 years (CPSA, 2019). The growth had started to take-off from the domestic market when consumer-driven large domestic players showed confidence to outsource its customer service, mainly

call centres, to the BPO companies. The key informant interview revealed that it was not easy to convince the client segments including banks, telecom operators, consumers electronics companies and healthcare service providers. Companies were skeptical about outsourcing their customers service work at the beginning, but the cost saving opportunity without losing the quality of the service, attracted large companies to make deals with local BPO companies. The size of the sector can achieve a three-fold growth if other service-oriented sectors, especially the financial sector, tied up with local BPO companies in the form of outsourcing. The government became another big stream of revenue, as several national services are outsourced to local BPO firms including ‘Emergency call 999’, ‘Information Call centre 333’, and ‘National healthcare hub 16263’.

Private sector dynamics

On the contrary, the sector is still in its nascent stage in terms of export. Only a few large companies are delivering voice and non-voice services. Taskeater Bangladesh (rebranded as Quantanite), Service Engine BPO, Kazi IT Centre, Digicon technologies and Genex Infosys, are leading in delivering various outsourcing services targeted in the outbound market. It was estimated that currently the sector has approximately 6000-8000 BPO seats, providing direct service as an offshore destination. The annual revenue stands to around US \$70-80 million¹. The government has included the BPO sector in export incentive programmes, which is considered as an incredibly good initiative to support the private sector in boosting their BPO business. Recently, leading conglomerates such as Square group, Abdul Monem group, and Bashundhara group started, BPO business with fairly large investments. As per data provided by BACCO, the sector currently employs around 60,000 workers where 40% are women. Around 150+ call centres are operating, and the majority

¹ Author’s estimation based on the data extracted from the interview. Each BPO seat roughly earns USD 1200/month (average value comparing US, EU and other market)

of the them are stationed at Dhaka with very few footprints beyond the capital city. For example, in Rajshahi and Jessore only 8-10 companies are operating, which concludes that the BPO sector is also Dhaka-centric, meaning the youth workforce living in the rural areas must come to Dhaka (like RMG sector) and look for work opportunity (Sharif, 2020).

An interview with the sector key informant outlined that Dhaka, as the centre of the BPO business, has flourished mainly due to government supportive policies, including tax exemption and export incentive. The findings also echoed with the data captured in a sector whitepaper published by Everest group. The paper revealed that the annual cost of operation per full time equivalent (FTE) in Dhaka is 16-20% less than major BPO hubs in Philippines and India (H Kartik, 2017). The figure illustrated below depicts Bangladesh' offering which is much lower than commonly perceived.

In addition, Jashore has the potential to be the next hub of BPO business beyond Dhaka, as the government has already built the IT infrastructure there and providing necessary legal support. Despite the availability of a large young, talented pool, companies who have started operation in Jashore are facing hard times in hiring qualified people even in the entry position. A recent recruitment effort ended up with 10% success rate. The companies claimed that World Bank supported SEIP curriculum did not provide enough weight on English speaking ability, which is a primary requirement of entry level BPO work. Private sector stakeholders shared that the sector needs international standard BPO training service providers in building the human capital to meet the demand of new BPO executives. They (the stakeholders) indicated that Bangladesh should learn from the success cases in India and the Philippines. India is currently leading the market and Philippines has established itself as a top destination for BPO service through utilizing the low labour cost, coupled with a good endowment in human capital.

The sector has a potential to generate 5000 new jobs each year while opening a new avenue of jobs for fresh undergraduate students. The government targets to create employment for 2 million youth by establishing hi-tech park in tier-2 metro cities such as Sylhet, Rajshahi, Khulna, etc. However, most of the projects are still in its development phase and need effort in the years to come (W. Sharif, personal communication May 27, 2020).

Women in the BPO sector

Women are choosing BPO profession as it does not require any comprehensive prior work experience and it allows to work in a friendly indoor environment. The demand for women as call centre agents for inbound customers is remarkably high. As per the interview with a BPO industry professional managing human resource, it was revealed that women show satisfactory performance during in-house trainings compared to men. Women are also suitable to carry out work that require direct customer interactions for sales and services. The demand for remote medical transcriber is rising in developed countries such as the US, UK and EU and women are considered suitable for this job. Medical transcription alone can generate around 1 million jobs in Bangladesh if scaled properly. For example, Augmedix has expanded their operation by 10X in just 3 years. Overall, the advancement of education for women has created more workforce ready women candidates who are ready to be employed in the service sectors. The focus group discussion (online session) with women engaged in BPO sector indicates that graduate women get better earning opportunities, which did not even exist a few years ago. To date, women hold approximately 40% of the total workforce in the sector.

“Previously, I used to earn 6000-8000 through private tuition. When I joined this sector as a call centre agent, I go to earn more than 10,000 per month.”— FGD participant

The future transformation

Innovation in the BPO sector will be the key for growth in the coming years. Bangladesh needs to set a target for higher value works. In terms of non-voice BPO the global market is shifting towards business process management (BPM), which can generate more reparative and process related work due rapid expansion of automation. Other emerging technology areas such as cloud computing, data analytics and machine learning, will have a big impact on the dynamic in BPO sector.

Challenges for women in the BPO sector of Bangladesh

Cultural barrier of women working in the BPO sector is identified as the biggest challenge. This may reflect stronger social constraint against women associated with work-life balance and difficulties in meeting family obligations. As the sector is fairly new and did not even exist 5 years ago, many parents are yet to understand the nature of the job and the work environment in general. There is growing demand of working during the night shift, however, none of the call centres allow women working in the night shift, since international voice-based work is still very low and families do not allow working in such graveyard shifts. Call centre service is 24X7 support work, so it requires shift workers. Although at a nascent stage, the growing export earnings will unlock a potential scope for women employment generation if companies can ensure safe ‘night shift’ working policy for women.

BPO is a labour-intensive job, and uneven wage structure and lack of career prospects are growing concerns. Focus group discussions pointed out that the BPO sector does not follow any minimum salary structure and needs long working hours. It also allows part-time working opportunities, which creates an opportunity for a full-time employee to be replaced anytime with equivalent part-time workers. Hence, many workers believe that the lack of job security creates an impression of an unfavorable career prospect in the sector.

“I have completed basic computer training during my semester break. I was looking for a part-time job and I am lucky that I got the job in outsourcing. But I do not have any future ambition to continue my career here. I will pursue higher studies.” – FGD participant

Women employee retention is lower compared to men. There are a number of social stigmas that exist in our society related to women working in call support. Focus group participants faced negative comments from their peers, where they said being a call centre agent is a tough job for women to handle. An agent needs to convince the customer over telephone, which sometimes turns into high-stressful situation. Over-work hours may lead to hearing loss or mental instability. None of the FGD participants have medical insurance covered by the employer. The respondents argued that the chances of women promoted to the role of team leader is very narrow. A team lead must take up progressive and rigid roles to maintain the team efficiency, which is believed to not be a ‘piece of cake’ for women.

Most of the top-level positions in the BPO companies are occupied by foreign employees, just like in the garments industry and women participation is extremely low. Respondents highlighted that the sector is still lagging in terms of market. Bangladesh as a lucrative destination for outsourcing in the international market, therefore companies are relying on experts from abroad in business development.

Despite the challenges, all the key informants and focus group respondents agreed that the sector will surely achieve a steady growth in the coming years and that women workforce definitely be integrated at a large scale. The chapter has identified some of the stories that shows early indications of the efforts to ensure a better workplace for women in the BPO environment. For instance, Augmedix, a leading medical transcription service provider aims to develop the biggest operational hub

in Bangladesh and employ 2000 women in the next 2 years. They also provide secured pick-up and drop-off service for their employees who are working in the late hours.

Regarding safety nets for women in the BPO sector, India has set some ground-breaking examples. Although the government does not encourage women working in the late hours, the local government issued supporting regulations to ensure a safe work experience for women.

Underlying challenges hindering the sectoral growth

Despite the policy support, the sector is facing a multitude of challenges in keeping the speed in establishing a strong presence in the export market. In the tough global BPO market, the competition over cost reduction is always a key factor and clients are constantly moving to cheaper locations. Bangladesh faces enormous competition by the aggressive marketing effort from countries like Vietnam, Philippines, India and Sri Lanka. Bangladesh needs further branding efforts to showcase its digital revolution and its future scalability mixed with demographic dividend. The sector's stakeholders shared a few underlying gaps, which need to be addressed in ramping up and enhancing the base of the sector. The following section has summarized a few gaps, which were highlighted during the interview with informants.

Access to low-cost finance is still a challenge as banks feel hesitant over lending money to BPO entrepreneurs

Lack of access to low-cost finance has been identified as a major constraint especially for the new entrepreneurs who want to start a BPO business with a 250-400 FTEs at a base level. Banks and NFIs are not interested to finance any IT-backed service businesses and many new entrepreneurs are unable to cope up with conditions given by the banks. Although small and mid-tier BPO companies have grown in Dhaka, most of them are stuck in the low value segment due to lack of investments.

Less emphasis on ‘Branding Bangladesh’ in the global market

Bangladesh is commonly known as the destination for garments manufacturing in the international market. The recent digital revolution, blended with a thriving pool of young graduates, should be highlighted in the international promotional activities and matchmaking events. India leads in software development services in the global BPO market, while Philippines has established the voice-based BPO verticals and Sri Lanka is an expert in financial and accounting based outsourcing work. These successes were possible due to their coherent approach to capture respective niche service areas with efforts to promote and brand the strengths. Stakeholders severely feel the need of a strategic branding of Bangladesh in the global market. While we are expecting the sector to be a vital contributor in the export earnings, a proper effort in ‘Branding Bangladesh’ as a lucrative destination for business process outsourcing will be important.

Inadequate supply of skilled workforce and lack of international standard training service providers

Given the attractiveness of BPO jobs as a first employment opportunity of many fresh graduates, the companies in the sectors frequently report difficulties in finding candidates with the right skillset to fill vacancies. The minimum entry requirement in the BPO executive position usually include a strong command of the English language, computer literacy and a service-oriented mindset. The chapter captured a case study where a leading BPO company, required to hire 600 executives, could fill only 150 positions due to lack of skilled candidates. Later on, they approached training service providers who could train the aspiring candidates to match the required BPO-specific needs for the job. However, even after investing in the pre-job training facility, the BPO company is struggling to meet their demand. This case study indicates that the market will need a sustainable solution to bridge the supply-demand gap of skilled BPO executives. Private sector stakeholders urged to bring international standard BPO training service providers or the

government can build a dedicated training institution. Many experts requested several non-government organisations (NGO) and donors to take initiative in launching exclusive training for workers in the BPO sector.

No stimulus for employing women in the sector

According to data provided by BACCO, in Bangladesh, women hold around 40% in the total workforce in BPO, where the percentage is over 55% in countries like India and Philippines. Currently there is no stimulus or policy support to employ more women in this sector (W. Sharif, personal communication May 27, 2020). Many experts argued that the sector is currently enjoying 100% tax exemption and export cash incentive but most of the companies are Dhaka-based, which creates challenges for women living in other districts to pursue careers in BPO. The sector needs dedicated policy support to be expanded in the tier-2 and tier-3 cities, which will eventually reduce operational cost and open access to cheap labour. Women living in the cities beyond Dhaka will also get the opportunity to be employed in the sector.

Policy and pragmatic intervention

This section summarized broad recommendations to facilitate further growth of the sector and its capacity to include women. The specific rationales are also discussed with supporting findings that emerged in the study. The recommendations have been classified into three categories focusing on the sectoral growth, women inclusion and cross cutting issues, which is applicable for both.

Growth for the sector

- Support BACCO to prepare a comprehensive national BPO export strategy in order to accelerate the ‘Branding Bangladesh’ promotion and secure a niche area in the international BPO market.

- Facilitate international standard TSPs (training service providers) to start operation in Bangladesh through PPP (public private partnership) modality targeting to provide high standard and dedicated outsourcing-specific trainings in Dhaka and tier-2 cities such as Jashore, Sylhet, Rajshahi, etc.

Inclusion of women in the sector

- Design and launch BPO Export Management course as a specialized major course in tertiary education level in collaboration with selected IT focused universities or institutions to help women to gain more practical education about the sector.
- BACCO, together with the government, should take initiatives to ensure better security and working conditions for women working in the sector
- The government of Bangladesh should create targeted campaigns (seminar/workshop/advertising) to influence families in breaking social and cultural barriers surrounding women working in new emerging sectors like BPO.

Cross cutting recommendation to accelerate the growth together with women inclusion

A dedicated incentive scheme for the BPO sector should be created by the government to chalk out a future growth trajectory of the sectoral growth and include more women in the sector. This may include, launching the Bangladesh BPO Promotion Scheme, which will subsidize private sectors for setting up operational hubs in tier-2 cities.

The scheme may include:

- Financial support to cover up to 50% expenditure of BPO business operation for capital expense/operational expense to generate more jobs in the tier-2 cities.
- Special incentive (10% quota of total scheme) for the companies who will ensure 50% women employment.

Conclusion

BPO sector stakeholders expressed their concerns regarding the lack of ‘*Branding Bangladesh*’ in the global BPO market place, resulting in poor international visibility as a global, offshore destination. This concern also matched with Bangladesh’s recent fall of 11 notches in the *Global Location Service Index 2019*, indicating severe vulnerability in cross-border service provision. Currently Bangladesh holds 32nd position in the lower quartile among the 50 countries (Kearney, 2019).

The chapter found that BPO companies who have successfully entered the global service delivery markets indicates that the global BPO landscape is extremely competitive. For any new country to enter and establish a strong unique selling proposition, it will have to go beyond cost competitiveness and ensure technology capacity and process excellence, which is a combination of two investment-intensive building blocks. For instance, a local leading BPO company named *Quantanite* (previously named Taskeater Bangladesh), launched a new dedicated service with a software named ‘Growthonics’ for clients to provide better digital marketing service experience in line with the newly formed General Data Protection Regulations (GDPR) compliance. This chapter also found that private sector stakeholders emphasized on the fact that before betting on such investment-heavy approaches, the sector needs a comprehensive national BPO export strategy roadmap, which will be crafted based on the buyer perception on Bangladesh’s capabilities, and pathway to new investment to build a niche area of expertise.

The Government of Bangladesh has started initiatives to set up Hi-tech parks in Dhaka and few other tier-2 regions such as Jashore, Rajshahi, etc., to facilitate BPO sector growth, as well as ensuring employment opportunities in those regions. The chapter found that the hi-tech parks are expected to add around 300,000 employment opportunities in the coming years. Even though expanding to tier-2 cities for low-cost infrastructure facilities and comparatively cheaper workforce is a very effective

strategy, there is still a vast gap in the demand-supply of skilled human resources outside of Dhaka.

This chapter already identified several challenges that may hinder the projected growth, if the private sector failed to attract investment and use those infrastructures. For instance, expanding business outside Dhaka has been described as a very challenging task even for the large companies. After analyzing the global success case, it was found that small and mid-tier BPO companies played a big role in creating BPO seats. For example, North Eastern cities in India have seen growing BPO businesses, as they could offer successful seats with a cost lower than tier-1– Bengaluru and Delhi. Therefore, BPO sector stakeholders shared that a promotional scheme may help the companies who are planning to expand in the tier-2 cities (using the IT infrastructure built by government) to be successful in creating more seats for the BPO sector. The government of India helped the small BPO companies through a dedicated promotional scheme, which was packaged with financial support

The chapter found that women occupied 40% of the workforce in the sector, which is relatively higher compared to other service sectors of Bangladesh. However, the majority of them tend to be concentrated in the low-paid, entry level positions. In addition, the employee retention rate among women is lower compared to men. Respondents shared that they feel a gap between their academic learnings and the BPO job environment. In the upper hierarchy of the BPO value chain, an employee needs more sophisticated business and analytical abilities in order to uphold the job responsibilities. Hence, government should focus more on the synergy between the academic and industry line, while crafting new courses and curriculum for IT graduates. During the study it was found that the Institute of business Administration, University of Dhaka, offers a dedicated course named Advance certification for Management Professionals (ACMP) for mid-level IT managers. This has brought about good results so far in the ICT sector. BPO stakeholder urged to add a similar course

as a major subject exclusively, to include women students in selected IT focused universities and institutions such as, IIT Dhaka University, IIT Jahangirnagar University.

There is large opportunity for the BPO sector in Bangladesh to flourish. According to the government projections, the hi-tech parks will generate 300,000 new employment opportunities, where the participations of women will be higher.

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CHAPTER 3

Automation, Apparel Industry, and Female Employees: Current Conditions and Future Strategies

Shuvro Sen

Introduction

The age of the Industrial Revolution has brought about groundbreaking changes in the economic, social, and cultural aspects of humankind. Industries have been going through a series of innovative and technically advanced changes such as artificial intelligence, robotics, data science, and the internet—all of which have been termed as digitalization or industry 4.0 (Oztemel & Gursev, 2020). It is believed that digitalization is one of the biggest changes in the industry.

To compete in industry 4.0, organisations are currently focusing on automation. Currently, the era of industry 4.0 pushes an industry in automated production. Automation creates a new industry, sectors, products, and services, in the advanced technological economic era. Automation has accelerated white-collar desk jobs, rather than blue-collar jobs in recent years (Acemoglu & Restrepo, 2018). Factories can do many of the hazardous tasks that previously endangered the lives of industrial workers (UNI Global Union, 2015). There is a widespread debate that industrial automation may increase the rate of unemployment, especially for women, which has been foreseen by the research done on this issue.

Many low, middle-skilled and routine-based jobs are now being eradicated through industrial automation (Pollack et al., 2019). Traditional economic sources, such as the agriculture and manufacturing sectors, have stumbled upon expansive substitutions of labour with machines (Acemoglu & Restrepo, 2018).

Bangladesh Apparel/ RMG industry, known as a women-driven industry, is in the second largest position across the globe, immediately after China (Banerjee Saxena, 2019). The RMG sector, known also as the lifeline of the economy of Bangladesh, has contributed BDT 2,513,471 million or 11.16% of GDP in the financial year of 2018 (Ovi, 2018b). In a recent study conducted by research institute Centre for Policy Dialogue (CPD) in 2018, it has been found that around 3.5 million workers are currently engaged in the RMG industry of which 60.8% are female and 39.2% are male (Centre for Policy Dialogue, 2018). In the last research by CPD, done in 2015, the female participation rate is mentioned to be 64%, in contrast to the male participation rate of 36% (Ovi, 2018a). CPD claimed that this reduction is the result of industry automation (Uddin, 2017). Asian countries, especially the developing countries, could lose more than 80% of their garment, textile, and apparel manufacturing jobs as automation spreads, according to ILO (Emont, 2018). Erik Brynjolfsson, the director of the MIT Initiative on the Digital Economy, has said “I worry about developing countries; they are in the bull’s-eye of this automation revolution” (Emont, 2018). During 2000-2010, the industrial sector of Bangladesh was the main source for job creation, although it created around only 0.3 million jobs from the year of 2010 – 2017 (Kiron, 2012a). Mr. Khondaker Golam Moazzem, the research director at the Centre for Policy Dialogue (CPD) pointed out this situation as an alarming issue for the economy (Chakma & Parvez, 2018).

Now, the chapter aims to find out the answer to the following questions: 1) Does automation eliminate the uneducated female labour force from the apparel industry?; 2) If so, what steps can be taken to support the female workers to adapt and prepare for these advanced technological changes.

To explore the answers to these questions, this chapter draws from literature shaping the debate, as well as data collected from research scholars, trade unionists, and mid-level employees of the RMG industry. This chapter begins by

providing a short description of industrial automation and how it affects the labour force. Next comes the discussion about the methodological approach of the chapter. From there, this chapter shares the findings from the data that has been collected from the interview. Finally, this chapter closes by considering policy directions that will help to build an efficient female RMG workforce to move ahead.

This study will be significant for different stakeholders, including those in the public and private sectors, policymakers, and analysts, helping them to gather knowledge regarding the condition of female workers in the RMG sector in Bangladesh.

Literature Review

Industry Automation

Generally, the public debate on automation focuses primarily on technology and “Industry 4.0”. The 4th Industrial Revolution, named by Klaus Schwab, Founder and Executive President of the World Economic Forum, describes a world where people move between a real and digital environment and thus should learn to manage it and benefit from it (Deloitte Global Business Coalition For Education, 2018). The new technological era is equipped with the development of that technology, which can be used to calculate, analyze, observe and learn, using physical and/or virtual machines to perform cognitive tasks that are outside of man’s reach (National Employment Office of Belgium, 2017). Every industry is currently focusing on digitalization through automation. Automation is one of the applications of industry digitalization that deals with mechatronics and computers for the production of goods and services (Kiron, 2012b).

The main objective is to focus on automation to improve quality and reduce costs. For the past few years, automation in the apparel industry has taken place in all the processes involved in textile manufacture- cotton picking, ginning, spinning, weaving, and processing, including garment-making. This has resulted in enormous gains in productivity and efficiency.

Robots, automated inspection systems, CNC machine tools, logistics support tools, security systems, material handling systems, CAD/CAM systems are all examples of automation.

The effect of automation on the labour force

There is a relative consensus on how automation effects workers as well as the industry. The discussion part of this topic is mainly focused around two other questions:

- a) Does automation increase productivity?
- b) If the production has changed due to automation, how does this affect workers?

The answer to the first question is “Productivity Paradox” (Brynjolfsson & McAfee, 2014). The productivity paradox has boosted the automation of the economy. When automation is the reason for certain changes in the workplace, the productivity paradox argues that these are more superficial than former advances. Automation improves productivity which leads to low cost, albeit not necessarily focusing on product quality. It is believed that low-cost production leads to higher consumption, resulting in economic growth. This concept is called ‘Techno-Optimism/the bounty’. On the other hand, there is also ‘Techno-Scepticism/the spread’, which is the belief that higher productivity due to automation leads to unemployment, which in turn leads to decreasing consumption resulting in shrinking markets, lessened prosperity, and higher unemployment rates.

- This idea of “bounty and spread” is the main theme in Brynjolfsson & McAfee’s influential 2014 publication *The Second Machine Age*. It contains techno-optimistic views because of the many changes that are seen in the Digital Revolution (the ‘bounty’) but warns us of the divergence this might cause between those who can benefit from these changes and those that are left behind (the ‘spread’) (Brynjolfsson & McAfee, 2014).

Is automation responsible for eliminating jobs or can it also create work opportunities?

The wave of digitization promises to have an impact on employment. Previous researches are divided into two groups: one that figures a sensational vanishing of employments as a result of robotization, and one that builds up the fact that negative disturbance impacts are exaggerated (Katz, 2017). World Bank statistics show that the number of jobs created by the apparel industry has reduced to 60,000 per year in 2010, which was over 300,000 annually in 2003. Robotics has played a vital role in this reduction. In 2014, China had just 11 robots per 10,000 employees, which increased to 97 robots in 2017 (International Federation of Robotics, 2019).

In 2013, Carl Frey and Michael Osborne of Oxford University assumed that 47% of total US employment will be at risk of automation in the coming decades (Benedikt Frey et al., 2013). Similarly, the International Labour Organisation (ILO) has predicted that due to technological up-gradation, more than half of total employment in the developing countries—i.e. Cambodia, Indonesia, Philippines, Thailand, and Vietnam—is at a high risk of disappearing over the next decade or two (Groff, 2018). Akin to these reports, OECD's study in 2016 indicate the same things. On average, 9% of jobs are really at risk in 21 OECD countries (Borgonovi et al., 2018).

Another group of researchers identified that innovation in the industry creates new jobs and/or increases productivity (Katz, 2017). The McKinsey Global Institute estimates that automation could boost world productiveness growth from 0.8% to 1.4% annually (Manyika et al., 2017). However, all jobs cannot be replaced by automation. The jobs that are most creative and need creative intelligence, social intelligence, perception, and manipulation, are at a low risk of automation (Benedikt Frey et al., 2013).

It must be kept in mind that automation will be fruitful if the ultimate production has been increased. The main reason is that automation-driven jobs will never compensate for automation-driven job losses. On the other hand, the demand for low-skill jobs has increased (Autor et al., 2013) because skilled workers with higher incomes create additional demand for local services (Moretti, 2010). For example, one additional job in the high-technology sector generates about 4.9% new jobs locally (Moretti, 2010). So, the new jobs will lead to an increase in consumers' buying power (Atkinson & Wu, 2017). Ultimately, without increasing productivity, living standards will not improve and, automation effects will not be realistic (Katz, 2017).

If automation creates jobs, will there be enough work in the future?

The previously stated literature shows that new employment opportunities have emerged due to the wave of automation. Unfortunately, the proportion of job creation to job disappearance is not sufficient (Katz, 2017). For example, the technological sectors of the US i.e. online auctions, video and audio streaming, and web design, etc. had negligible effects on employment patterns, which created less than 0.5% employment opportunity throughout the year 2000 (Berger & Frey, 2016). In 1990, in the US, technological upgradation was accounted for creating more than 34 million jobs while the technologically stagnant sector created around 98% of the total job (Spence et al., 2012).

Who does automation create jobs for?

The rate of job creation is not the same at every stage of automation. Initially, the rate of job creation was higher than it was during the second wave of automation (Lin, 2011). In 1980, the rate of new employment creation was 8.2%, which went down to 4.4% in the year 1990 (International Labour Organisation, 2013).

As automation has spread across the industry, a new demand for workers with analytical, interactive, and problem-solving skills

have surged (Acemoglu & Autor, 2011; Autor et al., 2003). Knowing computer programmes help to increase the wage at the rate of 8-15 % (Spitz-Oener, 2006).

Female Workers: More at risk due to automation

A larger percentage of the female workforce is in danger due to automation than their male counterparts (Brussevich et al., 2019). In Austria, only 12% of females are employed in contrast to 38% of males in the industrial sector (Hauer, 2017). The World Economic Forum reported in 2018, that the majority of jobs belonging to women were predicted to be displaced by automation (Fabrizio et al., 2018). That research estimated that about 1.4 million U.S. roles will become irrelevant by 2026, specifically those in office and administration positions, and 57% of those jobs will belong to women (Browne, 2018). PriceWaterhouseCoopers (PwC)² analyzed over 200,000 existing jobs across 29 countries to assess the potentiality for automation (PricewaterhouseCoopers, 2018).

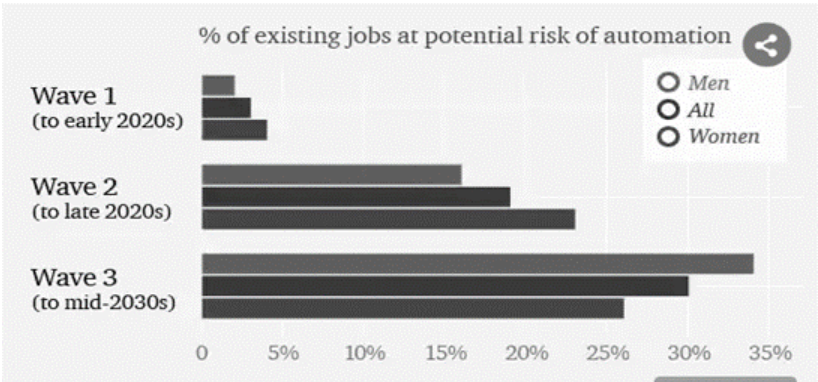


Chart 3.1: Percentage of existing jobs at potential risk of automation – gender wise

Source: https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_automation_on_jobs.pdf

² A data analyst company based in United Kingdom

PwC identified that, until the late 2020s, women could be at higher risk of automation due to their higher participation in clerical and other administrative functions (PricewaterhouseCoopers, 2018). As a result, labour segregation can increase and the gender gap can widen. However, automation also has increased the demand for skilled workers and introduced the opportunity to work from home for work-life balance reasons and have more flexible working hours (UNI Global Union, 2015).

Automation and employment in the apparel industry

Labour-intensive industries, such as the apparel and footwear industries, which are considered to be the springboard for industrialization in many developing countries, are more prone to be digitized, therefore dramatically decreasing the need for workers (Mattos et al., 2020). For example, about 64–88% of textile workers in Cambodia, Indonesia, and Vietnam are at high risk of job displacement due to automation (Chang et al., 2016). Another research shows that about 55% of jobs in Cambodia, Indonesia, Philippines, Thailand, and Vietnam, and over 70% in Bangladesh, China, El Salvador, Guatemala, and Nepal are at high risk of automation (World Bank, 2016). It has been predicted that the usages of computer-controlled equipment will abolish 99% of jobs for hand sewers and 89% for sewing machine operators over the next decades (Frey & Osborne, 2017). Different sectors in the apparel industry, such as spinning, dyeing, weaving, knitting, have already been automated.

Previously, the RMG industry was mainly labour-intensive which is now changing gradually. For instance, historically, female employees consisted of 80% of the total RMG workforce in Bangladesh, which went down to 60.8% in 2018 (Uddin, 2017).

The number of female employees fell to 5.07 million in Bangladesh in 2017 from 5.51 million female employees in 2013 (Ahmed, 2017). This is a reduction rate of 13.10% (Ahmed, 2017). By 2041, 2.7 million or 60% of workers in the labour

sector including the RMG industry may lose their jobs. As a result, low skilled and aged women are very prone to the risk of automation.

Other reasons behind female employment reduction in the Bangladesh RMG

The Bangladesh Government's a2i project and ILO predicted that about 60% of Bangladesh RMG industry workers will be unemployed by 2030 and robots will replace most workers. However, it is still considered a secondary reason for job loss (Behtarin et al., 2020). Low-profit margins, slowdown in export orders, unhealthy working conditions, increasing technology usages, low minimum wages, workplace accidents, social inequalities and lack of training facilities, are considered as the possible reasons behind the reduction (Jahan, 2019; Khan, 2019).

Women workers are among the hardest hit by COVID-19 in Bangladesh

Bangladesh is one of the worst struck countries due to the COVID-19 pandemic. COVID-19 has greatly impacted the social and economic conditions of Bangladesh and has significantly pushed the country backwards. The sudden onset of Covid-19 brought with it unprecedented impacts on the apparel industry and its employees, where about 60% are female (Leitheiser et al., 2020). The International Labour Organisation (ILO), the United Nations' labour agency, guesses that about 24.7 million jobs will disappear due to COVID-19 (McKeever, 2020). The impact of this pandemic on the Bangladesh apparel industry is ruinous (Sen, Ahmed, et al., 2020).

The first reason is that China, which is the predominant source of raw materials for the apparel industry, has been called the epicenter of the COVID-19 pandemic (Sen, Antara, et al., 2020b). Bangladesh exported 50% of apparel raw materials and about 40% of machinery and spare parts for the apparel industry from China (Perera, 2020). Another reason is the order cancellations from the global buyers and retailers through the

use of a force majeure clause in their contracts (Sen, Antara, et al., 2020b).

As a result, the factory owners were not able to pay the wages of the workers, stating reasons of not receiving payment from the buyers (Sen, Antara, et al., 2020a). A recent survey conducted by Professor Mark Anner³ concluded that millions of RMG workers are prone to be unemployed, with more than 1 million workers having already been fired or furloughed (Anner, 2020). Another study done by BRAC University found that almost half of the workers (47%) did not receive their wages and felt uncertain about their current job status with their respective employers (“Brac Rapid Survey: 47pc Garment Workers yet to Be Paid,” 2020). Defying the Government-declared lockdown, the workers started to demonstrate on the road demanding the arrears (“RMG Workers Block Highway in Gazipur for Arrears,” 2020). This situation made the workers even more vulnerable, especially women (Fair Wear Foundation, 2020).

The previously stated literature shows that automation reduces the dependency on the workers. As a result, workers, particularly the female employees, are prone to become jobless. In developing countries like Bangladesh, the risk is higher when female workers are not relatively skilled. The female participation rate in the Bangladesh apparel industry is now plummeting day by day due to automation, the COVID-19 pandemic provoked this even more.

The reality is that the businesses will adopt a cost-effective method to stay in the competition. While automation devours some jobs, new ones may be created (Nubler, 2017). It is, however unknown, what types of jobs will be created. Thus, employers and other stakeholders need to think creatively about retraining, reskilling, upskilling, and re-employing displaced workforce due to automation.

³ Prof. Mark Anner is the Director of Penn State Centre for Global Workers’ Rights.

Data Collection Strategies

Secondary Data Collection Method

The previous literature review, newspapers, and industry reports were utilized to compile the study. The majority of the secondary data was collected from different literature using search words such as automation, RMG industry, female employee.

Besides literature, different local newspapers like Prothom Alo, Daily Star, Dhaka Tribune, had also been viewed via Google News. Relevant news was collected by saving PDFs of the stories. Each of the stories was opened, read at a glance, and checked for relevance. Any news items that were irrelevant to the chapter's objective, were dropped at this stage.

The published reports from ILO, CPD and Mckinsey, had also been examined during data collection. For the newspaper and published reports, the search terms were almost similar to that of the literature.

Primary Data Collection Process

To understand the present status and expected future scenario on female participation in the automated RMG industry, Key Informant Interviews (KII) with relevant experts were conducted. The interviews were mainly conducted with the mid-level management of the RMG organisations and the trade unionists. In the interview session, they were asked to share their experiences with female employees in the RMG industry, as well as make suggestions to improve female participation in the broader labour market. The interview was conducted in English. Besides this, a focus group discussion has also been conducted with a small group of workers where they shared the problems that they have to face in the workplace, and their expectations. That interview was conducted in Bangla.

Data Analysis Technique

As all the interviewees did not agree to being recorded during the interview, highlighted points were noted down by the interviewer. For the data analysis, NVivo qualitative data

analysis software was used to collate and code the data. After coding the data, a software-generated report had been found. This report supported writing down the findings as well as suggesting a future direction.

Findings

The analysis of the literature demonstrates that automation displaced the employment opportunities of low-skilled workers. Secondly, automation has an impact on the RMG sector in Bangladesh mostly, which is now a most discussed topic. The interview with experts contemplated several important issues regarding female participation in the RMG industry in Bangladesh.

Women are mainly employed in low-skilled jobs

In the RMG industry, the female participation rate is very low in high-skilled jobs, although it is a women-centric sector. Women are mostly employed in the sewing, cutting, and finishing sections. The recent study conducted by CPD found that, out of the total 60.8% female workers, about 73.9% were employed in the sewing section and 22.7% in the cutting section. Only about 0.5% of managers in RMG enterprises were female. Around 9.3% of HR managers in this sector were female (Moazzem et al., 2018).

Skills gap is one of the significant contributing factors behind this stagnation

Lack of relevant skills is one of the major reasons for the fall of female employees in the RMG industry. There has been a high demand for skilled people since the beginning of the RMG industry's growth. Since there was no infrastructure to train female employees, the demand-supply gap was filled by male employees.

Reasons behind the inferior positions for females on the occupational ladder

The experts indicated a few reasons for the low skills of female workers. The lack of education and vocational training are the

primary reasons for the skills gap. Long working hours, working overtime, lack of workplace safety and the huge possibility of workplace accidents, lack of transport facilities, sexual harassment, and family burden are pointed out as the causes of the fall of female participation. Experts claimed that the slow progress in job creation for female employees, and rapid automation in the RMG industry, are the reasons behind the sluggish rate of female workers' participation in the Bangladesh RMG industry. Moreover, the Rana Plaza accident fueled the current situation. The three factory inspection programmes named Accord, Alliance, and National Initiative, initiated after the Rana Plaza accident, also played a vital role in this. After the inauguration of the inspection activities, factories were shut down if they failed to meet the required standards. In 2019, for instance, 133 RMG factories were shut down and about 62,582 workers, mostly women, lost their jobs (Ovi, 2020).

Automation hurts employment, particularly female employees

The interviewees agreed that automation has a negative impact on employment. This automation impact is not only limited to the apparel industry but also spreads to other economic sectors like leather, chemicals, food processing and pharmaceuticals. Automation reduces dependency on the workers, which leads to unemployment. Both male and female workers are affected by automation. However, the impact of automation on female workers is higher than that of male workers.

Alternative job sectors

Experts suggest focusing on creating new employment opportunities for female employees. The future will be in great crisis if it is only dependent on the single employment sector-the RMG industry. The interviews suggest other sectors such as, leather, chemicals, pharmaceuticals, catering, nursing and office administration as alternative sources for job creation for female workers.

Women employees need support

Experts recommend ensuring workplace safety for the workers as well as minimize workplace harassment. They also propose the establishment of a day-care centre in the workplace. The factory can organize accommodation and transportation facilities for the workers. The interviewees urged the establishment of women-friendly machines because, in the production facilities, there are a few kinds of machines that require huge pressure to operate, which is not possible for female employees.

Future Direction

Focusing on vocational training in the educational policy

There are only 37 educational institutions (Private, Public, and both partnered Universities, Colleges, Institutes, and Schools) for Textile Engineering/Fashion Design/Apparel Merchandising (Md. Mahedi Hasan, 2020). Important courses such as industrial relations, labour management, occupational health, and safety, are still missing from our educational curriculum. The Government can focus on the redesigning of the academic curriculum to better prepare the young generation. Besides these, the trade associations including Bangladesh Garment Manufacturers and Exporters Association (BGMEA), Bangladesh Knitwear Manufacturers and

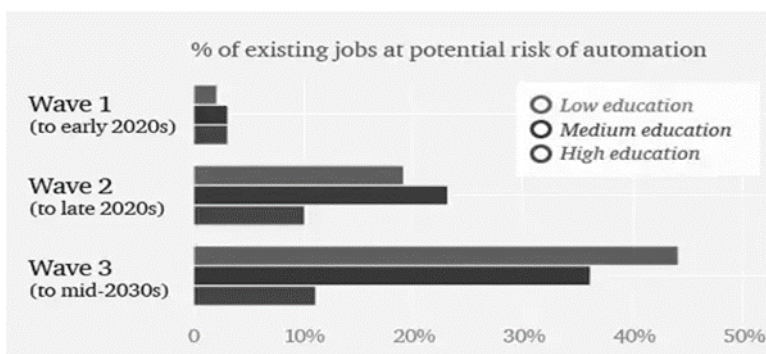


Chart 3.2: Percentage of existing jobs at potential risk of automation – Education

Source: https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_automation_on_jobs.pdf

Exporters Association (BKMEA), and Bangladesh Textile Mills Association (BTMA), as well as educational institutions, can extend their cooperation in this regard (Rahman, 2019). A collaboration between training institutes and industry experts is highly needed. A few Asian countries such as China, Thailand, India have made great progress using this strategy (Raihan & Haque Bidisha, 2018). PwC found that automation risks are low for all education levels in the short term, but low-educated workers are much more vulnerable in the long run (PricewaterhouseCoopers, 2018).

Vocational training has a positive impact on the career growth of an employee. In the RMG industry, there is a higher possibility of getting the required training on different subjects, such as sewing, quality assurance, fabric optimization, fire safety, social compliance management, and being promoted or receiving an increase in salary. A proper educational institution can play a vital role in offering female employee's multifarious courses on entrepreneurship development, fire safety and risk assessment, and production planning. Mr. Faisal Samad, Vice-president of BGMEA, has said, "We should impart skills training to them (female) so that they can make themselves competent for advanced jobs." (Krasley & Huq, 2020).

Offering "Leapfrog" opportunities for women's economic empowerment

In many countries, only one-third of the total graduates are women, and in engineering, this portion further falls to one-fifth (OECD, 2015, 2017). In Bangladesh, the situation is also worsening. As a result, women are unlikely to get benefits from new job opportunities. The organisation has to promote female participation in leadership positions. This also has a positive impact on the other female workers who work in lower and middle levels. They can easily share their opinions, and problems, as well as be more interactive in the training programme.

Closing the digital gender bias

Gender bias is one of the harmful barriers to female workers in the RMG industry. In a recent study, it has been found that about 51% of female RMG workers face physical harassment, while 43% encounter sexual harassment (Tithila, 2019). This type of attitude hinders the development of a female. Therefore, it should be addressed by promoting curricula that includes raising students' awareness, facilitating women's access to managerial jobs, and changing attitudes and stereotypes through the use of role-models, networks, and popular culture. In a broader sense, cultural perceptions need to be changed. Men need to show respect and learn to value women's contribution to the economy. Men can support the female in regards to family chores, especially in cooking, house-keeping and childcare. The Government, along with the NGOs, can take the lead to increase awareness among the people. Besides this, a private-public partnership (PPP) can be another fruitful strategy in this regard.

<i>Suggested Implementers</i>	<i>Suggested Proposals</i>	<i>Possible Ways</i>
Government	Creation of new employment opportunities	The Government may focus on other economic sectors like leather and pharmaceuticals to generate employment opportunities.
	Encourage more females towards pursuing education	The Government needs to ensure it by providing scholarships and other incentives.
	Establish vocational training centres	Here, the Government is in the leading position. After consulting factory owners, policymakers, and educationists, the Government needs to decide what type of training needs to be arranged for female employees.

Factory owners and law enforcement agency	Ensure workplace safety	The factory owners are in the leading position to ensure workplace safety. In addition, the Government law enforcement agency has to strictly monitor the laws regarding this.
Factory owners and Government	Provide relevant training to female workers	Factory owners need to come forward to discuss what type of training will be required. Besides, the Government needs to support the factory owners through different incentives i.e. tax reduction, for arranging the training session.
	Facilitate low-cost accommodation, daycare centres, transport facilities.	Factory owners are the main leaders in these areas. The Government can provide fiscal incentives to the factory owner or other private sectors to construct low-cost accommodation for workers.
Law enforcement agency	Ensure social safety for female employees	The law-enforcement agencies can support this.
	Implement the labour law	The Government law enforcement agency has to strictly monitor the laws regarding this. The factory owners need to co-operate in this.
NGO, Government, private sector	Promote female labour market participation	Non-governmental organisations (NGOs), the Government, and the private sector need to work together in this.

Table 3.1: Policy Proposals

Source: Author's own research

Promoting flexibility in the workplace

Automation provides the opportunity to work at flexible times, though it is very limited in the RMG sector. By promoting flexible work using new technologies, female employees can reorganize work schedules and introduce job sharing. The organisation needs to arrange maternity leave, childcare facilities, breastfeeding facilities, and flexible working hours, to encourage women to work. Moreover, the training programmes must be scheduled during office hours, because it is difficult for female workers to stay back at the workplace after office hours. The factory owners may arrange different types of facilities like low-cost accommodation, transportation for female employees. In this case, the Government may provide support through different incentives i.e. tax rebates, credit facilities at a low-interest rate.

Creating new employment opportunities

Ex-President of BGMEA, Dr. Rubana Huq said “Automation is the reality and essential now. We must start thinking about alternative jobs for our workers” (Atik, 2019). This statement indicates that it is high time to rethink alternative employment options for the workers who are losing jobs due to automation.

The Bangladesh Government needs to proactively address the challenge of slow growth rate at employment creation. It is imperative that they take up a national jobs strategy that will increase the growth of formal job creation, as well as connect vulnerable female workers to jobs. The job growth in the apparel sector is almost sluggish. So, the Government needs to emphasize formulating a long-term plan to create a diversified job market (“New Job Creation Vital for Bangladesh: WB,” 2017). The employment purposes must be focused on the national agenda. A comprehensive plan is needed to identify the unexploited growth potentials for jobs in agriculture, industry, exports, and services areas (Mujeri, 2019). The other economic sectors such as, leather, chemicals, pharmaceuticals, catering,

nursing, and office administration, may provide alternative sources for employment for female workers as these sectors are thriving these days.

Raise awareness against automation among RMG entrepreneurs

The medium and large-scale RMG factories have already adopted substantial digitalized technology. The small factories have also taken necessary steps, although it is still slow. This type of fast-growing digitalized industry may not be beneficial to the Bangladesh RMG workforce in the near future. Two recent incidents can be taken as an example. The USA's Defense Department (DARPA) granted \$1.25 million as a research grant to the Walmart Foundation to produce digitalized apparel product so that the USA can purchase domestically produced products (LightCastle Partners, 2019). Tianyuan Garments, a Chinese RMG company which produces for Adidas and Armani, have already set up an automated production plant in the USA. The company can minimize the labour cost by 50-70%. So, it is high time that wise decisions be made for automation (Centre for Policy Dialogue, 2017). Automation does not only reduce the production cost but also increases the unemployment rate. Thus, the Government, NGOs, and business persons need to raise awareness among the RMG entrepreneurs on the disadvantages of automation.

Conclusion

Automation does not only have a negative economic impact on society, it also creates employment opportunities. However, this is not sufficient in number when compared to job losses. Female employees with low skills are more at risk of losing their jobs than others. On the other hand, to be competitive in the market, the companies have to switch smartly from labour to automation. As a result, women fall behind in the workplace competition. So, to improve the situation, the stakeholders need to take up strategies that will enable keeping female workers with a moderate rate of automation. To compete in the global markets as well as

retain its major cash cow, collaborative research and adoption of advanced technology and better practices must be taken from all sectors. The RMG sector may endeavor to protect workers' rights at the workplace, focus on women's empowerment, and foster the movement toward an industrialized economy.

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CHAPTER 4

Participation of Women in the Information and Communications Technology (ICT) Sector of Bangladesh: Low Participation and Policy Options

Md. Rafiqul Islam

Introduction

Bangladesh (Khan, 2019) has taken several initiatives to transform itself into a digital country. The country's planning commission (Mustafizur Rahman, n.d., p. 24) has identified IT-enabled industries as potential FDI stages. Bangladesh's ICT sector is booming due to cheap, skilled labour, international capital flight, and other factors.

The ICT development, however, has not considered gender. It is not addressed in the relevant policy or case scenario documents. Breaking *Gender Barriers in the Workplace* (2018) published a list of fifteen case studies of successful women, none of whom however, have an ICT background. Another issue is the digital divide (Rai, 2019). Fortunately, the impact on women in the ICT sector is being considered (Ahmed et al., 2006). Nonetheless, this debate has yet to gain traction.

Finally, the 2015 National Skills Development System in Bangladesh (2015, p. 24) identifies information technology as a training performance monitor. Fortunately, it is taught in various forms and modules by various institutions. Some barriers include socio-cultural practices and traditional gender barriers (Saifuddin et al., 2019a, p. 2). This paper makes policy recommendations to increase participation. The current policy landscape does not include these determinants.

This policy paper addresses low participation from three angles. The first angle revisits the causes of low participation.

The second one incorporates these reexamined determinants into the policy landscape. The last one suggests solutions to counter the low participation. The study’s last two objectives distinguish it from merely exploring determinants.

Problem statement and the dynamics of low participation

State of participation

One of the less explored issues is women’s low participation in ICT. Dhaka University’s engineering and technology faculty currently has only 15% female faculty members (Suraiya, n.d.). Suraiya (n.d.) found that similar faculty at BUET had a percentage of just under 5%. She (n.d.) reports that female faculty members range from 10-20%, while female students only range from 10-20% in private universities. additionally, female participation in programming and other similar skills is low. Only 5% of contestants are female (Suraiya, n.d.), only 2% of top-performing teams (Suraiya, n.d.) have female members and only 10% of top executives are female (Suraiya, n.d.). According to BASIS (Suraiya, n.d.), only 4% of entrepreneurs are women.

<i>SL. No.</i>	<i>Participation type</i>	<i>Participation status (%)</i>
1	DU, the number of female teachers is	15%
2	In other public universities	10% -20%
3	In private universities	10% -25%
4	Number of girl students	10% – 20%
5	Girls in Programming & other contests	5%
6	Number of female executives	10%
7	Female freelancer	25%

Table 4.1: Women’s participation in the ICT sector

Source: Status of women in ICT in Bangladesh. Bangladesh Women in Technology (BWIT)

Women's participation in freelancing is also frustrating, as the average income for female freelancers is US \$300 (Suraiya, n.d.), while the maximum earning is rare. According to government statistics, women dominate among science students in pre-university education (Md Rahman, 2010). However, Daffodil International University (DIU) reports that this number drops to just 29% when applying to ICT-related programmes. Recently, the gap has widened by nearly 15% (Daffodil International University, n.d.) According to DIU, between 13-16% of women enter the workforce each year, with only 4.36% of them going on to start entrepreneurship.

This participation is lower than the global average for women in the workforce. In the global context, the World Bank estimates that the female labour force with advanced education is almost 57% (World Bank, n.d.).

In other developed countries, low female participation in research—either leading research projects or attaining post-graduate degrees—is a growing concern. This scenario makes sense in terms of leaks.

The two most common leakage areas are the transitions from master's to PhD and PhD to researcher. Female master's, PhD, and researcher rates are 53%, 43%, and 28% consecutively (Huyer, 2018). First leakages reduced participation by 8%, later by 15%. Leakages will be considered as a factor in low female participation. In Bangladesh, there are mainly three leakage areas. Only a handful of female students pursue ICT education, and even fewer graduate; only female students with a science background become ICT undergrads and fewer female ICT undergrad student enters the workforce; and finally, only a handful become IT sector entrepreneurs.

The determinants of low participation

Two studies have attempted to answer the reasons for low participation in terms of determinants. The low participation rate has been attributed to four clusters of determinants by Professor

Dr Suraiya Pervin. These clusters are about social concepts about women, family responsibility, job dropout rate, and children's responsibility. As shown in table 4.2, these clusters have certain determinants.

<i>Sl. No.</i>	<i>Determinants clusters</i>	<i>Determinants details</i>
1	Social concepts about women	Women are less intelligent.
		They are not very active.
		They are weak in mathematics.
		The engineering profession is not suitable for them
		Teaching and medical professions are the most suitable for them
		The primary duty is to maintain a family. Career is secondary.
		If a conflict arises between career and family, then the carrier must be sacrificed
		A lady should not be a careerist/ professional
		Sexual harassment may occur in the workplace
2	Family responsibility	Children care
		Senior members and patients care
		Satisfy the demands of relatives
		Manage housemaids
		Cooking, cleaning, etc.
3	Job dropout rate	Marriage and children
		Accompanying husbands to other places or abroad

4	Responsibility for children	In our society, mothers are responsible for meeting all the requirements of a baby.
		Earning money is the only duty of fathers.
		For children, many women do not avail higher degrees or receive promotions. Many quit their job.

Table 4.2: Initial determinants for low participation (1)

Source: Status of women in ICT in Bangladesh. Bangladesh Women in Technology (BWIT)

Samina Saifuddin, Lorraine Dyke, and Md Sajjad Hossain (Saifuddin et al., 2019a,) identify several more. Table 4.3 lists these determinants.

<i>Sl. No.</i>	<i>Determinants Clusters</i>	<i>Determinants details</i>
1	Social construction as a male domain	• Male dominated
		• Gendered recruitment
		• Gendered structure
		• Gendered perceptions/stereotypes
2	Occupational norms	• Extended work hours
		• Continual skill update
		• Travel to client site
3	Organisational policies and practices	• Unequal pay and promotion
		• Lack of access to challenging work
		• Lack of training
		• Lack of competitive salary
		• Organisational politics
4	Informal networking and mentoring	• Lack of Informal networking
		• Insufficient mentoring

5	Work-family responsibilities	• Balancing work-family responsibilities
6	Social infrastructure	• Issues with safety and mobility
7	Conservative norms	• Working and interacting with the opposite sex
		• Family restrictions
		• Traditional mindset
8	Other	• Problem with own preferences

Table 4.3: Initial determinants for low participation (2)

Source: Walls all around: Barrier's women professionals face in high-tech careers in Bangladesh

The current policy landscapes

Since the Bangladesh Computer Council Act was passed in 1990, ICT has been included in the policy landscape. We've come a long way since then. During these three decades, the Bangladeshi government made significant advances in ICT policy. This includes the Bangladesh Computer Council Act 1991, the ICT Act 2006, the Hi-Tech Park Law 2014, the Digital Security Act 2018, the Master Plan for ICT in Education, the National ICT Policy 2018 and the Digital Bangladesh Prize Policy 2019.

This low participation of women in the Bangladesh ICT sector has been a hot topic among stakeholders. But the policy concern and empirical evidence are absent. A single document—"Master plan for ICT in Bangladesh Education"—currently guides the current policy. This document (Ministry of Education, Bangladesh, n.d.) simply states the situation as:

“Male students in polytechnic ICT labs outnumber female students.”

This lack of inclusion is undeniably a policy flaw that must be addressed to ensure at least equal participation of women. The current development interventions aim to provide ICT facilities or training to the masses. Increasing female employment or entrepreneurship in ICT is not their main concern. Exceptions include the Bangladesh Open Source Network and Women in Digital.

The current development interventions aim to provide ICT facilities or training to the masses. The lack of research, policy gaps, and development interventions create urgency and justification for investigating low female participation and policy options.

Research methodology and rationale

This policy research uses qualitative research tools. They include group interviews, key informant interviews, and online interviews. During data collection, two qualitative research protocols were followed. They are SRQR and COREQ. SRQR (O'Brien et al., 2014) stands for Standards for Reporting Qualitative Research, where COREQ (Tong et al., 2007) stands for Consolidated Criteria for Reporting Qualitative Research. This study used interpretivism to deduce its arguments, and the conclusion was drawn from the literature review's determinants and the findings of the study. Here interpretivism has (Twining et al., 2017) been referred to how philosophically the statements of the stakeholders are interpreted with a linkage to identified determinants already.

<i>SL. No.</i>	<i>Research methods</i>	<i>Stakeholders Name</i>	<i>Quantity</i>
1	Group Interviews	Student	4
2	KIIs	Faculty members Recruiters Industry female leaders Mid-level professionals	10
3	Success case studies	Professionals	4

Table 4.4: Research methods and numbers

Source: Author's own research

Professionals, students, faculty members and recruiters are all stakeholders in this policy study. Students were interviewed in groups, while faculty, recruiters, female industry leaders, and mid-level professionals were interviewed individually. Successful case studies for professionals were captured. The failure case studies cannot be captured because they refused to be interviewed. But successful professionals have implicitly captured their perspectives. Group interviews capture common perceptions, while KIIs capture key ideas. The case studies helped identify the success factors. All of these operations helped identify low participation factors and how to simultaneously address them. Even though the sessions were recorded with their oral consent, the participants' anonymity was maintained in every way. Due to the pandemic, physical interviews were not possible. These sessions took place in the first and second week of June 2020.

Stakeholders' perception of low participation

The absence of low participation does not imply that the stakeholders are unconcerned. Instead, sector stakeholders are familiar with this scenario. Initially, they blamed each other for the situation, despite some natural differences.

<i>I need a job, and I cannot manage that</i>
<i>Recent graduate</i>
<i>Something good must happen</i>
<i>Freshers</i>
<i>Students are not becoming self-skilled</i>
<i>Faculty members</i>
<i>I am not finding any single capable freshers to recruit</i>
<i>Recruiters</i>
<i>Recent graduates cannot be recruited as intern at all</i>
<i>Industry female leaders</i>
<i>A woman needs to make a balance between her family and job pressure. All women cannot make it happen</i>
<i>Mid-level professionals</i>

Table 4.5: Stakeholders' perception

Source: Author's own research

However, recent graduates were depressed because they couldn't start working right away. Recruiters saw no need to hire recent grads, professors blamed the graduates for not being self-taught, and female industry leaders claim that fresh graduates are not qualified enough to be interns.

Low participation determinants

All participants in group or individual interviews agree that low participation is not a one-time event. According to the literature review, the numbers drop at three areas of leakage, and they are, low numbers of female ICT students, female ICT professionals, and female ICT entrepreneurs.

Fewer female ICT student's admission

The first leakage occurs when fewer female students are admitted to universities with a large female science student population. The study's participants agreed on four factors affecting this stage. Two sets of determinants explain the lack of female

students during admission. There are two types of determinants: gender-oriented and non-gender-oriented. The existence of non-gender-oriented determinants magnifies the impact of gender-oriented determinants.

Lack of self-explanatory books is the only non-gender determinant. Bangladesh's education system is evolving, but textbooks are still not self-explanatory. In the absence of self-explanatory books, students seek additional education. This is expensive compared to school fees. This scenario has a negative impact regardless of the students' gender. All recent graduates and newcomers were found to take such education. One participant said:

“If you need to continue studying, you need to have at least one private tutor. Those who are teaching in schools are also tutoring privately.”

The cost of private tuition may vary depending on location and other factors. This is more prevalent in SSC and HSC science studies.

Girls are thought to be married off according to current gender stereotype. The guardian is more concerned with paying dowry than investing in their education. Due to a lack of self-explanatory books in school and low family investment, they lack equal command over mathematics and English, in comparison to other male students. This mutual effect is a lack of education, which is a huge drawback. This is compounded by the other two determinants. A male student may experience this, but the context is very different.

Another type of discouragement has been reported after low schooling. Freshers and recent graduates in our country have reported a gender-based perception regarding disciplines. Girls are assumed to be weak in mathematics and strong in biology. A newcomer stated:

“I am a girl. I am good at mathematics. I might not be a girl then.”

The ICT textbook taught in the SSC and HSC levels do not include enough details on female ICT professionals. Only Ada Byron is mentioned in Bangladeshi textbooks. But the truth is different. Eventually, most early programmers were women. A rural newcomer reports:

“A girl can do programming. I might not know this if I do not get admitted to IIT.”

These four determinants identified and explored at this stage corroborate with the identified determinants of Saifuddin et al., (2019b).

Fewer female ICT professionals

Even if a female student is admitted to ICT-related courses, she may not get a job. Rather, she may drop out or never be hired after their respective internship. This is the second leak. Like the first leakage, this one can be tracked using gender-neutral clusters. Work hours, 24/7 services, and low-level training are all gender independent determinants. Patriarchy, lack of daycare, economic stability, and family responsibility are all gender-specific determinants. This leakage has two distinct stages. These two stages are never working and working for a while. Both stages bring down the number of female ICT professionals.

The corporate world is taught in educational institutions. It is less serious than core programming courses. That is not the case in the real world. The employees and entrepreneurs who responded agree. One female industry leader admitted:

“ICT is more than just programming. Corporate etiquette is a must for students.”

It's not surprising if this sector proves to be demotivating for some. This job, by nature, involves deadlines and projects, so it has its share of unusually long hours. In extreme cases, this could be 12-18 hours. According to a female industry leader:

“You must meet a deadline tomorrow. Official work hours are irrelevant.”

This demotivates most ICT professionals, though exceptions exist. This entices ICT professionals to switch.

Aside from occasional long duty hours, some ICT sub-sectors may work at least twenty-four hours a day, seven days a week. One such sub-sector is networking, which requires rotating day and night shifts. This demotivates ICT workers, and some young professionals wish to switch sub-sectors within ICT. Generally, undergraduate training falls short of both industry and national standards. One recent graduate from a national university reported:

“I had no practical classes during my undergraduate years.”

This inadequate training discourages recruiters from hiring recent graduates as interns.

Then there is gender-specific factors, for example, less daycare facilities, economic solvency, and family responsibility. Female ICT professionals are thought to be less capable despite numerous examples in the sector. This patriarchal discourse discourages women from entering or staying in this sector. That they are placed in jobs that require less programming skills is not surprising.

When a woman enters the ICT workforce, she may marry or have a child. Mother’s Mean Age at First Birth — The World Factbook - Central Intelligence Agency, n.d.) is 18 and 25-29 in Bangladesh. Regrettably, IT firms are smaller. This prevents them from offering daycare. So, if a mother has to choose between raising a child and working, she may choose the latter. This scenario encourages withdrawal. One of the industry’s female leaders said:

“IT professionals must be dynamic. You can’t join after raising a child.”

Women's economic independence inherited from parents is another hindrance. They are said to be lazy. They would rather live in luxury than deal with ICT professionals. A current female employee stated:

“My wealthy female classmates don't work. They are wealthy, and they enjoy it.”

The current gender landscape's perception of family responsibility is sexist. Women are expected to take care of the home while men work to support the family. Women entrepreneurs reported:

“My male coworkers have fun after work. After work, I cook.”

When male colleagues are busy learning new skills, female colleagues have to be responsible for household duties. This prevents equal competition. Patriarchy and lack of daycare facilities discourage women from working long hours or participating 24/7. The literature review also identified patriarchal discourse, low-level training, fewer daycare facilities, less corporate etiquette, and family responsibility (Saifuddin et al., 2019b).

Fewer female entrepreneurs in ICT

Employed women do not become female entrepreneurs. The number of women decreases dramatically from team member to entrepreneur. There are of course, exceptional female success stories. They are observed working long hours and 24/7. But one thing is certain: they are alone in the department. In some cases, they work alone. In one case, a young female ICT professional points out,

“I'm the only one here. I am unsure of my time commitment.”

It is not uncommon for some sub-sectors within an organisation to have only female employees. This may result in an intra-sectoral job switch. It may even lead to sector extinction. This phenomenon is unique and unresolved.

Policy options

This policy paper urges action. Stakeholders can work together to increase female participation. The implementers are the government, universities, and ICT companies. The government is the most important policy actor. The government can set guidelines and encourage other stakeholders to participate.

A single policy cannot address all three leakages. That's why we need a set of recommendations for all three leakages. The policy interventions proposed fall into four broad categories. This list includes revising curricula and teaching methods, mass campaigns, revising HR policy and offering economic compensation.

Revising curricula and teaching methods

This domain requires several programmes. These programmes include adding biographies of successful female ICT professionals to secondary and higher secondary textbooks, requiring professional ICT certification as a university degree, and hiring highly qualified faculty. To include biographies and self-explanatory teaching materials, the Ministry of Education must approve. The inclusion of biographies will inspire girls to become ICT professionals. Self-explanatory books will reduce the burden of private tuition regardless of gender and help self-skilling. This would increase female participation in ICT education as more girls would volunteer to take the admission test. Their participation in undergraduate classes should improve. In addition to a Bachelor's degree, professional ICT certification would assure recruiters of their expertise. Recruiting expert faculty members is urgent. The University Grant Commission can guide and monitor these two. Then, fresh graduates could easily find work, and professors would not blame them for their lack of skills. This would help prevent the loss of female ICT professionals.

<i>SL. No.</i>	<i>Policy Cluster</i>	<i>Policy detailing</i>	<i>Implementing Agency</i>
1	Curriculum and teaching method revisit	The incorporation of the biography of female successful ICT professionals to the secondary and higher secondary textbooks	Ministry of Education
		Introducing self-explanatory teaching materials	Ministry of Education
		Professional ICT certification mandatory with a university degree	Universities
		Highly qualified faculty members recruitment.	Universities
2	A mass campaign	Expertise over mathematics does not depend upon gender	Firms funded through CSR
		Men's programme	Firms funded through CSR
		Being employed is true empowerment	Firms funded through CSR
3	HR policy	Balanced working hour	Firms
		Women prioritization into the recruitment process	Firms
		More daycare facilities	Firms
4	Economic compensation	Less taxation	National Board of revenues
		Loan interest loan	Finance ministry

Table 4.6: Policy matrix

Source: Author's own research

Mass campaign

This one is an emergency. Mass campaigns should raise awareness on the fact that girls can do mathematics as well as boys. This would help girls become equally knowledgeable and prevent female ICT student admission leakage. There can also be campaigns directed at men about how to coexist with working women. This men's programme must also include true female empowerment. This is to show that women need to work instead of relying on inheritances to be truly independent. Also, this component should help attract more capable women.

HR policy

More daycare facilities are needed, as well as a balanced work-life schedule. The government should include them in the 2006 Labour Act. The ICT firms will adopt this incorporation as part of their HR policy.

Economic compensation

Women should put more emphasis on economic incentives. This section of the policy proposal advocates for more equitable economic treatment for women. Due to the lack of such prioritized economic incentives, women participate less, especially in entrepreneurship. This financial compensation could take two forms—less taxation and low-interest loan facilities. In the absence of these two policy options, women cannot become entrepreneurs in the ICT sector. If these two facilities are provided, their participation should increase. However, this loan facility should only be offered to genuine female entrepreneurs. The National Board of Revenue and the Finance Ministry must implement this simultaneously.

Additional words

The three identified leakages can be applied to other sectors employing highly educated personnel. The determinants may be fully or partially applicable to other sectors. This policy paper does not compare the ICT sector to other sectors. If these three leakages are prevalent in other sectors, implementing the recommended policies may help.

Conclusion

There are three areas of leakage that cause low female participation in ICT. These include the low numbers of female ICT students, professionals, and entrepreneurs. This policy paper discusses the reasons behind these leakages and how to stop them and increase women's participation. If the proposed policy framework can stop these three leakages, women's participation in this sector will automatically reach an equitable level. The previous two studies found predictors (Saifuddin et al., 2019b; Suraiya, 18:04:41 UTC). But they don't end there. It revisits those determinants and categorizes them. It argues that each type of leakage requires a different policy approach. What we need is for each leak to be met with the required set of recommendations. The situation cannot be changed overnight, but we must act now to improve the situation.

Notes on gender concern

This policy paper addresses female persons enrolled in secondary and higher secondary schools as "girls". The rest of the other female persons are addressed as "women" or "female". This form of addressing is just to differentiate those groups and is not intended as any manner of discrimination during this policy discussion.

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CHAPTER 5

Impact of the Internet and Organisational Innovation on Labour Productivity: Firm Level Evidence from Bangladesh

Sharif Md. Essa

Introduction

The Internet has become a driving force for economic growth in recent years. As the Internet of Things (IoT) is a major element of the fourth industrial revolution, the Internet has direct impact on business, government and people (Schwab, 2016). The Internet provides a cost-efficient way of sharing information, which is providing both consumers and producers with choices and options. Consumers can easily access the information of a variety of products through the Internet. At the same time, the Internet is contributing in the production process in several ways—e.g., workers in firms are using the Internet as a tool for communicating among themselves and with their clients via emails, and websites of firms are giving potential new clients a preliminary idea about them. Firms that are further advanced in using ICT are not limited to only emails and websites. They are using the Internet for enterprise resource planning, international transactions, business intelligence, supply chain management and more.

There have been several studies showing the impact of the Internet on economic variables such as growth, labour productivity (or workforce productivity) or investments. However, to find out if the Internet can improve the labour productivity of a firm on its own, or whether it requires help from other external factors, like organisational innovation, is the main research objective of this paper. Based on data from the World Bank Enterprise Surveys and the follow-up Innovation Surveys on Bangladesh, the paper shows the impact of the

Internet on labour productivity and the role of organisational innovation in it.

The paper uses linear regression model to show the impact of the Internet on labour productivity based on firm level data from Bangladesh. Additionally, instrumental variable (IV) regression model has been used to find out the if the impact of the Internet changes when organisational innovation is present. Lastly, the policy implications based on the findings have also been given.

Literature Review

ICT variables and productivity

The concept of improving productivity is simple. If a firm can produce better output from the same amount of input, the firm is more productive. Transforming this input to output needs capital goods, labour force and organisational management. Studies show that ICT has a strong positive impact on firms' productivity (Arvanitis & Loukis, 2009). Several studies have found positive effects of ICT on average labour productivity for the firms of USA (Black & Lynch, 2004), (Brynjolfsson, Hitt, & Yang, 2002) and (Cappelli & Neumark, 2001) .

Commander, Harrison, & Menezes-Filho (2011) used data from approximately 1000 firms in the manufacturing sector of two developing countries—Brazil and India—to look at the extent of ICT adoption at the firm level. Their analysis suggests that, in line with some of the evidence from developed countries, there have been very high returns to ICT. They also suggest that both poorer infrastructure quality and pro-worker labour regulation are associated with lower levels of ICT capital intensity in India.

Role of the Internet

The Internet is a good proxy for ICT as it offers quite possibly the cheapest and most comprehensive way of communication and information sharing. Studies have showed that the use of the Internet is positively related with labour productivity. Studies show that broadband adoption boosts firm productivity

by 7-10%; where effects are consistent across urban versus rural locations and across high versus low knowledge intensive sectors (Grimes, Ren, & Stevens, 2012).

Najarzadeh, Rahimzadeh & Reed (2014) applied dynamic panel data approach to study the impact of the Internet on labour productivity. They used data from 108 countries from the period 1995–2010. They concluded that the Internet has positive and statistically significant effects on labour productivity. Assuming other factors stay constant, this study shows that increasing the number of Internet users by one percent, increases GDP per employed person by \$8.16-\$14.6. They also showed that, educational expenditures as a percentage of GNI, per capita health expenditures, trade and gross capital formation as a percentage of GDP, also have positive and statistically significant effects on labour productivity.

Paunov and Rollo (2016) argues that, industries using the Internet has positive impacts on firms' labour productivity and on their investments in equipment. According to their paper, an industry's adoption of the Internet is unlikely to be affected by an individual firm's productivity and innovation performance. Hence, the risk of reverse causality is low. For our analysis, we use share of industry Internet use as one of the instrumental variables since it reflects public policies aimed at fostering industries' use of the Internet.

Role of organisational innovation

Black & Lynch (2004) argues that changes in workplace organisation, including reengineering, teams, incentive pay and employee voice, have been a significant component of the turnaround in productivity growth in the US during the 1990s. The use of the Internet and computers have evolved in the recent years. Studies have found that even though ICT is productive on its own, it is more productive in firms that combine high levels of ICT with high levels of organisational changes in the areas of production and efficiency practices, HRM practices,

product and service quality-related practices. The firms that combine ICT with organisational changes have a high incidence of productivity improvement and have high rates of innovation (Gu & Gera, 2009). The same argument is applicable for the Internet. Adoption of the Internet creates more opportunities for production growth, but this raises productivity rapidly if it is accompanied by a change in organisation structure and social attitude towards it. Firms need to restructure their organisation and find innovative ways of using this technological change. Brynjolfsson & McAfee (2014) argue that significant organisational innovation is required to capture the full benefit of technologies.

Data

The paper uses the World Bank Enterprise Survey (WBES) for the analysis. For Bangladesh, the survey data is available in two modules. The core module was constructed from interviewing officials of 1,442 firms during April 2013 to September 2013. A follow-up innovation module was later published which included interviews of 990 of the original 1,442 firms. The data is collected from four major regions of the country and from twenty-seven different types of industries of the country's economy.

After structuring the WBES dataset for the analysis of this paper, the total number of observations is 937. Table 1 shows the summary statistics of the data used for analysis. The majority of the firms are geographically located in Dhaka and Chittagong. It is worth mentioning that four industries in this dataset do not have any observation (namely: tobacco, precision instruments, recycling and transport section). The size of firms has been classified based on WBES definition.

Location	<i>No. of Observations</i>	<i>Share in Total (%)</i>
Dhaka	589	62.86
Chittagong	226	24.12
Khulna	74	7.90
Rajshahi	48	5.12
Industry		
Food	115	12.27
Tobacco	0	0.00
Textiles	92	9.82
Garments	126	13.45
Leather	89	9.50
Wood	15	1.60
Paper	21	2.24
Publishing, printing and recorded media	21	2.24
Refined petroleum products	1	0.11
Chemicals	83	8.86
Plastic & rubber	3	0.32
Nonmetallic mineral products	30	3.20
Basic metals	16	1.71
Fabricated metal products	47	5.02
Machinery and equipment	16	1.71
Electronics	10	1.07
Precision instruments	0	0.00
Transport machines	20	2.13
Furniture	108	11.53
Recycling	0	0.00
Retail	64	6.83
Wholesale	7	0.75
IT	2	0.21

Hotel and restaurants	41	4.38
Services of motor vehicles	9	0.96
Construction section	1	0.11
Transport section	0	0.00
Size		
Small (≤ 19)	305	32.55
Medium (20-99)	347	37.03
Large (100+)	285	30.41
Full sample	937	

Table 5.1: Short Description of WBES Data

Source: Author's own research

Empirical Framework

Testable hypotheses

The paper tests the following three hypotheses in the empirical analysis:

1. Adoption of the Internet by firms has a positive impact on labour productivity
2. The Internet has heterogeneous impacts on groups of firms divided by: (i) size, (ii) location, (iii) exporting and non-exporting firms
3. Firms that have implemented organisational innovation will have pronounced impact

Base model

To study the impact of firms' adoption of the Internet on firms' productivity performance, we use the following estimation model (Paunov & Rollo, 2016):

$$Y_{ij} = \alpha + \beta ICT_{ij} + \gamma X_{ij} + \lambda_i + \psi_i + \varepsilon_{ij} \quad \text{Equation 1}$$

Where,

Y_{ij} is labour productivity of firm ii in industry jj .

ICT is a measure of firm's Internet use.

X is a vector of firm-level control variables such as age, experience.

λ and ψ refer to industry and geographic fixed effects, respectively

Instrumental Variable (IV) Regression

Since the base model is an ordinary least square (OLS) regression equation, the assumption is ICT and ε are uncorrelated. However, for our case, there is a problem of endogeneity, namely- high productive firms are more likely to use the Internet (reverse causality). In this situation, ICT and ε will be correlated and OLS estimators will be inconsistent.

To address this endogeneity, we use Instrumental Variable (IV) regression model. IV estimation uses an additional instrumental variable Z to isolate that part of ICT that is uncorrelated with ε (Stock & Watson, 2003). A valid instrumental variable must satisfy the following two conditions:

Instrument relevance: $corr(Z, ICT_i) \neq 0$

Instrument exogeneity: $corr(Z, \varepsilon_i) \neq 0$

If an instrument is relevant, then variation in the instrument is related to variation in ICT . If in addition, the instrument is exogenous, then that part of the variation of ICT captured by the instrumental variable is exogenous. Thus, an instrument that is relevant and exogenous, can capture movements in ICT that are exogenous. This exogenous variation can in turn be used to estimate the population of coefficient β (Stock & Watson, 2003).

The Two-Stage Least Squares

If the instrument Z satisfies the conditions of instrument relevance and exogeneity, the coefficient β can be estimated

using the two-stage least squares (TSLS) IV regression. It is calculated in two stages. The first stage decomposes ICT into two components: a problematic component that may be correlated with the regression error. The second stage uses the problem-free component to estimate β .

The first stage begins with a population regression linking ICT and Z .

$$ICT_i = \pi_0 + \pi_1 Z_1 + v_i \quad \text{Equation 2}$$

Where, π_0 is the intercept, π_1 is the slope, and v_i is the error term. This regression provides the needed decomposition of ICT_i . One component is $\pi_0 + \pi_1 Z_1$ the part of ICT_i that can be predicted by Z_i . Because Z_i is exogenous, this component of ICT_i is uncorrelated with ε_i , the error term in Equation 1. The other component of ICT_i is v_i which is the problematic component of ICT_i that is correlated with ε_i .

The idea behind TSLS is to use the problem-free component of ICT_i , $\pi_0 + \pi_1 Z_1$, and to disregard v_i . The only complication is that the values of π_0 and π_1 are unknown, so $\pi_0 + \pi_1 Z_1$ cannot be calculated. Accordingly, the first stage of TSLS applies OLS to Equation 2 and uses predicted value from the OLS regression,

$$\widehat{ICT}_i = \widehat{\pi}_0 + \widehat{\pi}_1 Z_1 \quad \text{Equation 3}$$

Where, $\widehat{\pi}_0$ and $\widehat{\pi}_1$ are the OLS estimates.

The second-stage of TSLS basically uses Equation 1, which regresses the impact of $\widehat{ICT}_i$ on Y_i . The resulting estimators from the second-stage regression are the TSLS estimators $\widehat{\alpha}^{TSLS}$ and $\widehat{\beta}^{TSLS}$ (Stock and Watson, 2003).

Descriptive Statistics

In recent years, cell-phones have become a major source of communication for both individuals and firms. The statistics of our data also reflects it. Table 2 shows that, from our 937

observations, 98.19% regularly use cell-phones for their operations. However, when we move to Internet related variables, like if the firm uses email to communicate with clients, we find that 53.36% of our observations do not. Only one third of our 937 firms have its own website.

Use of cell phone		<i>No. of firms</i>	<i>Percentages</i>
	Yes	920	98.19
	No	17	1.81
Use of email			
	Yes	437	46.64
	No	500	53.36
Use of website			
	Yes	314	33.51
	No	623	66.49
Experienced power outages			
	Yes	629	67.13
	No	308	32.87

Table 5.2: Descriptive Statistics

Source: Author's own research

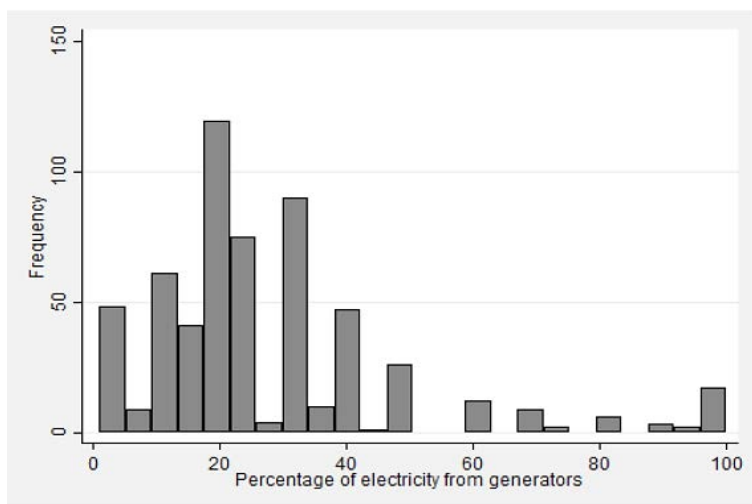


Chart 5.1: The percentage of electricity from generators

Source: Author's own research

Power outages are very common in Bangladesh. From WBES data, 67.13% of firms have experienced power outages. As a result, firms use generators to produce electricity. Figure 1 shows the percentage of a firm's electricity that comes from generators owned or shared by that firm. It is important to know that, 91.25% of the observations get 0% to 50% electricity from generators.

Findings

Baseline findings

The baseline findings of the Equation 1 is is given in table 5.3 Here, each column represents the impact of firm-level Internet use on labour productivity. Column 1 tests the impact of only firm-level Internet use. In every next column, we add firm level control variables in the regression. Column 2 adds employment and firm age. Foreign ownership and multi-plant firm are added in column 3. Exporter status is added in column 4. Lastly, credit access and managerial expertise are added in columns 5. In every column, we have kept industry fixed effect and location fixed effect. Robust standard errors are used for every regression.

The firm-level Internet use remains significant and positive across every column, which was the first hypothesis of this paper. Employment and firm age have a negative effect on labour productivity and their magnitude increase as more control variables are added. Foreign ownership gives consistent positive result. Exporter status, credit access and managerial expertise have significant positive impact on labour productivity.

	(1)	(2)	(3)	(4)	(5)
Firm internet use	0.633*** (0.090)	0.700*** (0.116)	0.668*** (0.115)	0.612*** (0.119)	0.608*** (0.117)
Employment		-0.037 (0.036)	-0.049 (0.038)	-0.084** (0.039)	-0.109*** (0.039)
Age		-0.003 (0.061)	-0.003 (0.061)	-0.000 (0.060)	-0.057 (0.066)
Multi-plant firm			0.116 (0.109)	0.107 (0.109)	0.081 (0.110)
Foreign ownership			0.392 (0.382)	0.367 (0.380)	0.380 (0.386)
Exporter				0.364*** (0.132)	0.342*** (0.131)
Credit access					0.341*** (0.083)
Managerial expertise					0.123* (0.068)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Geography fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	937	937	937	937	937
R²	0.244	0.245	0.247	0.254	0.271

Note: Dependent variable is labour productivity. Robust standard errors are shown in parentheses.

***, ** and * indicate significance at 1%, 5% and 10% significant levels respectively.

Table 5.3: Baseline Regression Findings

Source: Author's own research

Robustness tests

The regression from column 5 of table 5.3 has been used for robustness tests and the findings are shown in table 5.4. In column 1 the top and bottom 5% observations of labour productivity have been removed, and the number of observations drops to 843 after that. The impact of the Internet is still positive.

In columns 2, 3 and 4, heterogeneity across firm size (recall the second hypothesis) has been tested. Again, the Internet has positive and significant impact on labour productivity. However, it is worth pointing out that, the magnitude of impact is much higher for small and medium firms.

			<i>Firm size</i>		<i>ICT Intensity</i>	
	Removing the top and bottom 5%	Small (≤ 19)	Medium (20-99)	High (100+)	Medium	High
	(1)	(2)	(3)	(4)	(5)	(6)
Firm internet use	0.372*** (0.103)	0.548*** (0.262)	0.604*** (0.188)	0.375*** (0.178)	0.523*** (0.128)	0.397*** (0.157)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	843	275	347	285	937	937
R^2	0.233	0.389	0.343	0.330	0.261	0.252
RMSE	0.960	0.812	1.176	1.141	1.169	1.176
Note: Dependent variable is labour productivity. Robust standard errors are shown in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% significant levels respectively.						

Table 5.4: Robustness tests

Source: Author's own research

Two stage IV regression findings

The findings of two stage instrumental variable (IV) regression are in table 5.5. The first column uses only organisational innovation as an instrument. In the second column, industry use of the Internet has been added. All firm level control variables have been kept in the regression. However, industry fixed effects and location fixed effects are dropped. The outcome of Equation 2 is given in the first stage regression. The coefficient of the instrumental variable is positive and significant. The second stage least square shows the impact of a problem free firm level Internet use on labour productivity. A positive coefficient is found which is significant at 10% level.

	(1)	(2)
<i>First-stage regression findings</i>		
Organisational innovation (instrument)	0.100*** (0.034)	0.101*** (0.034)
Industry use of the Internet (instrument)		0.077 (0.073)
F-test of excluded instrument (p-value)	0.003	0.008
<i>Second-stage regression findings</i>		
Internet use	2.093* (1.114)	3.222** (1.243)
Firm-level control	Yes	Yes
Industry fixed effects	No	No
Geography fixed effects	No	No
Kleibergen-Paap rk LM statistic (under identification)	8.630***	9.407***
Kleibergen-Paap rk Wald F statistic (weak instrument)	10.505***	5.794
Hansen J statistic (over identification)	n.a	10.621**
Observations	937	921
Note: Dependent variable is labour productivity. Robust standard errors are shown in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% significant levels respectively.		

Table 5.5: IV Regression Findings

Source: Author's own research

Conclusion and Policy Recommendations

The paper found evidence of a positive impact of the Internet on the labour productivity using data from nine hundred and thirty-seven firms of Bangladesh. This result is consistent regardless of the size of the firm, the location of the firm and the intensity of ICT usage. We also find that instrumenting the firm level Internet use with organisational innovation and share of industry Internet use, the magnitude of impact becomes significantly higher.

It is important to address some limitations of this research. Firstly, the majority of the firms are located in Dhaka alone. If only Dhaka and Chittagong are considered, almost 87% of the entire observations of this data set can be found. Hence, the results are biased towards Dhaka and Chittagong only, and it may not be entirely valid for firms located in rural areas of Bangladesh. Secondly, from the twenty-seven available industries, ten have less than ten observations, while four industries do not have any observation altogether. Most of the firms are involved in either food, garments and furniture, with more than hundred observations. Because of this limitation, share of industry Internet use could not be used as the main variable of interest, something that Paunov & Rollo (2016) have used in their paper. Despite the limitations, the paper shows that the Internet has changed the typical productivity function of modern firms and it has two major policy implications. Firstly, firm level internet usage has significant positive impact on labour productivity despite the size or existing ICT intensity of a firm. The magnitude of impact is more for small, medium and low ICT intensity firms. Hence, the Internet is not only a source of competitive advantage for firms, but policy makers should also consider the lack of the Internet as a competitive disadvantage for both existing and new firms. Secondly, the impact of the Internet on labour productivity increases significantly when organisational innovation is introduced. This is important for policymaking because investing in ICT alone will not provide the expected outcome if there is no organisational innovation present. Hence,

it is recommended for policy makers to consider investing in both the Internet and organisational innovation at the same time for increasing labour productivity.

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CHAPTER 6

Policy Innovations and Practice in Solid Waste Management: A Study on Households and Waste Cleaners in Dhaka City

Abdul Fattah

Introduction

Solid waste management is a massive concern in Bangladesh, particularly in Dhaka city. The absence of an environmentally friendly urban waste management system increases a serious threat to public health, environmental protection, and the control of carbon emissions in Bangladesh. (Sara, 2020). With a high rate of urbanization in recent decades and a significant increase in population, Dhaka produces a high amount of waste every day. Consequently, surface water communication, soil communication, land and air pollution, and leachate in Dhaka city are currently in terrible condition. Besides, some economic factors, municipal wellbeing, and recycling revenue are also facing adverse effects (Hai et .al, 2005). It is estimated that by 2025, waste generation per capita is expected to be 0.75 kg/day, and the total amount of waste will reach 21.07 million tons per year. As Dhaka produces one-quarter of total the urban waste in the country and the total amount of urban waste is projected to grow by 47,000 tons per day, the densely populated city is set to face a bigger challenge (Ashikuzzaman et al, 2020).

The UN's Sustainable Development Goal 11 aims to 'make cities inclusive, safe, resilient and sustainable. Goal 3 for good health and wellbeing and goal 13 for climate action are also related to this (UN, 2021). An efficient waste collection and disposal system is crucial to achieving SDG goals and to ensure a sustainable economy for tomorrow (BRAC, 2015). Bangladesh has adopted several policy initiatives to reach these goals in recent years, notably the National 3R strategy 2010.

The implementation of these interventions is found to be far away from the policy papers.

The mixed method of study has been employed for this study containing both primary and secondary data collection methods. Two different sets of closed-ended questionnaires were developed for households and waste cleaners. The primary data of households was collected through google form, with random selection forms for different ages, sex, and educational background, living in both Dhaka North and Dhaka south city corporations. The survey was conducted in an open call and by personal request on social media. And, to understand the service provider’s perspective from waste cleaners, the questionnaire survey was conducted in two different sweeper’s colonies (the residence of waste cleaners). The methodology of the survey on waste cleaners consists of field-based data collection. Random sampling was used to explore the state of those waste cleaners and their knowledge. Key Informant Interviews (KII) were conducted with DSCC officials and community leaders.

Secondary data has been collected from governmental website sources—Dhaka North City Corporation, and Bangladesh Bureau of Statistics. Apart from that, several studies and newspaper op-eds found through internet sources were also analyzed.

<i>Data Collection Method</i>	<i>Type of questionnaire</i>	<i>Target Population</i>	<i>No. of respondents</i>	<i>Demography</i>
Questionnaire Survey (Online)	Closed-ended	Households (service recipient)	33	Dhaka North and Dhaka South
Questionnaire Survey (field based)	Closed-ended	Waste Cleaners (service provider)	21	Sweeper Colonies, DNCC
Interview (filed based)	Open-ended	WMD Official (service provider)	1	DNCC

Table 6.1: Data collection method

Source: Author’s own research

The unit of analysis was solid waste management policy trends, the recipient, and the provider of the solid waste management service in Dhaka city. Policy trend includes interventions taken by the government for waste management.

The target population was chosen households and waste cleaners in Dhaka city, as both groups are the immediate beneficiaries of solid waste management interventions. Households are people living in either part of the city, and waste cleaners, the key service providers, carry out the main task of waste collection, and manual road sweeping in Dhaka.

Two different sets of questionnaires were developed, one for service recipients and another for the service provider or waste collector. As the internet users in Dhaka increased significantly during Covid19 (BTRC, 2021), and considering nationwide Covid-19 restrictions, the household interview was conducted online. A google form version of the questionnaire with 31 variables was developed and in total 33 residents from Dhaka participated. A different questionnaire with 24 variables was developed to conduct in-person interviews of 21 waste cleaners. Both data sets are in statistical form, and the analysis for the service recipient part has been performed using IBM SPSS Statistics 27, MS Excel 2016, and google form online, while the waste collector's part was analyzed using MS Excel 2016.

Policy and practice of solid waste management in Dhaka

Solid waste management is defined as the discipline associated with control of generation, storage, collection, transport, or transfer, processing, and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economics, aesthetic, engineering, and other environmental considerations. (Sufina, 2007) Waste management can be defined as the collection, transport, recovery, and disposal of waste, including the supervision of such operations and aftercare of disposal sites such as landfills (European Council, 1991). Waste

cleaners, known as Sweeper, Cleaner, *Methor*, are a socially excluded community in our country. Their service, which is an integral part of the lives of city dwellers, is accepted without any form of recognition, and furthermore, they are widely considered as “untouchable” by society. They are deprived of healthy housing facilities, sanitation, and other social benefits (Rifat et al 2018).

BRAC (BIGD, 2015) studied existing solid waste management systems focusing on the functioning of the various stages of the SWM process and its governance. Islam and Shafi (2004) analyzed the SWM system from the perspective of the urban poor, sweeper, and cleaner. Ahsan and Zaman (2014) identified that high-rise buildings manage waste better than the slums. Tribune (2016) editorial urges Dhaka to take a lesson from Chittagong’s door-to-door waste collection system. Tanvir Hossain (2013), in a media op-ed elaborated on some hidden truths of sweepers and the discrimination they face. Environmental features of SWM include sorting and separating the waste at the household level for recycling, proper knowledge on waste separation, willingness to recycle and a proper SWM system (Ahsan T, 2014). The study finds 39% marked waste management system in Dhaka as a very severe issue (Ahsan T, 2014)

Solid Waste Management (SWM) status in Dhaka city

Dhaka is a rapidly growing and unplanned city where approximately 12 million people reside, including 3 million people who live in unincorporated areas (BBS, 2021). The Global Livability Index 2021, prepared by the Economist Intelligence Unit, marked Dhaka as the 4th worst livable city, for its poor health, education, and environmental quality (EIU, 2021). In a land area of 360km², around 20 million people live and generate approximately 6,250 tons of solid waste per day. The waste generation rate is 0.56/person (Waste Concern, 2005) that is expected to increase by 0.6/person by 2025. It implies the astronomical growth of solid waste in the city. Studies (Rashid

2019) show that only about 50% of the waste is collected by Dhaka City Corporations and dumped at the landfills, mostly without proper postprocessing.

Dhaka Metropolitan Area is divided into the Dhaka South City Corporation and Dhaka North City Corporation, and each one has a dedicated Waste Management Department to coordinate all waste management activities. (Scheinberg et al., 2010). The task includes primary and secondary waste collection, transportation, dumping, etc. The West Report 2018-2019 by DNCC mentions that the body collects 4,220 MT/day waste in a total of 54 wards.

The process for door-to-door waste collection is that the wastes are picked up in an integrated process and placed into specific containers near residential areas. Then organisations assigned by DCC collect and gather those wastes and garbage in allocated vans for waste collection to the secondary collection points. Waste and garbage trucks then transport the waste to the city's two landfill sites, Matuail and Amin Bazar. (DNCC, 2020).

Waste cleaners recruited by either the city corporation or private agency carry out the primary task of waste collection from households, including manual street sweeping, and drain cleaning (Rifat et al 2018). The West Report 2018-19 mentions that the DNCC has arranged several workshops for the waste cleaners and distributed worker's manuals. They also mentioned periodically organizing community involvement events under the Environmental Educational Programme.

SWM policy trends in Bangladesh

The Government of Bangladesh has formulated various regulatory documents such as policy, acts, rules, and strategies related to SWM as shown in table 0. Municipal Act 1864 is the first act that described SWM. After that, Dhaka City Corporation Ordinance 1983 played as the legal basis of SWM till 2009 and this legislation described waste management more broadly, including the collection and dumping process and stakeholders

involved in the process. The NEMAP was adopted in 1995, emphasizing the recycling process and promoting EMS among industries. The Master plan of Dhaka city in 2005 and the 3R strategy in 2010 have played a vital role in developing the overall SWM scenario. The 3R Strategy that was undertaken in 2010 by the Department of Environment (DoE), with the principle of reducing, reusing, and recycling resources and products is the most promising document for sustainable waste management. The Draft Solid Waste Management Rule 2018, which is now waiting for endorsement, will be a fundamental law for waste management.

<i>Time</i>	<i>Legislation</i>	<i>Organisation</i>
1995	Bangladesh Environment Conservation Act 1995	DoE
1995	National Environmental Management Action Plan (NEMAP)	DoE
1997	Environmental Conservation Rules 1997	DoE
2010	National 3R Strategy for Waste Management	DoE
2011	Local Government Act (Amended)	LGD
2013	National Environmental Policy	DoE
2015	Seventh Five Years Plan	Ministry of Planning
2017	E-waste Management Rules	DoE
2018	Draft Solid Waste Management Rules	DoE

Table 6.2: Key policy interventions related to SWM

Source: Waste Report 2018-2019/ revised by author

Findings of the study: Service recipient's perspective

Table 6.3 shows the socio-economic condition of respondents. The study finds that 45.5% of the respondents are female, and 54.5% of them are male. The highest number of the respondents have earned tertiary education degrees (84.8%), and the lowest number are those with no education (3%). Also, the respondents

from high school and primary education are 9.1% and 3% respectively. Considering Bangladesh's urban literacy rate of 81.0% (BBS Pocketbook, 2020), it seems that 97% of the respondents received formal education.

The Local Government (City Corporation) Amendment Act 2011 divided Dhaka City into Dhaka South City Corporation (DSCC) and Dhaka North City Corporation (DNCC) on 29 November 2011 (DNCC, 2021). The table shows that the higher number of respondents are from Dhaka North City Corporation (60.6%) and the rest are from the other city corporation.

In terms of the respondents' residence to the nearest waste dumpsite, table 6.4 shows that 40% of respondents claimed that they do not even know the location, and 25% said that the nearest location is more than 200m away which is not convenient for citizens.

<i>Item</i>	<i>Number of respondents</i>	<i>Percentage of respondents</i>
Sex		
Female	15	45.5%
Male	18	54.5%
Level of Education		
Primary	1	3.0%
High school diploma	3	9.1%
Tertiary	28	84.8%
None	1	3.0%
Location		
Dhaka North	20	60.6%
Dhaka South	13	39.4%

Table 6.3: Characteristics of respondents/researcher

Source: Author's own Research

<i>Items</i>	<i>Number of respondents</i>	<i>Percentage of respondents</i>
Between 101 and 200m	3	9%
Between 50 and 100m	3	9%
I don't know	14	44%
Less than 50m	4	13%
More than 200m	8	25%
Grand Total	32	100%

Table 6.4: Distance from dumpsite

Source: Author's own Research

Knowledge about policy innovation

Bangladesh's latest innovation for sustainable waste management initiative, the National 3R Strategy for Waste Management 2010. is a well-written paper that has not seen any visible effect since then. The study finds that the mean of understanding is below the median and the standard deviation of .609 points out that the big cluster of respondents is below the median value of 2. In percentage, 45.5% of respondents expressed that they know the policy. Considering that about 85% of respondents have finished tertiary education, only around 39% of highly educated people know this policy.

		<i>Percent</i>	<i>Cumulative Percent</i>
Valid	No Idea	6.1	6.1
	Definition	18.2	24.2
	Average	42.4	66.7
	Good	24.2	90.9
	Expert	9.1	100.0
	Total	100.0	
Standard deviation		1.023	
Mean		3.12	

Table 6.5: Understanding of National 3R Strategy for Waste Management 2010

Source: Author's own research

The survey asked to evaluate their understanding of the solid waste management concept using the Likert Scale. Table 6.5 shows that most of them (66.7%) considered their understanding of the topic average, and 9.1% of respondents were experts. We can also see that the mean is higher than the median by 0.12. This also shows the same scenario.

N	Valid	33
	Missing	0
Mean		1.61
Median		2.00
Std. Deviation		.609

Table 6.6: Understanding on solid waste management

Source: Author's own research

Current Practice Experience

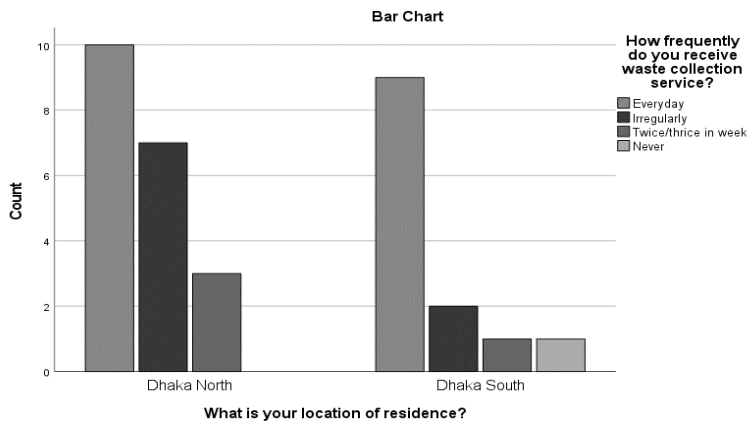


Chart 6.1: Frequency of waste collection service in two city corporations

Source: Author’s own research

The Waste Management Department, which supervises Dhaka’s waste management, claimed in the waste report 2018-2019, that they collect all waste and spends 44% of the budget on it. DNCC alone has around 418 primary waste collection points (Waste Report, 2020). Chart 6.1 also shows how the frequency of waste collection is higher in DNCC. Also, a significant number of DNCC residents (6) claimed that their waste collection is irregular.

The study then asked to rate the level of satisfaction with the city corporation’s service. Table 6.7 shows that the average satisfaction is higher than the median value by 0.67. But the standard deviation of 1,109 reflects most respondents are far from the median. So, a significant number of citizens are dissatisfied with the service.

Satisfaction on SWM Service

Rate your satisfaction with the waste management services provided by the city corporation		
N	Valid	33
	Missing	0
Mean		3.67
Std. Deviation		1.109
Percentiles	25	3.00
	50	4.00
	75	4.50

Table 6.7: Satisfaction on city corporation service
Source: Author’s own research

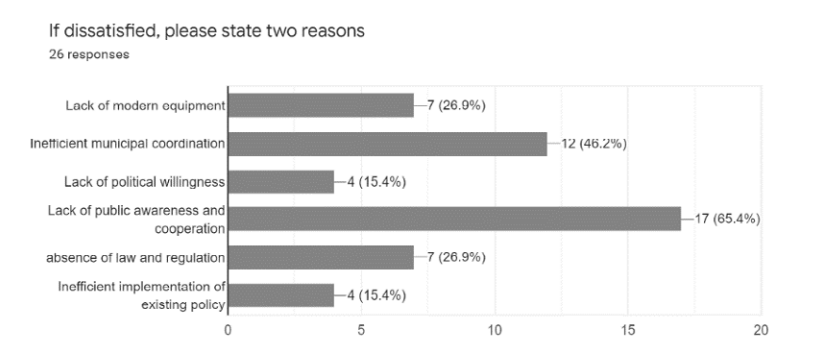


Chart 6.2: Reasons for dissatisfaction on service
Source: Author’s own research

Of those dissatisfied, around 65% expressed that lack of public awareness and cooperation is a core reason. A high number of citizens (46.2) also observed municipal cooperation as inefficient. In the same proportion of people (26.9%), there is a shortage of modern equipment and a lack of laws and regulations. Interestingly, very few people believe there is a lack of political willingness and inefficient implementation of existing policy (15.4% each).

Perspective on Waste Cleaners

<i>Satisfaction with waste cleaners</i>		
How satisfied you are with the service of waste collector/sweeper?		
N	Valid	33
	Missing	0
Mean		2.82
Std. Deviation		.950
Percentiles	25	2.00
	50	3.00
	75	3.00

Table 6.8: Satisfaction on waste collector’s service

Source: Author’s own research

Dhaka depends mostly on unskilled men and women to handle the massive amount of 4,220 MT (Waste Report, 2020) of solid waste generated each day. The waste collector includes young children aged under 18 which is a clear violation of the law. Also, in many cases, they live in inhuman conditions and are deprived of many basic rights. Given this scenario, the study asked to evaluate the satisfaction of waste collector’s service. Table 6.7 shows that the mean value of 2.82 is below the median value of 3; that indicates dissatisfaction with most of the individuals. And the standard deviation of .950 indicates most of the respondents are not satisfied with their service

Please mention your reasons for satisfaction or dissatisfaction
27 responses

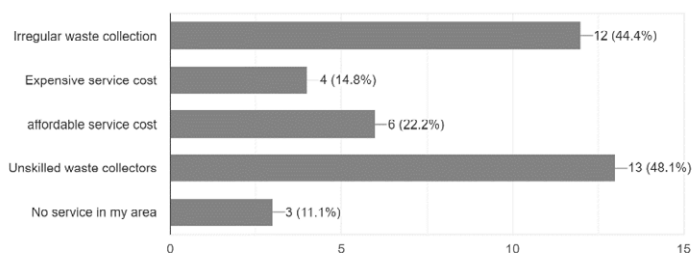


Chart 6.3: Reasons for dissatisfaction

Source: Author's own research

In reasoning for dissatisfaction on service, 48.1% agreed that waste cleaners are unskilled, which also asserts my findings from an interview I took of a waste cleaner five years ago. This clearly shows no significant changes have been made over the years. The next highest percentage of respondents (44.4%) stressed irregularity in waste collection. Regarding the service cost, 22.2% expressed that the charge is affordable, which is more than the people who said it's expensive (14.8%).

		<i>Frequency</i>	<i>Percent</i>
Valid	25% more than current charge	10	30.3
	50% more than current charge	5	15.2
	100% more than current charge	2	6.1
	I don't want to pay more	10	30.3
	Total	27	81.8
Missing	System	6	18.2
Total		33	100.0

Table 6.9: Willingness to pay for better service

Source: Author's own research

This chapter then asked how much people are willing to pay for improved service. Table 6.9 shows that a significant (30.3%)

number of respondents do not want to pay more, and the same percentage was agreed to increase 25% more than current charge. This clearly contradicts the fact that the majority didn't find the charge that is expensive in the last question.

It has been found and observed that the waste cleaners are not properly trained. So, the study asked from the service recipient if they also feel the same. Table 6.10 shows the assertion of most people and that they also think waste cleaners are not properly trained and equipped. Followed by this, 81% of respondents agreed that these unskilled workforces are contributing to poor waste management in Dhaka city. 14.8% of the respondents were ambivalent about it.

<i>Items</i>	<i>N</i>	<i>Range</i>	<i>Mean</i>	<i>Std. D</i>
Do you think waste cleaners are properly trained and equipped?	33	2	2.06	.429
If no, do you agree that this unskilled workforce is contributing to poor waste management?	27	2	1.33	.734
Valid N (listwise)	27			

Table 6.10: Waste cleaners’ training

Source: Author’s own research

Stakeholder contribution

The role of three stakeholders, city corporations, private agencies, and citizens, has been analyzed. The study asked to rate their level performance from very good to very poor putting the average in the middle. Chart 6.4 shows that only one respondent found the city corporation’s role very good, and almost 50% of respondents marked their performance average. Around 81% of respondents fall between average and very poor. For private agencies, 33% of respondents evaluated their performance as good, and around 61% of respondents marked it as good and average. This clearly illustrates people’s trust in private agencies over the government one.

<i>Items</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. D</i>
City corporation	33	1	5	3.24	1.001
Private agency (Community service)	33	2	5	3.21	1.083
Citizens	33	1	5	3.42	.936

Table 6.11: Evaluation of role played by city corporation, private agency, and citizens

Source: Author's own research

The study then asked to evaluate citizens' performance. Chart 6.4 shows that a total of around 52 percent of citizens said their performance is bad and very bad. And around 85 percent of citizens are among the very poor to average category.

Public Awareness Analysis

Public awareness has been considered as a key to improve overall solid waste management in Dhaka city by numerous studies. This study finds the poor condition of public awareness even among most educated citizens. The study asked about knowledge about the government's policy on the National 3R strategy for waste management. It has been found (shown in table 6.10) that the most educated people have no or little idea about the policy, as the mean value of 1.61 is below the median. And SD also denotes the high number of unaware people about the policy. The mean value of 1.73 presents the same scenario for waste separation that most people do not separate.

The study observed that even those who know about the SWM concept and policy very well, several of them (35%) are not conscious or aware of personal waste disposal. Table 6.12 shows that a significant number of people do not really separate waste or separate irregularly regardless of a knowledgeable background. About waste separation, a total of 6.33% of respondents said that they separate their waste and none of the expert separate waste regularly.

<i>Items</i>	<i>Number of respondents</i>	<i>Range</i>	<i>Mean (Std)</i>	<i>Variance</i>
familiaroty with National 3R Strategy for Waste Management 2010	33	2	1.61 (.609)	.371
Waste separation habit	33	2	1.73 (761)	.580

Table 6.12: Policy knowledge and awarness about SWM

Source: Author’s own research

				<i>Frequency</i>	<i>%</i>	<i>Cumulative %</i>
Valid	Yes			11	33.3	40.7
	Yes, it's a common practice in my area			7	21.2	66.7
	No			9	27.3	100.0
	Total			27	81.8	
Missing	System			6	18.2	
Total				33	100.0	
<i>Items</i>		<i>N</i>	<i>Range</i>	<i>Mean</i>	<i>Std. D</i>	<i>Variance</i>
legal punishment for that offence		21	0	2.00	.000	.000

Table 6.13: Street dumping habit and punishment

Source: Author’s own research

This chapter asked whether respondents throw waste into the street. Section 13 of the fifth schedule of the Local Government (City Corporation) Act (amended) 2011, states littering as a

punishable offense. The fine includes no more than Tk 5000 and for reoccurrence, Tk 500/day. Table 6.13 illustrates that 66.7% of them acknowledged that they dump waste randomly. More interestingly 21.2% of respondents found this practice is normal in their area. Regarding punishment, all unequivocally said that they did not pay any fine for the offense.

<i>Items</i>	<i>Number of respondents</i>	<i>Range</i>	<i>Mean</i>	<i>Std. D</i>
I use trash bin	33	4	3.61	.659
I randomly dump waste	33	4	1.97	.984
I keep waste until waste cleaners receive it	33	4	3.39	.899
I am aware about waste management	33	4	3.24	.867

Table 6.14: Waste management habit

Source: Author’s own research

Applying the Likert Scale, this chapter asked to evaluate four awareness issues as shown in Table 6.14. For the habit of using trash bins, it has been found that the mean value is 3.61 which is more than the median 3 with the standard deviation of 0.659. It shows a large group of people uses trash bins for disposing of wastes. Almost the same result came for keeping waste until the waste collector’s come to collect. The mean value (1.97) went far below the average for the statement that ‘I randomly dump waste’. With the SD of 9.84, it shows that the majority do not dump waste randomly. However, table 6.13 found it otherwise. On the statement on ‘I am aware of waste management; the mean is also higher (3.24) with an SD of 0.867.

Table 6.15 illustrates people’s experience in participation in the public awareness programme. Only 10 out of 33 respondents participated in any such events once/twice whereas others never participated or found any awareness programme.

<i>Response</i>	<i>Count (N)</i>
No awareness programme	2
once/twice	10
Never	21
Total N	33

Table 6.15: Public awareness programme participation

Source: Author’s own research

Recommendation

In evaluating factors responsible for the poor waste management system, chart 6.4 shows that the majority said the city corporation management is primarily responsible for this, followed by lack of public awareness (39.4%) and population density (24.2%). Nobody considered that there is a shortage of budget for this.

In your opinion, what is the reason for the poor waste management in Dhaka?
33 responses

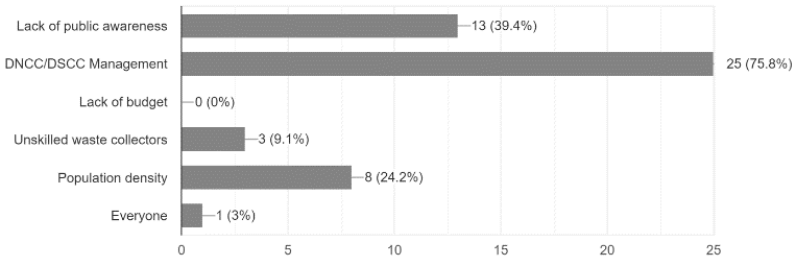


Chart 6.4: Factors responsible for poor waste management

Source: Author’s own research

Findings of the study: waste cleaners’ perspective

This survey was conducted in two sweeper colonies, Ganoktoli sweeper colony and Dholpur sweeper colony, including few random waste cleaners. Most of the Waste Cleaners are from Dalit, Telegu, and other marginalized communities. In the Dholpur colony, there are 700 houses and homes of approximately 3500 people, according to Kashu, a DSCC waste cleaner. Colony

residents are mostly in poor condition, and it becomes worn during the rainy season. Most of the families reside together with parents, children, adults, boys/girls in a small room. Due to congestion which leads to a lack of proper ventilation, there is no scope for inhaling fresh air at all. Insecurity and uncertainty are the part of these colony dweller’s livee due to the presence of crime and threats of eviction from local musclemen. While speaking about their forlorn living, Suraiya Begum, who works for the DSCC, said with her gloomy face “How can we serve better if we don’t have better lives for ourselves? Therefore, bringing about improvements in our lives should be prioritized.”

Wage and job condition

A study by Sheltech in 2004 found all types of waste cleaner’s wages to be below 4,000 BDT. This scenario has been changed. Though all living expenses have increased by this time, no waste cleaner earns below 4000 BDT, even the one who works four hours in a private company. DSCC increased their wage with a new pay scale recently and, for that, the corporation is spending more than 100-crore taka per year for their new increments, according to DSCC officials.

<i>Monthly Income (Tk.)</i>	<i>Frequency</i>
<5000	3
5001- 6000	5
8001-9000	5
10000- 12000	4
12000-14000	2
14000- 16000	7

Table 6.16: Income pattern of waste cleaner/researcher

Source: Author’s own research

Permanent DSCC waste cleaners earn more than 12,000 BDT per month, but it is now very tough to manage a city corporation job as the last recruitment was in 2001. According to Devid, a primary waste cleaner, government officials usually demand 5-6 lacks of bribe for a DNCC job. Under the circumstances. Young people are working in the private sector where payment is low and below 8000 BDT.

Most of the primary waste cleaners don't receive any performance bonus, while DSCC, and government service holders get bonus twice a year. Our study finds 40% of respondents do not receive any bonuses, and most of them work in the private sector (details in annexure). However, AHM Abdulla Harun, AE (WMD) of DSCC said that DSCC gives performance bonuses of 5,000 BDT to waste cleaner and 10,000 BDT to CI.

Health condition

Waste cleaners have shown their concerns about health risks, and a few respondents said they are becoming habituated with this poor health condition. Kashu, a DSCC worker, said the government does not provide any costumes or safety equipment. Twenty respondents out of 23 said that they do not receive any risk allowance aiming their high risk at work. Residues who work for primary waste collection in the apartment said they get between 500-1000 BDT depending on the problem. DSCC officials also acknowledged the fact and said they only provide 50,000 takas for death at the workplace. The study also reveals that street sweepers manually handle a variety of waste: domestic, industrial, and commercial. Their work involves collecting, sweeping, and dumping garbage on the streets every day.

Education and training

Around 95% said that they do not receive any training for the job, and most of them said that they already know everything as it is their family job. They do not even feel the need for training. One of the respondents, who works in an autonomous government

institution said that he went to get training from the Fire Service Department, and they refused as he had not completed his secondary school. City corporation officials acknowledged the lack of training and urgency of training. The official said that the training resumed in 2013 yet does not have any plan to start it.

Regarding the education of waste cleaner's children, many of them said that they can now enroll their children in any school as long as their identity and address remain hidden. Many universities including Dhaka University reserve a quota for Dalits that wish to pursue higher studies.

Women work environment

This study attempted to analyze the work environment of waste cleaners, especially from a women's perspective. The survey reveals that none (98%) receive any maternal leave. Women who work at DSCC must substitute someone on their behalf during pregnancy otherwise they will not get any salary and might lose their job. Women road cleaners who start work at night (3am) reported several harassment cases on the street. Sabira Khatun who works for DSCC at Dhanmondi said that men, especially rickshaw pullers, usually harass her when she works in the early morning. Several other female respondents said that they faced harassment by rickshaw pullers.

Social recognition

The survey finds around 27% waste cleaners need to hide their identity when getting public services, even when it was not mentioned in the questionnaire. The other same percentage said that the situation is now improving, and they do not feel being discriminated against. The remaining said that they have a bad experience with it. Kashu said that a tea stall opposite the colony does not even want to sell tea to cleaners. They behave rudely when cleaners ask for a cup of tea, even though they are paying money themselves. Some waste cleaners including Abdul Kadir said that even a rickshaw puller does not behave properly. On the other hand, cleaners like Devid who work at the apartment shared good experiences.

Policy Recommendations

Training for waste cleaners

To increase work efficiency, waste cleaners need to take part in capacity development and educational training. A range of courses from introductory courses on sustainability and waste management to advanced and specialized training in hazardous waste and leachate management should be arranged based on individual needs. A foundation training for each waste collector should be ensured where they will learn basics about waste separation, collection, personal health, and environmental protection-related topics.

Community Involvement

Local people need to engage in the waste management process. Citizens' participation in the municipal decision-making process will empower both the administration and citizens. The participation of the apartment committee, local organisations, clubs, and religious bodies in the SWM process needs to be ensured. There can be a partnership with local NGOs, influential bodies, and government agencies in the process.

Awareness Raising Campaigns

All parties involved in the study stressed the importance of awareness-raising programmes. The campaign should be both online and physical. Online campaigns through social media, YouTube, website, short videos, posters, and writeups can be organized. Physical awareness programmes like workshops, rallies, seminars, and games should also be initiated. Awareness can be raised to change people's mindset toward waste cleaners, to promote waste separation at the household level, to enhance green mindset, and to stop people's common habit of throwing waste randomly.

Decentralisation

It can ensure monitoring day-to-day activities and engage staff and infrastructure at the root level. Devaluation of power from the WMD to local bodies is recommended for effective

management. Local management bodies should be properly authorized and empowered so that they will be able to carry out full waste management operations for their own areas.

Provide essential equipment

City Corporation should provide necessary safety equipment such as uniform, gloves and masks to all waste cleaners. Also, to enhance work efficiency, modern equipment for waste collection and street cleaning should be ensured at every level of the process.

Women Friendly Work Condition

A women friendly environment is essential to ensure the safety and security of women waste cleaners. City corporations should ensure waste cleaners' right to health, education, and shelter so that they can be motivated to perform better. Provision for maternal leave should be added.

Implementation of existing policies

This study found that even existing policies, like the National 3R policy is not in practice. This policy can solve most of our existing problems. Capacity development of staff, officials, and procurement of necessary equipment needed to implicate these modern policies.

Enhance municipal cooperation

The Waste Management Department of both city corporations should exchange information and cooperate with each other for better waste management. The cooperation with city corporations and central government agencies should also be improved.

Conclusion

Dhaka is one of the world's most densely populated city where approximately more than 15 million people reside (World Bank, 2021). This large population generates a sheer number of solid wastes every day. The combined perspectives from households and waste cleaners give an overall policy implementation status, and the gap between the two interdependent groups has also

been explored. The study examined the factors contributing to poor waste management by both service providers and service recipients. It found that waste cleaners experience a range of demotivating factors in their jobs like poor salary and benefits, corrupt recruitment process, poor or no performance bonus, no maternal leave, etc.. Many waste cleaners mentioned facing risks like mental pressure, women harassment, police harassment, road accident, and respiratory health problem. The study found that about 95 % of waste cleaners do not receive any training.

Consequently, the study suggests that only 0.03% of households were satisfied with their service. The study found that 81% of households believe these waste cleaners are untrained and unskilled, and the same percentage think these workers are causing poor waste management in the city. Thus, about 44% of respondents are said to face irregularities and disruption in the waste collection service. Thus, around 66% of citizens expressed not Willing to Pay (WTP) more for better service or increase lightly (25%). However, households are dependent on these unskilled people and cannot afford any service disruption for a single day. Therefore, an efficient and sustainable waste management programme is needed to improve the condition. Further study can be done among stakeholders related to the SWM process focusing on newly initiated Draft Solid Waste Management Rules 2018 and the National 3R Strategy 2010.

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CHAPTER 7

Water Transit and Its Challenges and Opportunities in Bangladesh

S. M. R. Arfanul Alam

Introduction

Bangladesh has been considered an important player in today's rising Asian economy due to its continuing economic growth, cheap labour, and, most importantly, its geographic location. What blessed the country is its maritime boundary. Bangladesh's location on the Bay of Bengal has blessed the country with seaport facilities, blue economic activities, and water transit for itself and the neighbouring countries. The Bay of Bengal is situated between latitudes 5°N and 22°N and longitudes 80°E and 100°E. It has a boundary with the east coast of Sri Lanka, India in the west, and the Myanmar peninsula in the north. It occupies an area of about 2.2 million sq km, and Bangladesh is located at the head of the Bay (Banglapedia, 2016). Bangladesh's sovereign rights have been established on more than 118,000 sq km of maritime territory, 200 nautical miles (NM) of exclusive economic zone, and 354 NM of the continental shelf in the Bay after verdicts in international courts (BD News, 2016).

There are many opportunities for ocean economic activities in this vast maritime area. One of the establishing economic activities is water transit. "More than 90% of Bangladesh's total external cargo trade is seaborne," and ongoing globalisation has made this flow more important (Alam, 2014). The long coastline and long tradition of navigation in the sea have led Bangladesh to a comparatively strong development of 'maritime services' that carry out the trade and transport in the sea. As of 2015, the value of all imports is Tk 266.34 billion, and export is Tk 196.36 billion in Bangladesh (Trading Economics, 2016). These

exports and imports are carried by 2,500 foreign ships, regularly visiting Bangladesh's ports (Alam, 2014).

Besides the water transportation for the country, Bangladesh can and is offering the inland water transit facility to other countries. Bangladesh and India signed an Agreement on Coastal Shipping and a Standard Operating Procedure (SOP) in 2015 (MEA of Indian Government, 2015; SASEC, 2015). There are several transit agreements with India to exchange transit facilities. These include Bangladesh's water routes. As a water transit hub in the region, Bangladesh can also provide transit to Nepal, Bhutan, and China. This process will have a 'spill-over effect', such as creating jobs (which will minimize Bangladesh's acute unemployment problem), exploring other ocean economic activities, providing ample technical expertise in the field, and earning foreign remittance.

Besides pure economic issues, Bangladesh is in the middle of the China-Indian geopolitical race. For example, China's interest in financing Sonadia deep seaport grabbed India's attention. India did not want China to have such a strategic position and thus, had a reservation; the USA too had an objection to allowing China to build the port. It is assumed that due to India's and America's objections, the agreement with China was not signed in 2014 (The Diplomat, 2016). However, water transit presents plenty of opportunities for Bangladesh using the enhanced relationship with neighbouring countries and increased trade volume.

This chapter describes the challenges and opportunities of water transit in Bangladesh. It critically examines the scope of water transit both nationally and internationally and sheds some light on its geopolitics. It also suggests some recommendations to mitigate the challenges and enable a better outcome from the water transit in Bangladesh.

Methodology

This chapter was originally written as a policy paper in 2016. After revisiting it in 2021, the policy paper is shaped into a book chapter without changing the previous data. So, the results, discussion, and recommendations in this chapter reflect the data from 2016 and backward.

The study from which this chapter originated was conducted using the qualitative method. The study profoundly relied on media content and the open-source official documents of the Governments of India and Bangladesh. The media—mainly the newspaper reports—were reviewed to follow the advancements in the water transit domain in Bangladesh. Besides official documents and news content, data were collected from relevant websites as well. The reports were selected through online keyword search and content review in printed versions.

Finally, a SWOT (strengths, weaknesses, opportunities, and threats) analysis was performed based on the reviewed data. In this chapter, ‘strengths’ are the internal opportunities/capacities, ‘weaknesses’ are the internal challenges, ‘opportunities’ are the external prospects and ‘threats’ are the external challenges.

Unlike the traditional SWOT analysis, where the items are written in the sequence—strengths, weaknesses, opportunities, and threats—the researcher conducted the SWOT analysis differently in this study. It followed the sequence—weaknesses, threats, strengths and opportunities. The reason for this sequence is to make it easier to put the relevant findings together.

Results and discussion

The internal and external challenges (weaknesses and threats)

There are three major ports in Bangladesh—Chittagong, Mongla, and Payra. Among these ports, Chittagong port is the country’s oldest, and Payra is the latest. These three ports have different problems. The Chittagong Port has been the principal seaport of Bangladesh by handling about 92% of all import-export trade of the country (Chittagong Port Authority, November

2015). However, the increase in container vehicles without the increment in handling facilities makes it difficult to run the port smoothly and efficiently. Mongla port faces heavy siltation at the approaching paths to the berths and hinterland access. Again, the Payra port is yet to be fully operational.

Bangladesh's export sector is booming day by day, and the sector has a lion's share of the country's total GDP. For example, 15% of the country's GDP comes from exporting readymade garments (BD News 24, 2016). However, considering this large volume of export goods and future opportunities, developing port facilities should be at the apex of priorities. Bangladesh did not build any port after the independence in 1971 until the Payra port recently. The other ports are also looked down. Chittagong port, as the prime port of the country, attracted less attention. The port necessitates less maintenance cost due to its natural location in the river Karnaphuli. Still, the port lacks proper dredging and modern equipment. Shipwrecks, scraps, and silt beneath the riverbed hinder proper navigation. Many cargos are seen waiting in the outer sea for the tidal-time to anchor—the lack of depth of the routes is the reason. Institutional corruption, illegal land grabbing, vacant positions of the officers, and the red-tape complexity are some of the problems that make Chittagong port costlier and less attractive (Ahmed, T. and Rosette, J., 2007).

It also faces excessive traffic and creates vessel congestion. However, the Bangladesh government has taken a 25 to 30 years long-term plan to modernize the port with the help of the Asian Development Bank. On the other hand, Mongla port cannot also handle cargo compared to its necessity. The port is located 48 km from Khulna, 70 NM from the Bay of Bengal, and is nearer to Kolkata than Chittagong port. It also costs less compared to the Chittagong port in handling cargo vessels. Interestingly, even though the Mongla port is the second busiest after the Chittagong port, it has no adequate road or rail connectivity. Thus, delivery delays occur regularly, costing Bangladesh an additional \$15,000 per day (BD News 24, 2016).

The Payra port will take three to four years to be fully operational. If the port is appropriately run, Chittagong port will face less traffic congestion. Along with this, Bangladesh has signed the Protocol on Inland Water Transit and Trade with India. Under this, India can use Bangladesh's water routes to deliver goods to its northeastern part. The transshipment of goods began on June 16, 2016, with the unloading of 1,004 tons of iron sheets at Ashuganj river port in Brahmanbaria on June 17 (The New Age, 2016).

This transshipment of goods has created some controversies. The amount fixed as transshipment fee is the main point of criticism. Under the Inland Water Transit and Trade Protocol between India and Bangladesh, Bangladesh charges Indian goods Tk 192.22 per ton as transshipment fee. This is a minimal amount of fee compared to the services. The experts' committee of the Bangladesh Tariff Commission have recommended a fee of Tk 1,058 per ton earlier. Another point of controversy is the lack of infrastructural development and the roads used for transporting goods by heavy vehicles.

There is no internal container terminal. Also, the port lacks upgraded infrastructure, including jetty and approach roads in the port areas, to facilitate the unloading of Indian goods to be carried to Akhaura land port by roads. Also, The Inland Water Transit Protocol has no provision on anti-dumping, anti-trafficking, and anti-pollution measures. Thus, the opportunities and challenges of water transit for Bangladesh are undermined.

The major challenges of water transit do not only lie in infrastructural inadequacy. They also come from transit facilities provided to the neighbouring countries. 'The Inland Water Transit and Trade Protocol' between Bangladesh and India allow Indian ships to visit Bangladeshi ports and use at least eight points—Sheikbaria, Mongla, Khulna, Barisal, Chandpur, Narayanganj, Sirajganj, Chilmari or at any point determined by the competent authorities of both countries—to refuel (Vide article

5 of the Protocol on Inland Water Transit and Trade). There is a risk of oil-spilling and wastes disposal from the vessels that will pollute the river and thus the environment. These rivers are the providers of a large number of fish. Pollution may cause harm to these fishing grounds.

Secondly, India is one of the biggest countries in the world, with 1.34 billion people in 2016 (Indiaonlinepages, 2016). The risk of infectious diseases and drug trafficking cannot be ignored. As Bangladesh seriously lacks the material capacity to deal with infectious diseases due to its dense population, the country should have considered necessary steps while signing the agreement.

Thirdly, the amount (Tk 192 per ton) of fees fixed for the transshipment of goods has been considered a disadvantage for the transit. The country (Bangladesh) has to invest in developing its road and port infrastructure in the coming days. Finally, another concern raised by the experts is that large Indian cargo ships with high capacity might undermine the necessity of Bangladeshi vessels. It may seriously compromise the local vessel owners' profit and can even cost their business.

Dr Moshir Rahman, an economic affairs advisor to the Prime Minister, said three to four institutions are associated with the transit process. However, we do not yet have any effective strategy to adjust the work of all these institutions together (The Daily Prothom Alo, 2016). So, the process is tough to administer as well. Lack of coordination among the institutions will make the whole operation slow and costly. It is crucial to minimize the institutional costs and time to make the transit easy and beneficial for both the countries involved.

The internal and external opportunities (strengths and opportunities)

Bangladesh is facilitated by the two major ports (since the one in Payra is not fully operational yet) and many river ports that help make water transit easier and cheaper. According to Bangladesh

Inland Water Transport Authority (BIWTA), there are twenty-two complete river ports with the essential measures to load and unload goods, board and unboard passengers, and land motorized vessels and 448 ‘secondary riverine ports’ (small-medium ports) in Bangladesh (Banglapedia, August 2016). According to a World Bank report, tariffs for water cargo are more than 300% cheaper than road tariffs. The ratio is Tk 0.98 Tk per ton/ km, whereas rail tariffs are between Tk 2.5 and Tk 4. After paying all the costs of handling goods at the ports, the tariff still remains cheaper. For example, “between Dhaka and Chittagong, the tariff to transport a 20-foot container is around Tk 600 per ton by IWT, compared to Tk 1,200 for rail and Tk 6,000 for the road” (The World Bank Office Dhaka, 2007).

These national port facilities encourage international water transit services through Bangladesh. As part of the opportunities, Bangladesh and India have signed the Inland Water Transit Protocol. Both the countries can use water routes for the transshipment of goods. The necessity of this kind of ‘exchange’ is in high demand from the Indian side to send goods to its northeastern region. Bangladesh will be benefitted from the fees and employment of its people.

Because of Bangladesh’s geographic location and rising economy, China also showed strong interest in building a deep-sea port at Sonadia in Moheshkhali (also related to Chinese geopolitical interest). The Chinese state-owned China Harbor Engineering worked as the frontrunner. Both the countries were about to sign an agreement on the proposed project in 2014. However, as mentioned earlier, India and the USA had an objection to this as the countries are not ready to accept China in such a strategic position. Bangladesh formally announced China’s disengagement from the project in 2014.

With the pulling out of the Chinese proposal, Bangladesh approved Japan’s proposal to build a deep-sea port at Matarbari, located at just about twenty-five kilometers far from Sonadia

in September 2015. JICA (Japan International Cooperation Agency) will finance \$4.6 billion at a 0.1% interest rate for over 30 years for building a port and a power plant (BD News 24, 2016). This deep-sea port will facilitate large international cargo to unload goods. It also promotes the transportation of these goods to different countries by lighter cargo or to different parts of Bangladesh through highways, railways, and water routes. Bangladesh now has to use ports in Singapore to anchor large cargo. The deep-sea port will make Bangladesh self-sufficient in handling large-scale international vessels.

Bangladesh has the third-largest port facilities in South Asia, followed by India and Pakistan. So, Bangladesh can become a regional transport hub earning remittance and booming its economy through exports. However, it is also necessary to keep in mind that Bangladesh must use its water routes to connect with the outer world. Thus, the development of facilities for water transit and the maintenance of them will benefit Bangladesh's economy.

The scope of futuristic policies

Water transit is the only option for Bangladesh to make better use of its expanding export sector. It can be said in the reverse form that water routes are stimulating Bangladesh's export sector. On the other side, the transit through Bangladesh is not merely an economic factor; it is also strongly related to global politics and Asian politics in particular.

China's interest in the Bay of Bengal has been bold due to its plan to connect Asia through all means. China's endeavour to be a global leader has a foundation in Asia. Thus, transit facilities, in a more precise word, for direct access to the Asian market is an important step. It is essential to mention that China has more expansion of its market in South Asia than that of any other country. China is also the largest exporter in Bangladesh.

However, China's strategic presence in Bangladesh gave India and the USA a thought. Though Bangladesh cancelled

the Sonadia deep seaport project with China, it is still vital for Bangladesh for regional politics.

On the other hand, India has always been in quest of reaping benefits from Bangladesh's ports and water routes. The Protocol on Inland Water Transit and Trade between Bangladesh and India was restored in 1972, which was suspended by the Pakistan authorities in 1965 (The Daily Star, 2015). Since then, Indian cargo vessels have increased manifold. The protocol has been seen as a sign of cooperation between the two countries.

For several reasons, India had an aspiration for a long time to get easy access to its northeastern part. The region has a history of insurgency and anti-Indian sentiment. To pacify the people and to have quicker connectivity, India needs access to Bangladesh's water routes. Otherwise, the country had to send goods to its eastern region via Siliguri and Assam to Agartala, by passing through 1,600 km roads. The roadways were at high risk of attack from insurgents, compelling Indian trucks to be escorted by military convoys. This situation explains the importance of Bangladesh's water routes for India.

On the other hand, according to article 2 of the protocol, each country shall keep the water routes in its territory in a navigable position and provide necessary pilotage and conservancy. Due to an imbalance in trade volume, the number of Bangladeshi ships visiting Indian ports is small. As the number of Indian ships is increasing continuously, as per the protocol, Bangladesh would need to dredge the water routes for Indian vessels to pass through, which would not have been necessary for Bangladesh otherwise. Dredging is costly and requires regular maintenance. Thus, the present fee of Tk 192 per ton, is inadequate in maintaining all the facilities and will not bring the expected benefit for Bangladesh. However, India will pay Tk 1000 lakh to Bangladesh for maintenance of the routes between Sirajganj and Daikhawa and between Sherpur and Zakiganj from April 1, 2015, to March 31, 2016 (vide article 3.2

and 3.3 of the Protocol on Inland Water Transit and Trade). It somehow minimizes the burden for Bangladesh.

Bangladesh has shown some advancement in its container handling capacity in 2015. The Chittagong port, as the principal port of the country, has advanced 11 steps from 87th last year to 76th this year among one hundred ports in the world, according to a report of Lloyd's List (The Daily Prothom Alo, September 2016). However, the problem lies somewhere else. According to the World Bank Logistic Performance Index 2016, Chittagong port did not advance much compared to previous years. It takes two days to load goods on to a ship and the time extends to three days if the process is monitored in-person, which means the amount of time remained the same as in 2014 (The Daily Prothom Alo, 2016). Jahid Hossen, a lead economist of the World Bank to Bangladesh, told the daily Prothom Alo that the technological advantages could not be enjoyed fully due to weak management.

The 24.8% rise in container volumes than that of in 2014 in Chittagong port was mainly due to the import of heavy industrial and mega infrastructural projects equipment. Moreover, the advancement in ranks occurred due to less performance of some other ports in the world.

However, it is factual that the number of containers is increasing day by day. If the facilities, including navigation, are not augmented, the port might not make better use of it. Besides this, Mongla port is not on Lloyd's List due to its small operational size and poor performance. Bangladesh is yet to formulate a detailed policy framework, particularly for water transit. The internal challenges and opportunities, Inland Water Transit and Trade Protocol with India and possible transit with Nepal and Bhutan necessitate long-term policies for water transit as soon as possible.

So, a viable policy framework for water transit in Bangladesh is crucial. There are at least three major reasons

behind it: (1) to make the optimum use of the advantages of the country's geographic location, (2) to maintain a balanced and friendly relation with neighbouring countries without undermining the national interest, and (3) to arrange employment opportunities for its large population. While formulating the policy framework, the issues mentioned above and other aspects should be considered to simultaneously address geopolitical aspects, environmental safeguarding, and economic enhancement.

Conclusion

This chapter discussed the internal and external challenges and opportunities of water transit in Bangladesh. In doing so, it critically examined the events relating to the water transit agreement, the existing facilities, and the future directions. The key findings are: (a) there is a lack of infrastructural facilities making the existing ports 'underdeveloped' for future business volume, (b) the bilateral agreements on water transit are not compatible with Bangladesh's needs, (c) still, Bangladesh can primarily benefit from water transit as the country has developed a good number of riverine ports and has the potential to collaborate with neighbouring countries, (d) the geopolitical calculations of China, India and the US has a direct impact on Bangladesh's water transit and (e) and Bangladesh needs a detailed policy framework for its water transit.

Recommendations

Short term (1-3 years)

- Bangladesh should develop a policy framework for its water transit facilities.
- The transshipment fees should be reviewed. The transshipment fee should be fixed after considering all possible expenditures, including the infrastructure and maintenance costs.
- All kinds of dumping and pollution should be monitored.

Long Term (3-10 years)

- The existing problems in ports (like siltation at the approaching path) should be solved.
- Bangladesh should expand its existing security system to monitor non-traditional security threats as well.
- Bangladesh should maximize the benefits of water transit. It should be considered as the geopolitical tool to bargain with superpowers.

Further study, from the perspectives of both the physical and social sciences, should be conducted on water transit to make some solid decisions for the future.

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CHAPTER 8

Growth, Export and Domestic Demand in Bangladesh: The Road to the New Phase of Development

Syed Ashikur Rhaman

Introduction

After achieving independence in 1971, Bangladesh was reeling from the aftermath of the genocide carried out by the West Pakistani (today's Pakistan) military junta. In addition, the long-term unequal and oppressive policies of the former West Pakistani ruling elites had left devastation at its wake, mainly in the form of financial crisis, weak industrialization, and inadequate institutional and infrastructural capacity. However, during the last four decades, Bangladesh has passed several milestones and achieved reasonably rapid economic growth. The amount of the first budget of independent Bangladesh, for example, was only Tk 786 crore. However, during the fiscal year of 2017-2018, the amount of the budget was more than Tk 4 trillion, which is about fifty-five times higher than the first budget. In addition, Bangladesh is now well on its way towards becoming an emerging economy. A report of the Bangladesh Bank (BB, 2017) shows that during the fiscal year of 2015-2016, the export income of Bangladesh exceeds \$34 billion with a GDP growth of 7.02%. This unbelievable growth of the country's economy is sometimes phrased as 'Bangladesh's Development Surprise'. (Asadullah, Savola & Mahmood, 2008, p.1)

This economic boom is highly influenced by Bangladesh's policy shifts towards modernization and liberalization. During the late 1970s, according to Mahmud and Mahajan (2008, p.3), 'a market-oriented development strategy was introduced, which created a foundation for the export led manufacturing sector.' The introduction of parliamentary politics in the 1990s

strengthened these policies. As a result, strong export growth took place, which plays an influential role in accelerating the GDP growth. For the last two decades, Bangladesh maintains the export-led growth strategy that brings desirable success and helps to achieve prestigious entry within the club of the lower-middle-income countries.

Now the question is, how long Bangladesh can enjoy this economic boom by following these policies, as history provides enough examples where countries enjoying such growth fall into economic crisis eventually. For Bangladesh, some syndromes are already beginning to show. After enjoying increasing export growth over the last two decades, the economy of Bangladesh experienced its lowest export growth since 2001 during the fiscal year of 2016-2017. The most fundamental reason behind this decrease is due to the lowest export growth of Bangladeshi garments products during fiscal year of 2016-2017.

In addition, the process of globalisation that stimulates the export-led growth strategy became slower over the last few years. Since 2016, global trade has been growing at a slower rate than global GDP, the first time since 2001 and only the second time since 1982 (WTO, 2016). On the other hand, strong anti-globalisation movements have become evident in European countries and the United States, and many right-wing parties are doing well in the national elections of these countries. As a result, government policies may become more protectionist in nature than before. The issue of concern is that the export market of Bangladesh is highly dependent on the market of the United States and the European Union and if these changes go further, it will not bode well for Bangladesh.

The export-led growth model of development has some deep theoretical problems at its core. This model is founded on the concept that the industrialized developed countries will absorb the export products of developing countries. For example, the United States had played a crucial role to shape the

East Asian economic miracle throughout the last part of the 20th century by turning into the major consumer of export products. However, the domestic economy of the United States is saturated with loan and performing weakly. As a result, it cannot work as the engine of growth for the world economy. Nor is China likely to become the engine of growth because its growth model is still that of an assembler focused on supplying industrialized country consumers. (Palley, 2011)

Another issue of concern is that most of the developing countries, as well as some developed countries, are now following an export-led growth model to achieve their expected economic growth. Thus, the export-led growth model will suffer from a fallacy of composition, whereby it assumes that all countries can grow by relying on the demand growth of other countries. (Blecker, 2001) As a result, each country will try to expand its production to achieve its developmental goal as early as possible, which will eventually lead the world towards global excess supply and the global fall of price. Export-led development may work when adopted by one or even a few countries, but it takes on a zero-sum dimension when adopted by all. (Palley, 2001)

The emergence of China in the global market creates another great obstacle for developing countries like Bangladesh to maintain their export-led strategy. In general, export-led growth operates through a hierarchical process with less developed newcomers replacing more maturing export economies as their wages grow. (Felipe, 2003,) As China has a large supply of labour from its growing population, it can keep wages low by replacing the worker who demands greater wages with the new workers from the agriculture sector. Therefore, as argued by Palley (2001, p.4), “it is not clear that any developing country can now enter this system with production costs below those of China, making it impossible for newcomers to enter the hierarchy of export-led growth.”

The above arguments do not mean that Bangladesh should keep apart its export sector to ensure its developmental goal. The export sector will always remain essential to earn the funds needed to pay back the cost of the imported goods as countries lack enough domestic market to sustain self-sufficiency (Palley, 2001). However, overemphasizing the export sector will devalue the importance of domestic demand in the development of the country. Using the Granger casualty analysis, academics show that exports and domestic demands are both important for economic growth. (Wong, 2010; Mohanty, 2012)

The changing context of the global market demands a new development model for Bangladesh if it wants to attain sustainable economic growth. By developing effective domestic demand and creating a specialized export sector, Bangladesh can place its foot in the new phase of development. For this reason, this study proposes that Bangladesh should follow the dual-track strategy to bring Bangladesh into a simultaneous process of creating both internal and external demand. However, the issue of concern is - what types of policies should Bangladesh adopt to ensure the increase of its exports, domestic demand, and economic growth? This paper is shaped to create a policy framework by proposing a new development model, which can lead Bangladesh towards a new phase of development.

The nature of this study is qualitative, supplemented by a limited number of quantitative data. The information used in this study is collected from both primary and secondary resources. The primary data consists of the statistical reports published by government agencies such as Bangladesh Bank, Bangladesh Bureau of Statistics, etc., and international organisations such as World Bank, Asian Development Bank, etc. The secondary data will be collected based on the review of published documents, that is, books, public policy documents, reports of international organisations, journal articles, and academic publications.

Framework of the study: The Dual Track Strategy

In a liberal democracy, the democratically elected governments always try to achieve the desired economic growth to ensure material prosperity and high quality of life for its people. However, the most difficult task facing every government is to fix a policy framework to attain this goal, especially if a country needs to transition to a new development model from the old one. However, the route may not be the same to attain this destined goal. After the cold war, for example, we witnessed that most of the countries of the communist bloc transformed into a market economy from a planned economy within a short period. In economics, these policies are popularly termed shock therapy (Murrell, 1993). Meanwhile, in China, the transformation took place more gradually. By following the dual-track strategy, China had transformed its planned economy into a market economy. Indeed, this approach has been widely regarded as a major catalyst for China's remarkable economic performance in recent years. (Le, 1999 as cited in Che & Facchini, 2004, p.1)

However, it will be wrong if we consider that socialist countries alone follow this strategy to integrate their economy with the global market. Countries may also follow the dual-track strategy to reduce their dependence on the global market. After the Asian financial crisis in 1997, for example, the Thaksin administration follows the dual-track strategy to develop the economy of Thailand by promoting domestic demand and attracting increased foreign investment.

Lian (2004, as cited in Felipe & Lim, 2005) argues that the dual-track strategy works in a framework where the first track seeks to expand the external demand and the second track intends to create an effective domestic demand. The policies that involve in the first track try to bring diversification of the export products to create specialized demand in the global market. The Second track policies help the country to move away from an economic structure that is overly dependent on external demand by realizing the sustainable expansion of domestic demand

through the strengthening of the economic base of the agricultural sector and the implementation of regional vitalization policies that harness regional characteristics (METI, 2004).

For Bangladesh, the dual-track strategy will be the suitable policy framework in the changing context of global political economy. The emergence of China creates major obstacles for Bangladesh to compete in the conventional price competition in the global market. Therefore, Bangladesh needs to look for specialized export sectors by focusing on its specific advantages. In addition, it should develop its domestic industries so that they can compete in the global market after some years. Inequality still dominates the features of the economy in Bangladesh in the form of labour and wage suppression, increasing income gap, and power hierarchy. The dual-track strategy will be a powerful tool to fight against such inequalities and it will lead to an inclusive economy in the future.

The Dual Track Strategy for Bangladesh economy

As mentioned earlier, the dual-track policy strategy mainly focuses in stimulating external demand, as well as domestic demand. However, there is no single model of dual-track strategy that can fit all. To carry out the expansion of both domestic demand and export demand, the policies of dual-track strategy should consider the internal dynamics of the home economy. Therefore, the policies should try to identify the weak points within the domestic social, political, and economic environment to overcome those problems. In chart 8.1, this chapter proposes the policy framework for a dual-track strategy of Bangladesh's economy.

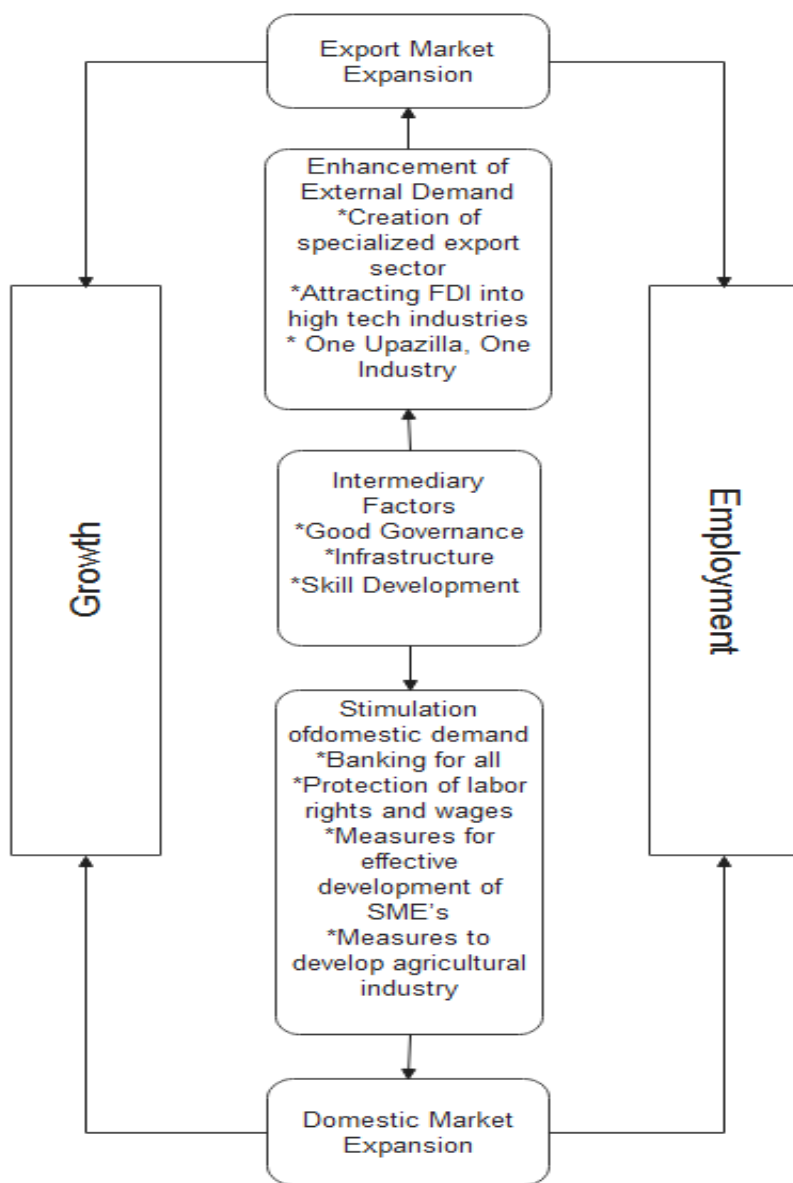


Chart 8.1: The Dual Track Strategy for Bangladesh economy

Source: “Ministry of Economy, Trade and Industry (METI). (2004).”

Enhancement of external demand

Attracting FDI into high-tech industries

The strong presence of a high-tech industry is one of the significant features of economic advancement for any country. According to OECD (1997, as cited in Smith, 2000, p.7), high-tech industries are those industries (such as pharmaceuticals or ICT) that spend more than 4% of its turnover in R&D. In addition, industries that spend between 1% and 4% of its turnover (such as vehicles or chemicals), are medium-tech and, those that spend less than 1% (such as textile or food) are low-tech industries. As a developing country, Bangladesh still suffers from a lack of capital and technology to establish high-tech industries.

<i>Industrial Sectors</i>	<i>FDI (In Millions)</i>
Food	108.24
Textiles	396.05
Machinery product	2.80
Vehicle and transport	2.93
Cement	36.68
Banking	254.20
Telecommunications	267.12
Computer software & IT	14.13
Pharmaceuticals and chemicals	37.02

Table 8.1: FDI in different sectors of Bangladesh.

Source: BB, Foreign Direct Investment in Bangladesh, Survey Report, January-July, 2016.

As such, FDI will be a possible instrument to eliminate these obstacles and will help Bangladesh to move towards high-tech industrialization. However, if we follow table 8.1, we will find that Bangladesh fails to attract FDI into its high-tech industries and still manages to collect FDI into medium-tech and low-tech industries. The IT sector of Bangladesh, for example, just

received US \$14.2 million as FDI during the previous fiscal year. Therefore, the government should take policies that can attract FDI into high-tech industries.

Creation of specialized export sectors

Although Bangladesh exports hundreds of product items every year, the ready-made garment dominates its export income. During the last few years, among the top five industries with sectoral growth, the ready-made garment was the only export-oriented sector. The other top four belong to the import-substituting category (Yunus and Yamagata, 2012). So, Bangladesh has to create more growth in other export sectors too if it wants to ensure its economic growth. However, in the context of the present global market, it will be difficult to compete in all industrial sectors at a time. Bangladesh has to find out its strengths and unique characteristics if it wants to compete in the global market.

One Upazila, one industry

Historically, the industrial sector has always played an influential role to pave the way for development for a country because it ensures high income for the population by raising the productivity of high-value goods. In Bangladesh, agriculture still provides a large proportion of annual GDP. As a developing country, if Bangladesh wants to ensure its middle-income status, it must ensure rapid industrialization and specialization in manufacturing to achieve the goal. Although Bangladesh became successful in maintaining rapid manufacturing growth in recent years, this growth was highly concentrated in a few geographical areas only. In the Chittagong district, for example, almost every established industry such as textile mills, garments factories, steel and aluminum industries, are situated within the metropolitan area. The other thirteen upazilas mostly have rice mills as their major industry (BBS, 2011). As a result, people from these upazilas migrate to Chittagong for a better life. As a result, a city once known as ‘the healthy city of South Asia’, is now fighting to remain so because of its huge population.

Bangladesh needs to decentralize industries across the country if it wants to reduce the extreme pressure from the metropolitans. It can also establish the specialization of manufacturing by creating specific industries through the utilization of specific characteristics of specific locations. By transforming the upazilas to produce one special product, Bangladesh can compete in the global market. This does not necessarily mean that industries will stop producing other products in those upazilas. The selected special industry will receive the policy priority from government and commercial institutions. In table 8.2, this chapter proposes some specific industries for the upazilas of Chittagong district. Here, one important point is that many geographical locations of Bangladesh do have certain shortcomings in terms of developing industries. For that reason, Bangladesh has to take both short-term and long-term policies to bring these geographical locations into the modern process of manufacturing.

<i>Name of Upazila</i>	<i>Name of Industry</i>
Sitakunda	Ship breaking
Bashkhali	Salt processing
Fatikchhari	Rubber processing
Raojan	Hasking craft mill
Boalkhali	Paper manufacturing
Mirsharai	Furniture industry

Table 8.2: Specific industries for upazilas of Chittagong district

Source: Bangladesh Bureau of Statistics (BBS).(2011). Districts Statistics, 2011, Chittagong.

Intermediary factors to develop both export and domestic demand

Good governance

The nexus between good governance and economic development is a well-recognized issue at the academic level. Institutions, rules, and political processes play a big role in whether

economies grow, whether children go to school, whether human development moves forward or back (Bakshi, 2015). As a developing country, Bangladesh needs to improve transparency, government effectiveness, political stability, rule of law, and accountability so that it can make the more appropriate use of its limited resources. However, as table 8.3 shows, Bangladesh still has governance issues in respect to its competitors (WB, 2017). Therefore, Bangladesh should take effective policies to promote good governance to accelerate economic growth in the future.

<i>Name Of the Country</i>	<i>Control Of Corruption</i>	<i>Government Effectiveness</i>	<i>Political Stability</i>	<i>Rule Of Law</i>
Bangladesh	-0.802	-0.689	-1.240	-0.59
India	-0.302	0.1	-0.954	-0.07
Myanmar	-0.646	-0.982	-0.634	-0.63
Vietnam	-0.396	0.01	0.169	0.169

Table 8.3: Comparative analysis of good governance
 Source: World Bank, World Wide governance Indicator, 2016

Infrastructure

Infrastructure, the prerequisite condition for effective economic development, can provide public goods and services, which may ensure a better life for people through poverty alleviation. Without the development of infrastructure, it will be impossible to create an effective economic environment to expand both export and domestic sectors. That is why the literature on development economics puts great importance on infrastructure development to achieve the destined economic growth.

Bangladesh is still facing great challenges in terms of delivering an efficient and trustworthy infrastructure to attract investors. Infrastructural problems such as power shortages,

lengthy and delayed transportation, and higher shipping costs are reducing the competitiveness of Bangladesh. Besides, the regional disparity is one of the defining features of the infrastructural development of Bangladesh. In his study, Raihan (2011) has stated that, among the top ten districts having more infrastructures in Bangladesh, six are from Dhaka division. On the other hand, the Rangpur division has five districts with the lowest infrastructure. To achieve inclusive and rapid economic growth, Bangladesh should solve its major infrastructural problems by developing infrastructure across the country.

Skill development

The recent surprising economic development of Bangladesh is partially achieved because of the successful inclusion of the labour force from the agriculture and informal sector into the process of manufacturing. This trend is driving Bangladesh towards a more difficult task. The next level of development of Bangladesh will require a transition from the low or semi-skilled population to the highly skilled labour force. Besides, Bangladesh is enjoying a demographic dividend that has produced a large working-age population that will need adequate skills to support a modernizing economy. (ADB, 2016)

Adam (2007) has argued that workforce development is highly influenced by education, early work experience, labour markets programmes such as non-formal training programmes, labour market policies to improve investments and create jobs, and finally, other forces in the home, community, and economy that shape the transition towards work. In Bangladesh, each of these factors is not properly working to create a mass workforce for high-skill professions. According to the Economic Intelligence Unit report (2014), for example, Bangladesh has the highest number of unemployed local graduates among the South Asian countries, and the number is nearly 5 out of every 10 graduates. The graduates blame the lack of opportunities, while the employers claim that the graduates lack the skills to enter the job market. Therefore, the education system or the labour

market policy or both are not working properly in the context of Bangladesh. Bangladesh must reorganize its skill development policies to find a way out of this situation.

Stimulation of domestic demand

Banking for all

Although Bangladesh has shown incredible success in reducing the poverty rate in recent years, the overall poverty rate is still high. According to the Bangladesh Bureau of Statistics, the poverty rate was brought down to 24.3% at the end of 2016 from 31.55% in previous years. (Country sees drop in the poverty rate, Dhaka Tribune, 2017). The people of rural areas are more affected by poverty than the people who live in urban areas. Savings and capital creation are considered the first steps towards tackling poverty. In Bangladesh, a large portion of the poor are still out of the institutional process of capital creation—the banking system. Other mechanisms such as NGOs or cooperative organisations exist to create capital for poor people and they have achieved reasonable success in recent years. Still, these institutions are sometimes criticized for their lack of accountability and high rate of interests on loans. Besides, the informal way of borrowing money (the usury custom) is still evident in some parts of the country. Therefore, the inclusion of the banking system to create capital for poor people will provide a better chance for the poor to change their economic condition.

Protection of labour rights and wages

On 14 April 2013, Bangladesh experienced the deadliest garment factory accident in its history—the Rana Plaza Collapse—which killed 1,134 people and injured almost 2500 people. This incident again shows the poor level of labour standards in Bangladesh. The mainstream economic thinking has always put belief in the market forces to face such issues and criticizes labour unions as a market distortion. However, the Rana Plaza Collapse proved that market forces alone cannot protect the workers from such accidents. Therefore, workers should be included in the power

structure through effective labour unions so that they can raise their voices to protect their rights.

In addition, fair income distribution and political power-sharing are effective tools to develop the domestic market (Palley, 2002). If incomes are distributed fairly, it will increase the savings and consumption of a large portion of the population, which will eventually lead to the development of the domestic market. To achieve an inclusive economy where people from every social class will receive the benefits of economic development, Bangladesh should promote fair wages and deliver more protection of labour rights.

Measures to develop SME's

It is well recognized among the policymakers of Bangladesh that SMEs can be the driving force of the economy of Bangladesh. The development of SMEs can help Bangladesh to ensure double-digit growth. Besides, in a populated country like Bangladesh, SMEs will provide thousands of career opportunities for the Bangladeshi youth entering the job market. The ground reality also supports these arguments as Alauddin and Chowdhury (2015) points out, that 'SME's provide employment to 4 out of 5 industrial workers in Bangladesh and contribute to over one-third of industrial value-added to GDP'.

The development of SMEs can be an effective weapon to keep the strength of the economy during an economic crisis. In general, the tendency of foreign capital flight becomes apparent during such a crisis, which creates more fragility within the economy. However, it is not so easy for the domestic capital invested in SMEs to do so. This may help to hold the economy in a crisis. Besides, if Bangladesh dreams of becoming a developed country in the future, it should prepare its domestic sector from now on so that these sectors can lead the export market in the future. The development of the SME sector can be the starting point of this journey.

Measures to develop agro-industries

Although Bangladesh has ensured rapid industrial growth in recent years, it is still unsuccessful in developing an industrial base across the country. Besides, the lack of diversification in the industrial sector will be the critical challenge that Bangladesh should overcome in the coming years. One of the major tasks of the government of Bangladesh, is trying to find an effective solution to fight these problems. The agro-industry can be an effective means to spread the process of industrialization across the country. Historically, agriculture has had greater influence in creating a base for our economy. However, it will not sustain in the upcoming years if Bangladesh fails to integrate agriculture within the modern process of industrialization. The agro-industries are already contributing a large portion of national income and generates a good number of employment opportunities in rural area.

Establishing a fair price of agricultural products, the most contested issue in the agricultural sector, has become one of the greatest challenges for the government of Bangladesh. The agro-industries can deliver a market solution to this problem by improving market service and value addition. Besides, these industries will promote technological innovation and research in the agricultural sector to help their business flourish and compete in the market.

Policy recommendations

- To ensure the expansion of the external demand,
- Government should develop a platform with the participation of the stakeholders to create specific export processing zones in suitable geographical locations and to understand existing and upcoming problems of the export sectors.
- The Ministry of Finance, with the collaboration of other stakeholders, should establish a separate agency to promote FDI into high-tech industries and reduce harassment of the investors.

- The Ministry of Industries should carry out a country study to identify specific industries for specific upazilas by analyzing the investment environment of all upazilas and ensuring necessary arrangements to provide incentives to these industries.
- To mobilize the intermediate factors to develop both external and domestic demand,
- Government should establish a good governance desk in every government institution so that people affected by the bad governance of government officials, can complain against them.
- Through cautious budget allocation, the infrastructural gap between regions across the country should be reduced.
- The Ministry of Education should take initiatives to create linkage between the employer and the education system and promote vocational training at the secondary education level.
- Finally, to stimulate domestic demand,
- Bangladesh Bank should take up policies such as opening a bank account with just Tk 10, small deposit schemes on a daily basis, and mobile banking to integrate the low-income people within the formal banking system.
- The Ministry of Labour should develop a platform with the participation of the stakeholders, to revise the wage structure every three years and to build consensus on the protection of labour rights.
- Bangladesh Bank can create rules of giving 30% percent of bank loans to the SME sector.
- The Agricultural Ministry, in collaboration with the Ministry of Trade and Commerce, should establish a department to promote agro-industries.
- The Ministry of Finance should allocate a separate fund to invent new technology for the agro-industry so that farmers can get more profit by adding value to their products.

Conclusion

Over the last four decades, Bangladesh has gone through a tough time in developing its economy, and has achieved success in several sectors. Still, it has a long way to go in terms of ensuring sustainable development for its people, as new challenges are continuously emerging in the landscape of global political economy. For a better future, the policymakers of Bangladesh must predict the future to create a perfect policy framework so that Bangladesh can reach the desired goal of development.

For the last two decades, the force of globalisation had shaped the frame of the global economy. Bangladesh has also achieved reasonable economic development by placing itself in the tide of globalisation. As a result, the export sectors of Bangladesh have flourished and become a significant factor in the economic development of Bangladesh. However, the global political economy is gradually changing and several factors begin to rise that will eventually affect the force of globalisation. Therefore, Bangladesh should adopt a new policy framework to maintain its surprising economic success.

Now the question is, what types of economic policies Bangladesh should adopt in the future? Does Bangladesh follow the previous export-led growth strategy? Will Bangladesh make a policy framework to promote the export market and the domestic market at a time? This chapter suggests that Bangladesh should follow the latter—the dual-track strategy—to bring economic development by depending on both export and domestic demand.

The policies that this chapter suggests are necessary because these policies will reconstruct the export sectors of Bangladesh to survive in the future global market. These policies also help Bangladesh by diversifying its export products to reduce its overdependence on the garments sector. By moving towards more value-added export sectors, Bangladesh will be able to ensure the middle-income status in the upcoming years.

The policies to promote the domestic sector will reduce the vulnerability of Bangladesh in times of external economic shock. If these sectors can make a successful expansion in the domestic market, they can transform themselves into robust export sectors soon.

This chapter predicts that if Bangladesh continues to follow the present development model, it will fall into crisis sooner or later. Although Bangladesh managed to escape the global recession of 2008, it may not do so the next time such a crisis strikes. Therefore, it is high time for Bangladesh to follow the dual-track strategy to prepare itself for the changing global economy and ensure a better life for its people through greater economic prosperity.

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CHAPTER 9

Impacts of Trade Liberalization Policy on Reversing Gender Differential Income: Evidence from Selected Ready Made Garment Industries in Bangladesh

Mahbuba Khadija Kanta

Introduction

Conceptually, trade liberalization is often defined in terms of the bias in the incentive structure between exports and imports. Trade liberalization can be achieved by either the reduction of tariffs or of any anti-export bias through other means (e.g., the introduction of raising export subsidies). Another element of trade liberalization is the replacement of an instrument of trade control by another that would reduce the distortion of the incentive structure. A common example of this is when quantitative restrictions on trade are replaced by a tariff. In practice there are several ways in which the extent of trade liberalization can be measured, but there are problems with each of these. One frequently adopted measure is that of relying on announced changes in policy such as a reduction in tariffs or the removal of quantitative restrictions. A second measure is based on a direct estimate of the change in the bias in the trade regime, as reflected in changes in relative prices. A third measure is to use multiple criteria such as tariff changes and changes in relative prices, but this too faces the same problems of weighting and aggregation.

In Bangladesh, the major trade liberalization policy reform was started in 1991 with a substantial scaling down and rationalization of tariffs, removal of trade related QRs and elimination of import licensing, unification of exchange rates and the move to a more flexible exchange rate system. In 1994,

Bangladesh complied with the IMF's quota agreement, and made most current account transactions convertible. Overall, the customs duty rate was reduced from 350% in 1991 to 37.5% in 2000. A new door was opened to boost Bangladesh's RMG export further, as some traditional as well as non-traditional markets relaxed the rules of the Generalized System of Preferences (GSP) and created provisions facilitating duty-free access for Bangladeshi products.

Bangladesh has experienced significant changes in the economic indicators—such as the steady increase of GDP per capita (PPP) since pre-liberalization (before 1990) period from \$272, and continuing to move at a faster rate (\$4,680), up to now achieving total GDP of \$303 billion. Besides, FDI and remittances show high growth rate in the post liberalization period. There is a profound importance of the Ready-Made Garment industry in the economy of Bangladesh. Centering around the readymade garment (RMG) sector, many more ancillary industries have also been set up as a supportive sector to RMG. Since the emergence of trade liberalization policy, the RMG sector has become the most significant contributor to Bangladesh's total world export because of its cheap labour and comparative advantages. Both exports (\$46 billion) and imports (\$64 billion) have increased noticeably since liberalization through the flourishing of the RMG sector. One of the reports conducted by WTO statistics reveals that countries like China, Bangladesh and Vietnam are registering much higher growth rates in comparison to India. Bangladesh is part of the top 15 clothing exporters' group. Out of the 4 million employed in BGMEA member factories, 2.95 million are women (almost 80%). A majority of these women employees are economically disadvantaged, poverty stricken, not educated enough and have migrated from rural areas in search of earning a living.

Unfortunately, during the beginning of the Covid 19 pandemic, factory owners in Bangladesh started reporting receiving notices from brands to delay shipment of orders,

and by the end of April 2020, approximately \$3.2 billion USD worth of orders had been suspended or revoked. By the end of May 2020, Bangladeshi workers had lost nearly 30% of their wages, estimated at \$502 million. The dramatic economic shock experienced by workers resulted in serious compromises in consumption and asset depletion.

In 2013 a survey report was published by CNN World, which reported that shirt production costs were \$13.22 in USA and \$3.72 in Bangladesh. The reason behind this huge difference is due to varying industrial laundry, materials and labour cost. A worker in USA gets \$7.47 for sewing each shirt, whereas a Bangladeshi garment worker gets only \$0.22 per shirt. The minimum basic salary of each worker in Bangladesh is Tk 5,300 per month, which is mandated by the government.

Female workers in the garment industry who were previously employed (only about 7 percent of the total), showed that they earned a wage that was 2.7 times higher than in their previous jobs. With the growth of the RMG industry, linkage industries supplying fabrics, yarns, accessories, packaging materials, etc., have also expanded, thus increasing employment opportunities for many women. The economic empowerment of these working women has aided in changing their status in the family and is also contributing to the country's GDP.

Considering the scenario of this thriving sector, this study took 140 sample workers from selected RMG industries, to perform a decomposition analysis of gender differential income, by gathering their demographic and socioeconomic characteristics information. If we can explore the perspectives of some key players on what kind of changes are helpful to female workers, then it will be easy to formulate economics policies concerning workers' long run welfare and women's economic empowerment.

Research Objective

Based on the existing literature review of post trade liberalization policy, the major objective of this study is to estimate the underlying factors of wage determination using Mincer (1974) regression technique for RMG workers. This can be based on cross sectional primary data (140 observations taken from 20 selected industries' sewing, cutting, finishing, quality processing and dying sections). In addition, the study, by using the Blinder-Oaxaca decomposition method, attempts to assess whether any kind of reverse gender differential income between women and men exists or not in the current RMG labour market as a result of increased productivity, skill and endowment effect.

Literature Review

From an economic point of view, theoretically, trade liberalization benefits women, both in terms of increased number of jobs and increased wages, thus, enabling a reduction in the gender wage gap. The main theoretical underpinnings come from the Hecksher-Ohlin and Stolper-Samuelson trade theories. The Hecksher-Ohlin-Samuelson (H-O-S) theory predicts that trade expansion should increase demand for the country's abundant factor, which is employed intensively in the production of goods in which the country has comparative advantage. If women are relatively less skilled than men then females should gain from trade in developing countries (that are relatively more abundant in less skilled workers) through increased employment opportunities, while they should lose in developed countries (where skilled labour is the abundant factor). Anand & Absar, S.S. (2001) found that a male ironer gets Tk 1,894, where a female ironer gets Tk 1,106. These numbers show the existence of a substantial wage difference between male and female garments worker in Bangladesh. This scenario is attributed to a higher proportion of men securing high skilled jobs in this sector and an increase in the number of temporary workers largely comprising of women (Bhattacharya D., I 999; Paul M. and Begum, 2000).

Contrast, a USAID (2007) study reports that the income gap between male and female workers in the RMG sector appears to be gradually decreasing over the time. In the current RMG sector, a female operator's average monthly earnings are almost similar to their male counterparts though female helper's earnings are only 52.7 percent of a male helper's earnings. This may happen because of female workers' increasing participation, high literacy rate as well as skill level, liberal attitudes of factory owners and strict government regulations after recent incidents in RMG factories. A critical contributor in the narrowing of the gender wage gap appears to have been gains in education. However, as recent real wage and income gains for women have been concentrated among the more educated and typically more affluent population, there will have been more limited impacts for poor women.

Nevertheless, despite the progress of RMG female workers, the global clothing supply chains have been disrupted during the COVID-19 pandemic. One recent study of Kabir et al. (2021) showed that there have been considerable cancellations of clothing orders from international brands/buyers since the COVID-19 pandemic outbreak. The 'Centre for Global Workers' Rights' and 'Worker Rights Consortium' conducted a study on the impact of the COVID-19 crisis in the Bangladesh RMG sector on March 27, with the participation of 316 Bangladeshi suppliers. The study reported that international brands and retailers have suspended clothing orders amounting to almost \$3 billion in Bangladesh. This outcome has the potential to create unemployment and lesser bargaining power for the RMG workers about wages and other issues relating to female workers rights. Irregular wage payment has been a major problem in the RMG sector. Disruption in the existing supply chain may justify factory owners to continue paying their workers' wages at irregular intervals.

On the other hand, Hossain et al. (2019) found that eight in ten female RMG workers in Bangladesh suffer from anemia,

a condition which damages both health and productivity. And productivity is very much correlated to female workers' job status and wage rate in the RMG sector. The wage gap has been decreasing for female workers, but glass ceiling issues and barriers in regards to careers, such as getting access to better job positions in the RMG industries still persist (Islam and Jantan, 2017)

For the experiment, identifying wage determinants in least developed countries is even more important, as wages are directly linked to living standards and the extent of poverty. Mincer (1974) provided the analytical foundation for empirically investigating wage determinants, by estimating monetary returns to factors such as age, education, quality of schooling, work experience, and occupation, among others, and countless returns to productive factors, such as education and experience, and estimating the extent of discrimination in a labour market due to factors such as race and gender.

Moreover, many research studies propose Oaxaca & Blinder (1974) decompositions developed by Neumark (1998) which is based on a pooled regression without group-specific intercepts. In his paper, Neumark talks about the linkage of empirical estimates of wage discrimination between two groups, introduced by Oaxaca (1974), to a theoretical model of employers' discriminatory behavior. It is shown that, conditional on different assumptions about employers' discriminatory tastes, Oaxaca's estimators of wage discrimination can be derived. That the approach is more generally useful is demonstrated by deriving an alternative estimator of wage discrimination, based on the assumption that within each type of labour (e.g., unskilled, skilled), the utility function capturing the employers' discriminatory tastes is homogeneous of degree zero with respect to labour inputs from each of the two groups.

Methodology

The empirical analysis has been carried out using primary data for cross section analysis. The data have been collected through a well-constructed questionnaire of relevant core variables.

Two stage sampling techniques have been used in this study. Following this scientific sample design in the first stage, based on characteristics of their production system (woven/ knit /textile industry), 20 RMG factories, as primary sampling units, have been drawn from the total population (currently more than 4500 RMG industries exist in Bangladesh). The study (a part of the Masters thesis project under EoT fellowship programme in 2015) was conducted at Narayanganj, Gazipur, Mirpur area in Dhaka district. The secondary sampling units (140 respondents consisting 77 female and 63 male RMG workers) are taken randomly who have homogenous characteristics regarding their types of work in 5 sections—sewing, cutting, finishing, quality processing and dying. Both female and male full-time laborers, between ages 15-45 years, are considered as sample respondents of the study.

Theoretical framework of econometric models:

(a) Model 1: Mincer wage earning function

$$\ln Y = \alpha + \rho_1 s_i + \beta_1 x_i + \beta_2 x_i^2 + \varepsilon$$

$$\ln Y = \alpha + \rho_1 s_i + \rho_2 D_i + \beta_1 x_i + \beta_2 x_i^2 + \varepsilon_i$$

where wage logarithm (Y) is a stochastic function of schooling s (measured with completed years of education), experience x and experience squared. It uses the theory formulated in 1970, which claims that human capital influencing productivity is reflected in wages (Mincer 1974).

Wage Earnings Function:

$$W_i = f(\text{gender}, X_i, Z_i)$$

$$\text{i.e. } \ln W_{ij} = X_{ij} \beta_j + e_{ij} \dots \dots \dots (i)$$

- Here, i and j refers to the individual and group characteristics respectively
- W_{ij} = individual earnings (wages)
- X_i =Individual characteristics (age, education, experience, household size, children, marital status, migration status)
- Z_i = job characteristics (over time working hours, section of work, commuting time)
- β_j = vector of parameters
- ϵ_{ij} = zero mean error term, uncorrelated with X_{ij}

(b) Model 2: Blinder-Oaxaca Decomposition Method

In order to investigate the sources of gender differentials in detail, researchers estimate men's and women's wage functions separately. where m represents men and f is women.

$$\ln W_m = \beta_m X_m + \epsilon_m \quad \text{and} \quad \ln W_f = \beta_f X_f + \epsilon_f$$

If men as reference group:

$$\ln W^*_m - \ln W^*_f = \beta_m (X^*_m - X^*_f) + X^*_f (\beta_m - \beta_f) \dots \dots \dots (ii)$$

- $\ln W^*_m - \ln W^*_f$ = Total difference
- $\beta_m (X^*_m - X^*_f)$ =observed gender wage gap in Characteristics]
- $X^*_f (\beta_m - \beta_f)$ = Unexplained gender wage gap due to differences in β s
- $\ln W^*$ = predicted mean (log) earnings (wages)
- X^* = mean characteristics of males (m) and females
- Assuming $(\epsilon_m - \epsilon_f) = 0$

If women as reference group:

$$\ln W^*_m - \ln W^*_f = \beta_f (X^*_m - X^*_f) + X^*_m (\beta_m - \beta_f) \dots \dots \dots (iii)$$

The first term of the right-hand side of the equation captures how the male female wage differential changed in response to changes in the men-women gap in characteristics. The first term is sometimes called “observed X’s” or “observed gender gap

in characteristics.” The second term measures the unexplained wage gap due to differences in coefficients or returns. This term is considered to measure the level of “gender discrimination.”.

The second and the third terms capture the difference between the actual and pooled returns for men and women, respectively (Oaxaca & Blinder 1974).

Variables	(1)	(2)	(1)	(2)
	Eq.1	Eq.1+	Eq.1	Eq.1+
	Gender, Years of schooling, Years of experience, Age, Marital status, Migration status, Household size, Having children	Total hours of overtime last month, Work section, Commuting time	Robust Gender, Years of schooling, Years of experience, Age, Marital status, Migration status, Household size, Having children	Robust Total hours of overtime last month, Work section, Commuting time
Female dummy	.1482496*** (0.004)	.121114** (0.023)	.1567545*** (0.002)	.1620483*** (0.001)
Education	.042227*** (0.000)	.0460973*** (0.000)	.0412392*** (0.000)	.0396559*** (0.000)
Experience	.0764989*** (0.000)	.062973*** (0.001)	.0751678*** (0.000)	.0737782*** (0.001)
Experience 2	-.0024474** (0.021)	-.001736* (0.105)	-.0023176** (0.026)	-.0028169*** (0.003)
Age	.0045972* (0.863)	.0125707* (0.632)	.0126994* (0.629)	.0494502* (0.034)

Age 2	.0000211* (0.963)	-.0001055* (0.813)	-.0001424* (0.751)	-.0008218** (0.038)
Married dummy	.0378457* (0.646)	.0571457* (0.478)	.0351763* (0.665)	.0324287* (0.647)
Migrated dummy	.0151768* (0.803)	.024493* (0.685)	.0033272* (0.956)	.0324287* (0.647)
Family size	-.0139183* (0.281)	-.0071531* (0.573)	-.012696* (0.320)	-.0001662* (0.988)
Having children dummy	-.0287075* (0.704)	-.0343719* (0.645)	-.0402411* (0.590)	-.0557291* (0.397)
Dyeing section dummy		-.0990019* (0.380)		-.0419809* (0.672)
Finishing section dummy		-.1291227* (0.126)		-.1486186** (0.046)
Quality processing section dummy		-.2278235** (0.027)		-.3134258*** (0.001)
Sewing section dummy		-.1279313** (0.084)		-.1507131** (0.021)
Total overtime hours (Average per month)		.0019914** (0.036)		.00201** (0.017)
Commuting time (in minutes)		.0021029** (0.034)		.0024918*** (0.005)
Constant	8.144615*** (0.000)	7.961554*** (0.000)	8.05068*** (0.000)	7.495467*** (0.000)

Observation	140	140	140	140
R-Squared	0.5112	0.5664	0.5112	0.5664
Adjusted R-Squared	0.4733	0.5100	0.4733	0.5100
F statistic, Root MSE	F(10,129) = 13.49 Prob > F = 0.0000 Root MSE = .2591	F(16,123)= 10.04 Prob > F = 0.0000 Root MSE=.24995	F(10,129)= 13.13 Prob > F = 0.000	F(16, 123) = 12 Prob > F = 0.0000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	Ho: Constant variance Variables: fitted values of lw chi2(1) = 1.99 Prob > chi2 =0.1587
Ramsey RESET test using powers of the fitted values of lw	Ho: model has no omitted variable F(3, 121) = 0.51 Prob > F = 0.6758
Note: P<0.05 indicating significant value P values are in parentheses (P****<.01, P***<.05, P*<0.1)	

Table 9.1: Regression Result

Source: Author's own research

Specification Test result

- Constant term in OLS : Coef. 7.495467, P value 0.000
- Observation: 140
- R-Squared :0.5664
- Adjusted R-Squared: 0.5100

- F statistic : $F(16, 123) = 12$, $\text{Prob} > F = 0.000$
- Root MSE=.24995
- Breusch-Pagan/Cook-Weisberg test for heteroskedasticity:
- Ho: Constant variance
- Variables: fitted values of lw , $\text{chi2}(1) = 1.99$, $\text{Prob} > \text{chi2} = 0.1587$
- Ramsey RESET test:
- Ho: model has no omitted variable
 - $F(3, 121) = 0.51$, $\text{Prob} > F = 0.6758$
- Multicollinearity test: Mean VIF 10.91
- Endogeneity test with 2SLS: Minimum eigen value statistic = .680733
 - Excluded regressor/ Instrumented variable: per month total OT hours
 - Endogenous instrument: Having chronic diseases or disability (as it affects workers productivity during overtime work)
- There is no relative selective bias and over identifying restrictions. There exists weak endogeneity between per month total OT hours and chronic diseases or disability with Wald $\text{chi2}(14) = 13$ and $\text{Prob} > \text{chi2} = 0.4687$,

and at level of 10%, 15%, 20%, 25% test shows:

2SLS Size of nominal 5% Wald test	16.38	8.96	6.66	5.53
LIML Size of nominal 5% Wald test	16.38	8.96	6.66	5.5

- Note: Participation in Training Programme can be tested as endogenous instrument for the variable of Years of Schooling (Education).

Result discussion for model 1

Based on the summary statistics of the dependent and independent variables from STATA Regression Table presented in the mean log wages are 8.815043 for women and 8.743453 for men. The

log gender wage gap is only TK 0.07159 per month (higher for female workers) which shows female workers' wage advantage in terms of the significant participation and contribution of women to the RMG sector. The positive sign of the female dummy coefficient .14824960(p-.004) than male .121114(p-0.023) in the model signals the current existence of the reverse gender wage gap in the RMG sector.

By comparing the female and male results, it was found that for women, the effect of education and experience (in RMG factories) is higher and statistically significant. Women, however, were reported to have 1.14574 years more in education and 0.36413 years more experience than men; meaning that women have more years of schooling and RMG job experience than men on average. In contrary return on experience has showed a negative effect on wage in the RMG section as most of the time younger workers are preferred because of their high productivity and tolerance rate. In addition to this, age does not have much significance on female employment rate- as almost all the workers hired are in between 18-35 years of age. Moreover, less commuting time and long overtime (OT) hours per month are significant, positive contributors to their high wage. And commute time- travelling moving to and from the workplace affects their productivity.

Surprisingly, the result of the average monthly overtime working hours for women is a little misleading. Even though due to domestic responsibilities and security bindings women work

<i>Variables</i>	<i>Total mean</i>	<i>Female mean</i>	<i>Male mean</i>	<i>Gender gap</i>
Log wage	8.782827	8.815043	8.743453	0.07159
Age	24.7	23.61039	26.03175	-2.42136
Marital status	.5785714	.5714286	.5873016	-0.01587

Family size	5.578571	5.519481	5.650794	-0.13131
Education	5.814286	6.444444	5.2987016	1.14574
Experience	4.236714	4.436984	4.072857	0.36413
Migration status	.8071429	.8311688	.7777778	0.053391
Overtime working hours Per month	38.47857	43.32468	32.55556	10.76912
Daily Commuting time (in minutes)	40.97143	43.74026	37.5873	6.15296
Disease or disability	.3928571	.5324675	.2222222	0.310245
Training	.2357143	.2207792	.2539683	-0.03319
Cutting section	.1071429	.0779221	.1428571	-0.06494
Dyeing section	.0714286	.1038961	.031746	0.07215
Finishing section	.2142857	.1298701	.3174603	-0.18759
Quality processing Section	.0928571	.0519481	.1428571	-0.09091
Sewing section	.5142857	.6363636	.3650794	0.271284

Table 9.2: Sample means of variables by both gender

Source: Author's own research

comparatively fewer overtime hours than men, the result however, shows differently. This happens because of their high participation in the sewing section, as machine operators or helpers which contributes more towards timely order shipments in the RMG industries. Due to health issues, heavy works, overnight OT hours and lack of proper training, the number of women workers is comparatively low in the finishing and dyeing sections. So, female high wage is mainly correlated to work concerning sewing, cutting and quality checking. The number of years in schooling and skill learning are vital when quality processing job requirements. Additionally, in case of occupational segregation in intra RMG industries (in cutting, sewing, finishing, quality processing, dyeing sections) women get more wage benefits, mainly in the sewing section and quality processing section rather than finishing and dyeing sections (cutting section is omitted here; reference group).

Furthermore, being married and migrated affects wage positively for both genders, and being single affects negatively, yet it is not significant for female as they get much more pressure for working overtime an earning money. Having children, household size may have a negative effect in women and a positive effect in men, however it does not have a significant outcome for women. Besides; women seem to have more kids than men since we obtained a negative gap for the variable children (if has at least one child). Furthermore, less commuting time and long overtime hours per month play a significant positive role behind their high wage. As less time for moving to and coming from the workplace affects their productivity. It was found in the data that most of the women reside in those locations that take only few minutes walking distance from their workplace. It is worth mentioning that, having any chronic disease/disability and participation in training programme can be tested as endogenous instruments for further research to include in the regression model. Though the sample means of those variables have been presented in the table based on query response data.

Graphical result for model 1

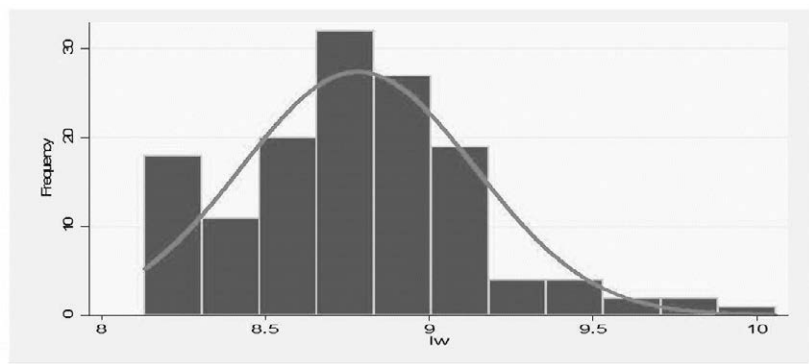


Chart 9.1: Two-way histogram for distribution of log monthly wage

Source: Author’s own research

The upper two-way histogram is the graphical representation of distribution of the total log monthly wage data taken from sample RMG workers. Here, its frequencies look almost symmetrical and follows a normal distribution path.

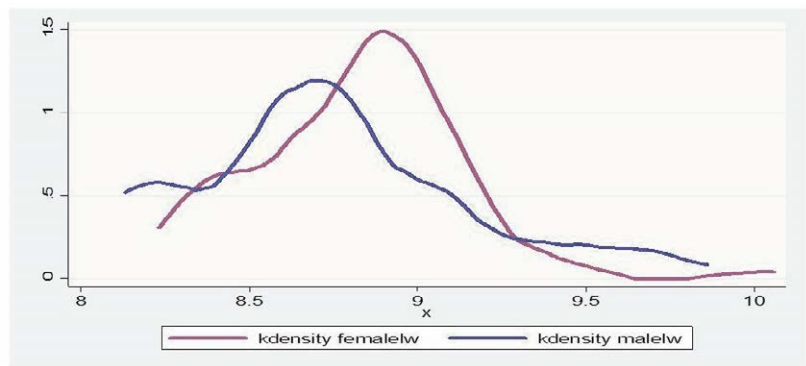


Chart 9.2: Two-way kernel density function of log wage for both gender

Source: Author’s own research

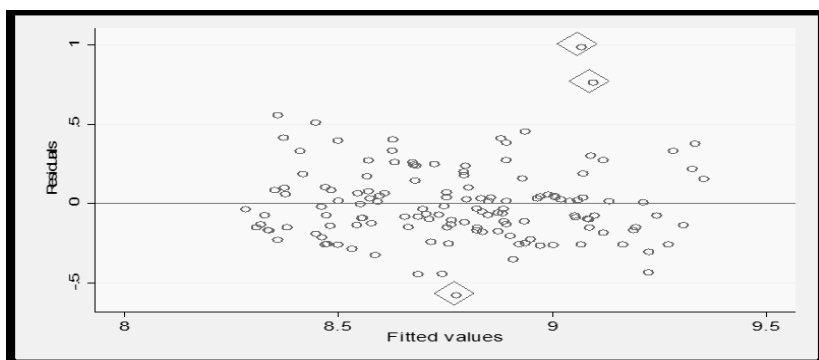


Chart 9.3: rvfplot for fitted values verses the residual

Source: Author's own research

Result discussion for model 2

Number of observations =140

Reverse Wage Differential

<i>Log Wage</i>	<i>Coefficient</i>	<i>Std. Err.</i>	<i>Z</i>	<i>P value> z </i>	<i>[95% Conf. Interval]</i>	
Group 1: Female Prediction_1	<u>8.902069</u>	.0888791	100.16	0.000	8.727869	9.076269
Group 2: Male Prediction_2	<u>8.573108</u>	.1116017	76.82	0.000	8.354373	8.791844
Difference	<u>.3289607</u>	.1426689	2.31	0.021	-.6085867	-.0493348

Decomposition Result

<i>Log wage</i>	<i>Coefficient</i>
Endowments	.0418493
Coefficients	.2801368
Interaction	- .0069746
Robust pooled result	
Explained (En)	.0413107
Unexplained (C+I)	.28765

Table 9.3: Oaxaca-Blinder wage decomposition result

Source: Author's own research

Oaxaca threefold composition first estimates two group-specific regression models for men and women log monthly wage based on some characteristics like age, education, experience, training, total monthly OT hours, 5 work sections at RMG industries, type of work /designations like machine operator, Iron man, cutting master, helper, poly man, dyeing man, quality instructor, packing man, helper and so on. And then performs the pooled decomposition result. In this study sample, the mean of log wages for men is 8.573108 and for women is 8.902069, yielding a reverse wage gap increase of .3289607 which is called female wage advantage.

In the second panel of the decomposition output, the wage gap is divided into three parts. The first part reflects the mean decrease in men's wages if they had the same characteristics as the favored group of women workers. The coefficient result is also observed to be significant by P values. The .0418493 increase in endowments indicates that differences in years of schooling (edu), years of experience or job skill (exper), and special training (included variable training) provided by BGMEA and industry management) account for about half the wage gap.

Coefficient factor (C) which quantifies the change in discriminated groups' (males') wages if favored group (female) coefficients were applied to them (that is if the labour market rewarded them as women are specially rewarded in RMG sector). The third part is the interaction term that measures the simultaneous effect of differences in endowments and coefficients.

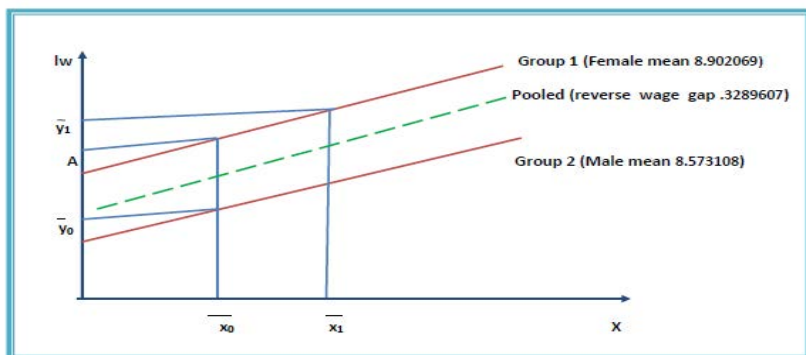


Chart 9.4: Graphical representation of wage decomposition result

Source: Author's own research

Policy Recommendations

Developed importer countries should reform labour favored trade policy internationally for developing and less developed countries. They should implement labour laws according to ILO's conventions properly, regarding maternity leaves, working hours, OT payment, child labour and minimum wage. Here, the Bangladesh government can also play a great role by formulating a strict monitoring body in collaboration with foreign buyers, civil society and BGMEA. Apart from that, the trade unions can encourage more female workers by facilitating their fundamental rights through collective bargaining. Most of the female workers are still rural migrants. There is a need for safe and secure housing at a comparatively cheap cost. On the other hand, the garment owners must improve access to health care facilities at the factory site and skill training programmes, as well as basic education for female workers in order to aid

in increasing their productivity. They should provide enough compliance cost (on exhaust fans, masks, aprons, alternative stairs, clean floors, proper tiffin, child care facilities and so on) towards reducing health hazards and accidents in the factory. Workplace nutrition programmes can reduce anemia in female RMG workers, with the greatest benefits observed when both nutritionally enhanced lunches and IFA supplements are provided.

Securing the job and work environment for female worker to avoid verbal abuse and harassment is also a must. Providing transport facilities like factory buses for all workers who reside far from the workplace can also be planned in the long run as a convenient way to commute. It is equally important to focus on preparedness (available treatment facilities, human capacity, emergency response system, etc.), to reduce the risk of Covid 19 outbreak. Unfortunately, neither the State, nor the BGMEA, mandated any such precautionary measures in order to protect the RMG workers from potential health risks, before re-opening the RMG factories. Now it is high time those organisations improved collaboration, social dialogue and industrial relations for the rights of the workers.

Conclusion

Our thriving sector Ready Made Garment Industry still needs proper policies, institutions and financing. As countries open themselves up to trade in goods and capital, they also face risks of vulnerabilities to global economic crisis, global climate change effects as well as probable negative impacts of losing USA's GSP facilities. Besides, we are facing tough competition from China, Vietnam and India. In order to survive in the competitive market, new export-oriented industries must be set up. Industrial development is never possible without the initiative of the private sector, which is why this sector also needs proper patronage. On the other hand, the Rana Plaza building collapse and Tazreen Factory Fire drew the world's attention to the RMG industry in Bangladesh. The industry has faced several challenges, but has,

to date, proven to be remarkably adaptive to its global market environment. Thus, all these issues should be kept in mind for greater policy attention in the near future and to keep pace with global economic challenges, as well as sustainable economic development.

Trade liberalisation provided a huge opportunity for Bangladeshi women to be employed in income earning activities. The RMG sector, where most of the work force comprises of women, developed tremendously as a result of trade liberalization. The effects of trade liberalisation on society and economy are multidimensional: some effects are beneficial, and some effects may be considered harmful. In Bangladesh, income gap between male and female workers in the highly educated groups is smaller compared to that in lower educated groups. Therefore, education, experience and skill training programmes, as well as health benefits of female workers must be increased.

At the same time, the production of clothing during the COVID-19 pandemic must not go ahead without an urgent overview of the system and the development of a plan to ensure the health and safety of workers. The Bangladesh export sector should collaborate with the United Nations Development Programme, which has initiated a prompt assessment for global trades to conduct human rights in due diligence and regards to the COVID-19 pandemic.

This research examines the male and female wage structures and the factors that explain the wage differential between genders in Bangladesh, using primary data through the Oaxaca-Blinder decomposition. The result suggests that, in Bangladesh, substantial differences in wages between men and women and key wage controlling factors can be identified. The paper finds out, through the use of primary data, the male and female wage structures and the factors that explain the wage difference between genders in Bangladesh. The average

wage is higher for men than women except in the RMG sector. By examining the differences in the wage distributions, the evidence shows that this differential is not particularly sensitive to the choice of the quintile. Female workers getting wage advantage due to endowments, effects participation. The reverse wage differential has been influenced positively by health and schooling too. Still, this study area can be extended for further research with more aggregated large scale survey data and equal participation of female and male workers respondents for avoiding any selection bias. As Bangladesh's apparel industry envisions needs to be a holistic growth to stay sustainable in the long run therefore conducting more research will help promote workers' rights and voice, women's health, financial inclusion, and gender equality in Ready Made Garment Industry Sector.

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