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Half Yearly Journal of the Institute of Chartered Accountants of Bangladesh

EMERGING ECONOMIC CHALLENGES: OPTIONS FOR BANGLADESH



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Editorial

Mahmudul Hasan Khusru FCA
Chairman - Editorial Board

It gives me immense pleasure that we have been able to publish the second issue of 'Bangladesh Economica', a research-based journal of ICAB. This issue contains and analytical articles evolved from the current state of business, finance and economy.

Bangladesh is steadily developing its position in the world by showing resilience to the challenges the economy is facing now. In the continuous progress of prosperity, from the most ordinary working people of Bangladesh to getting involved in high-quality professions, the constant movement of the socio-economic circle, the implementation of mega project like Padma bridge, the radiation of these potentials is now clearly visible. It is fair to assume that the year 2022 opens up many new horizons in those enlightened directions.

Since 2017, Bangladesh has emerged as a role model for development according to the survey of various research organizations. Bangladesh's position in South Asia is absolutely enviable. The gender gap in Bangladesh is the lowest among countries in South Asian countries, according to a study by the World Economic Forum. It has ranked 71st out of 146 countries on the Global Gender Gap Index 2022 with a score of 0.714. The study breaks down the overall gender parity of a country into four sub-indices – economic participation and opportunity, educational attainment, health and survival, and political empowerment. In those sub-indices, Bangladesh's progressions are quite commendable.

For this fiscal year 2022-23, the forecast GDP growth is 6.2 per cent. The growth projection is

supported by receiving readymade garment demand from abroad, and a rebound in domestic demand—with improving labor income and remittance inflows. All these also supported the recovery of the economy of the country from the savage caused by Covid-19.

In the present context of economy, we observe that still many developing economies are encountering the challenges like recurrent Covid-19 outbreaks, persistent supply-chain bottlenecks and inflationary pressures owing to ongoing Russia-Ukraine war. These have accelerated the financial vulnerabilities of people in the country and the beyond. Moreover, rising inequality and inflationary pressure are still the issues for Bangladesh.

In this backdrop, the government has taken a policy decision to enact the 'Universal Pension Management Act, 2022' to introduce a universal pension system with a view to ensuring a sustainable social safety net for the elderly and the needy people. The implementation of the universal pension scheme will bring a large number of citizens from both the formal and informal sectors under the institutional social safety net. This is a very positive and timely demand initiative, no doubt.

With this prelude, the readers will find more details while navigating the articles of this issue.

Last but not the least, my heartfelt thanks to the authors and the reviewers who have given their valuable time and efforts to make it a distinctive piece of publication.

With best wishes to all.

President's Note

Md. Shahadat Hossain FCA
President-ICAB



ICAB published an important and compelling research-based Journal that would rightfully encourage our members and students to use their knowledge and skills in important professional research works.

It is our obligation to bring the professionals, academia and researchers together on a single platform to disseminate their innovative thoughts and ideas. Our esteemed readers should take the time to read all the research papers/articles as these are dealing with critical contemporary economic issues. The writers and the professional researchers of Bangladesh Economia are not only the members of ICAB but some of them are also prominent economists and think-tanks who influence the government policy making level.

Through continuing support, respect and admiration, ICAB always encourages the researchers, and the potential researchers who would like to contribute to professional development.

Besides, ICAB always focuses on serving the global community and ensuring the best possible access to research publications. It is

our commitment to making published research widely acceptable and ensuring them to come out timely.

We are willing to work constructively and cooperatively to promote professional research through a variety of means, as we want to have collaboration with academia, research institute and professionals home and abroad.

I appreciate all those who enriched our Journal through contributing professional research papers. I would like to express my gratitude to Mr. Mahmudul Hasan Khusru FCA, Chairman, Editorial Board of Bangladesh Economia who spent his valuable time to bring out this publication successfully.

I also thank Members of the Editorial Board, Researchers, Writers, Reviewers and Member-Secretary who have accomplished an outstanding work of this publication.

Finally, I believe, we will be able to stand out and earn respect through this publication, establish the journal as an authoritative one, home and abroad.

With profound regards to all.



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**RESEARCH
- ARTICLE**

Managing the Emerging Economic Challenges What Options Does Bangladesh Have?

Dr. M. Masrur Reaz
Chairman, Policy Exchange

Hasnat Alam
Economist

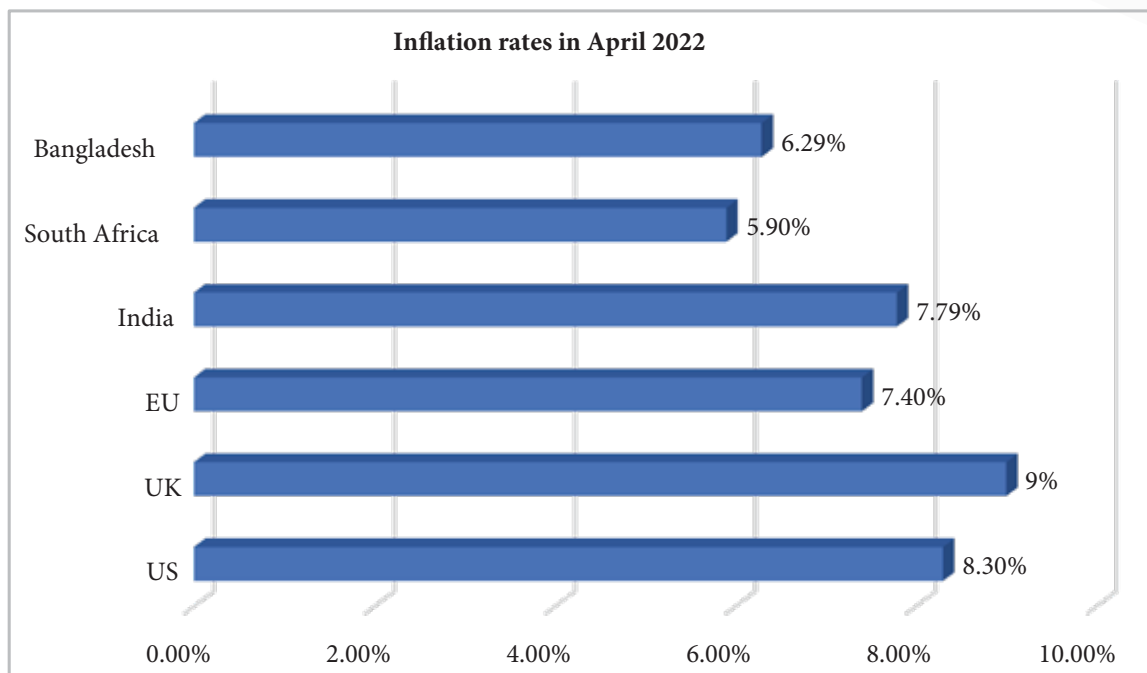
Several Pressure Points Loom Large Over Global and Bangladesh Economies

Bangladesh has made tremendous economic progress backed by sound macroeconomic management over the years. The better-than-expected recovery from the Covid-19 onset, with exports surging high at a record clip of over 35 per cent year-on-year and imports growing faster at 46 per cent for the year, has further invigorated confidence in Bangladesh's development path.

However, the Russia-Ukraine war coming on top of the supply chain disruptions caused by the two-year pandemic, has delivered a double whammy of trade and output shock on the one hand and rising inflation on the other. The annual inflation rate in Bangladesh has been rising consistently since the turn of the year amid persistently high food and commodity prices. In April, the point-to-point inflation –calculated by the Consumer Price Index (CPI)—recorded an increase in the cost of living of 6.29 percent compared to a year ago, well below the target of 5.3 in FY22. Previously, the International Monetary Fund (IMF) had forecast the headline CPI to rise by 5.9 per cent in 2022 due to higher international commodity prices.

Periods of inflationary surges in Bangladesh tend to largely follow the trends in the movement of commodity prices in global and domestic markets. According to the World Bank's April Commodity Markets Outlook report, global energy prices, which have already seen a dramatic surge due to the ongoing Covid-19 lockdowns in China and the Russia-Ukraine conflict, are expected to surge by 50.5 per cent this year. In the US, the annual rate of inflation went down to 8.3% in April from 8.5% in March but remains at a level unseen since the 1980s. Over the year the CPI's food index increased 9.4%, the most significant 12-month increase since April 1981. In Britain, consumer prices surged 9% in the year through April, the fastest rate since March 1982; in the eurozone—the 19 countries using the euro—the annual inflation is expected to hit 8.1% in May 2022, up from 7.4% in April. Among developing countries, India experienced an inflation rate of 7.79 percent in April, an 8-year high, while South Africa recorded an inflation rate of 5.9 percent last month over the same period.

Chart 1: Inflation in comparator countries in April 2022



Challenges Emerge from a Confluence of International and Local Factors

Inflation in many countries has been brewing for quite some time due to production disruptions and supply chain issues related to the Covid-19 pandemic. The supply of numerous commodities and goods has been unresponsive to higher demand reflected in, among other factors, bottlenecks, rising shipping costs, delivery delays, and shortages of key production inputs such as computer chips. Productions have gone down, with many firms struggling to cope financially, putting pressure on the prices of essentials. Furthermore, the transport sector and the intra- and inter-country movement of commodities have disrupted the supply chains, contributing to supply shocks and global inflation. There was a dramatic rise in container freight rates between January 2019 and March 2022, reaching a record price of nearly \$10,400 in September 2021 from as low as \$1,446 in April 2020, a 600 per cent increase. Global oil prices were already up by 77 percent in January 2022 compared to December 2021.

With the economy on its way to recovery and lot of pent-up demand for foreign goods and types of machinery, there has been an import surge of around 46 percent this fiscal year. While 75 per cent of our import basket comprises of raw materials, intermediate goods and capital goods meant for the

productive sector, the high global prices have expectedly put more pressure on the consumers, who usually take the burden of cost hikes. The recent lockdown in Shanghai is likely to exacerbate global supply-chain problems and inflation concerns further, given China's critical role in the global supply chain and as the city accounts for around a fifth of China's port volume.

Capital is flowing to the United States in pursuit of greater yields as the Federal Reserve tightens monetary policy by raising interest rates to combat inflation. Most developing country currencies, including the Bangladesh Taka, have lost substantial value in recent weeks in the face of a strong dollar, potentially fueling additional imported inflation, increasing debt payment costs, and increasing financial instability. Nonetheless, in comparison to most South Asian countries, Bangladesh's natural gas, which accounts for 69% of the country's primary energy mix, relieves some of the pressure on the country's depleting foreign exchange reserves.

The ongoing conflict in Ukraine has further reinforced the surge of inflation. Shocks in global oil markets due to sanctions on Russia, a major oil- and natural gas-producing country, and Saudi Arabia's refusal to increase its production have resulted in price hikes in the global market. According to World Bank, energy prices were more than four times higher in March 2022 than those in April 2020 lows-the largest 23-month increase since the oil shock of 1973. Fertilizer prices rose by 220 per cent

during the same period. Ukraine and Russia combined contributes to about 28 percent of the world's total food production. Ukraine is also a major supplier of corn, contributing to 17 percent of global exports. Following disruptions in production and global supply chains of wheat and corn due to this war, prices of bread and corn and other commodities has consequently increased.

Implications on Bangladesh Economy and Businesses

Global inflation has adversely impacted food and energy prices in the world, and Bangladesh is not immune to that. As Bangladesh is a petroleum-importing country, the increased prices of petrol in the global market directly impact Bangladesh. Food and transport have been adversely affected, with common people paying the price. Since the average food consumption constitutes more than 60 percent of the total consumption expenditure of marginal households, increased food inflation in Bangladesh devastates their livelihoods. The vulnerable households will have to, in such cases, opt between food and essentials on one hand, and their children's education or healthcare services on the other, as real income and wages of people erode away. If inflation persists, inequalities and disparities between the rich and the poor will widen, not only in terms of income but also in terms of opportunities, reversing any progress made in human development.

According to World Bank estimates, energy costs might climb by more than 50% in 2022 before

declining in 2023 and 2024. Oil prices may reach \$150 a barrel, and non-energy prices, such as agriculture and metals, are expected to rise by over 20% in 2022. In such situations, Bangladesh's export competitiveness will suffer if inflation is not managed well as a rise in raw material costs will increase the overall cost of exportable commodities. The reduced volume of exports will hit our export earnings, shrinking our foreign exchange and further widening the capital account position.

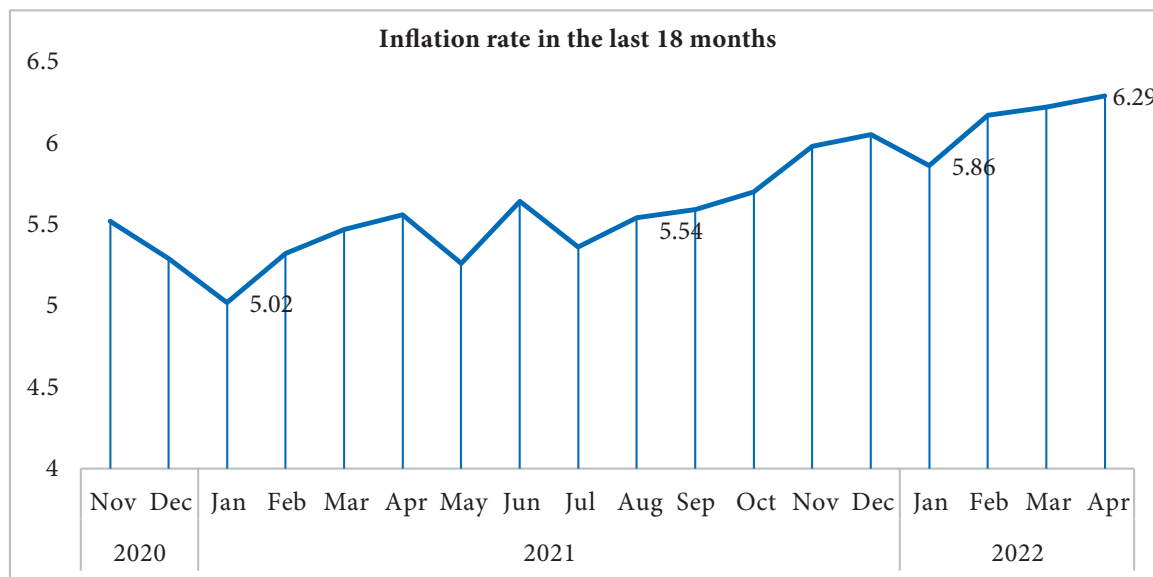
Finally, Inflation would be an added blow to small businesses—which are yet to recover from the Covid induced shock fully— as increases in input prices, higher costs of loans and decreased demand will put them in further misery.

What Other Countries are Doing to Manage the Uncertainties

Central banks around the world are concerned about the suffering of low-income people and moving expeditiously to curb the situation from further escalation. Harsh steps such as increasing interest rates to the highest level in years and increasing the repo rate have been taken.

In March, the White House announced plans to release up to 1m barrels of oil a day from the strategic reserve, in an attempt to dampen high gasoline prices exacerbated by the war in Ukraine. So far this year, the Fed has raised interest rates by three-quarters of a percentage point, which is forecasted to rise two more half-percentage-point increases to bring overnight bank-to-bank

Chart 2: Inflation rate in Bangladesh over the last 18 months (BBS)



borrowing costs to a range of 1.75 -2 percent by the end of July. The anticipation of further rate hikes appears to be already dampening demand in the housing market, where prices have risen. Still, significant increases in mortgage rates helped push down home sales for the sixth month in a row in April.

India has prioritized inflation over growth and recently proposed a tax cut on gasoline and diesel to combat inflation while raising the repo rate by 40 basis points earlier. This reduction in excise duty and import taxes may result in a revenue loss of Rs 1 lakh crore per year, but it is expected to reduce inflation by 35-40 basis points.

In response to rising inflation, the Bank of England hiked interest rates by 0.25 percentage point to 1.0 percent on May 5, bringing them to their highest level since March 2009. The interest rate was raised due to the tightness of the labor market, substantial domestic cost and price pressures, and the possibility that those pressures will endure.

The Proposed National Budget and Its Offerings to Tackle the Challenges: Some Good News but We Needed a Lot More

The GoB has recognized inflation to be a key challenge for the fiscal year, and has considered the possibility of further increase in global prices of major commodities due to the ongoing Russia-Ukraine conflict and disruption in supply chain worldwide when crafting the budget of FY 2022-2023. Containing the inflation through increasing the supply and reducing the growth in demand has been a core policy objective of the proposed budget. The reduction of customs duty for wheat gluten and feeds, plans for procurement of 47,000 MT of government procurement of food grain in case of shortages, and actions against hoarders through mobile courts should help increase the supply of essentials, while the increased sales of daily necessities at low prices through TCB, overall 21 percent increase in subsidies on items including food, fuel and other agricultural goods, and 5 percent increase in social protection budget and planned increase in people brought under the safety net should, to some extent, help the people in need and keep inflationary effects down.

The strategies to contain inflation and support the people who will be affected most could, however, have been more comprehensive. The tax-free personal income threshold remains unchanged

despite the added burden of increasing prices, while for the lower-income who receive social protection benefits, the small benefit amount has remained the same as in the previous years. The increase in the social protection budget has also been minimal— the proportion of which to the overall budget has rather come down by 2 percent points compared to previous year. The support extended to the lower income has been minimal as the large expenditure plan and ambitious ADP targets is expected to have high import components to put pressure on foreign exchange and lead to further depreciation of taka and more inflation. Although low-cost rice has been planned to be provided to 5 million low-income during the lean season, the number of households requiring such support for rice, and other essentials far exceeds that. While VAT and AIT exemption on import or local purchase of raw materials for pharma, digital device manufacturing and other sectors might somewhat help local consumers besides supporting the sectors, some of the import-substituting measures put in place to support local businesses will have an adverse impact on inflation. Allowing lower tariff for some of essential food items, including rice, lentils and palm oil could have ensured better supply in the market, discouraged hoarding practices and kept the prices down.

At a time when Robust exchange rate management is critical to ensure optimum supply of foreign currencies, the support provided in the budget for boosting exports and FDI, two key drivers of foreign currencies, have much improvement room. . Transfer to Special Reserve is no longer an allowable expense which will make the effective tax rate on Transfer to Special Reserve to increase to 39.06%. The effective tax rate on contribution to Workers Profit Participation Fund (WPPF) has increased to 22.50% since contribution to WPPF has been made inadmissible. This makes efforts private sector's efforts to improve employment benefit/conditions for workers more expensive, and makes the business environment less attractive for FDI. Budget FY 23 makes submission of tax returns mandatory for global digital service providers like Facebook, Google, Twitter, and Amazon. This will further deter Bangladesh's prospects of becoming a digital hub in the region. There are some measures which have increased the tax rates exporters. The rate of source tax collection has been increased to 1% and TDS rates have been raised in areas of minimum tax. The effective tax rate will increase as a result, and will minimize the positive impact of the reduction in corporate tax will have a lower impact.

Overall, at the current level of strategies and policy support extended in the proposed budget—which has an ambitious ADP and a deficit of BDT 2450.64 billion, higher than it should be in the current context of pressure from high import costs and prices—it will be testing to contain inflation at the target level of 5.6% and stabilize the exchange rate.

What Priority Measures Bangladesh Must Consider

Even though the scope of policy response is constrained due to deficits in fiscal and external sector—consolidated fiscal balance registering a large deficit of 5.2 percent of GDP in December 2021 and current account deficit is projected to be 3.1 per cent of its GDP in 2022, owing to big gaps in export earnings and import payments and the slowdown in inward remittances—and other uncertainties in global developments which is beyond the control of Bangladesh, there is still some scope for policy maneuver through monetary and fiscal policies aimed at limiting the impact of current inflation as well as anchoring medium- and longer-term expectations at moderate levels.

Monetary Policy Measures

Effectively Increase the Interest Rates

There are marked anomalies between policy rate, deposit rate, and lending rate. At present depositors are getting an interest return lower than the inflation rate, which erodes their purchasing capacity. Bangladesh Bank had so far failed in safeguarding the depositors despite asking banks to comply, making it challenging to manage aggregate demand in line with BB's inflation target.

Maintaining an Appropriate Level of Exchange Rate of Bangladesh Taka is an Imperative for Limiting the Impact of Imported Inflation, While Sustaining Export Competitiveness

Even though the Bangladesh Bank has continued to devalue the local currency, it has failed to address the misalignment between the official and market Taka-Dollar exchange rate. Furthermore, Bangladesh's real effective exchange rate (REER) has been higher than nominal since the pandemic, indicating exports have been more expensive and imports cheaper relative to trading partners.

The official exchange rate fixed by the central bank also discourages remitters from bringing in foreign

currency through banking channels due to the marked difference in rates between official and other challenge, despite the 2.5% incentive for remitters. It is thus important to further devalue the currency after thoroughly assessing the exchange rate pass-through ratio (ERPTR) to inflation and market difference.

Fiscal Policy Measures

Social Protection Support for Low-income Groups

Fiscal authorities should prioritize safeguarding individuals facing the twin blow of commodities price increases and pandemic-induced economic crises through targeted food subsidies and social protection benefits. The safety net should be increased effectively with minimum exclusion error, and the benefits must reach those in need with efficient monitoring and accountability in place in such trying times. Energy price increases should be delayed in order to keep inflation and inflation expectations in check despite this rising the budget deficit in the short run.

Reduction of Tariff and Taxes on Essentials

If some consumer goods, like palm and soya bean oil, are all imported, it is important to temporarily eliminate tariffs or substantially reduce it for both crude and refined as an emergency measure, similar to India, and take other necessary steps to increase supplies from imports to keep the price level low and. Other consumer goods might also need tariff reduction to stimulate supplies. However, tariff on luxury products and those that have local alternatives should be increased effectively to discourage unnecessary spending. The market should be signaled that the central bank is determined to relieve inflationary pressures as much as possible, even at the expense of GDP growth, to reduce future expectations of inflation.

Maintaining Energy Prices Affordable for Businesses and Citizens

It is critical that the Bangladesh Energy Regulatory Commission reconsiders its plan to hike industrial/business energy prices by up to 116%. Such an increase will exacerbate the adverse effect of already spiraling commodity and dollar prices on businesses and citizens, diminishing competitiveness and adding to the cost of living.



Russia-Ukraine War Impact on Bangladesh's Economy

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ABSTRACT

This study examines how Bangladesh should respond and go forward through the challenges and uncertainties in the economy, forex market volatility and worldwide supply crunch based on secondary data from the Bangladesh Bureau of Statistics and the Bangladesh Bank. The study finds that Bangladesh should adopt a hold and bear strategy rather than a large-scale cut-off or go as usual. The study offers some implications for policymakers, businesses and academicians. The originality of the study is that this is the first study of its kind in the context of Bangladesh that explores responses of Bangladesh from diverse perspectives including trends, and quantitative and qualitative inputs. Findings and conclusions drawn in the study will be very useful to the policymakers, development partners and researchers in the fields of development economics.

KEYWORD

Economy, Bangladesh, currency, inflation, war

I ntroduction

The economic impact of war is so bad on this integrated interdependent economy is more costly than the war itself. We have been experiencing this since the onset of the Russia-Ukraine war. With the responses of many countries, the situation emerged with uncertainties and challenges from many fronts. Being an import-dependent country Bangladesh's economy was mostly affected negatively which also hampered the recovery from pandemic stress.

Research Methodology

We have analyzed secondary data from the Bangladesh Bank and the Bangladesh Bureau of Statistics to understand and interpret trends and reasons using the descriptive quantitative research method. The method is used to understand the real impacts and interpret those by the actual scenario.

Currency Trend and Reason for Increasing Dollar Value Against BDT, Euro, Rupee and Rouble

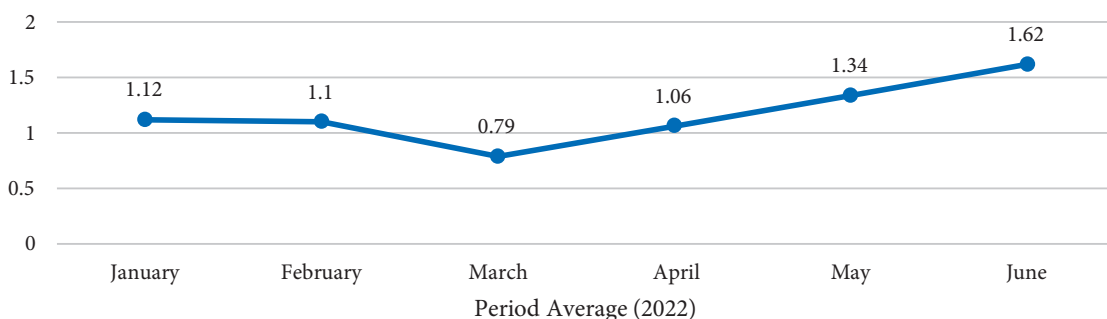
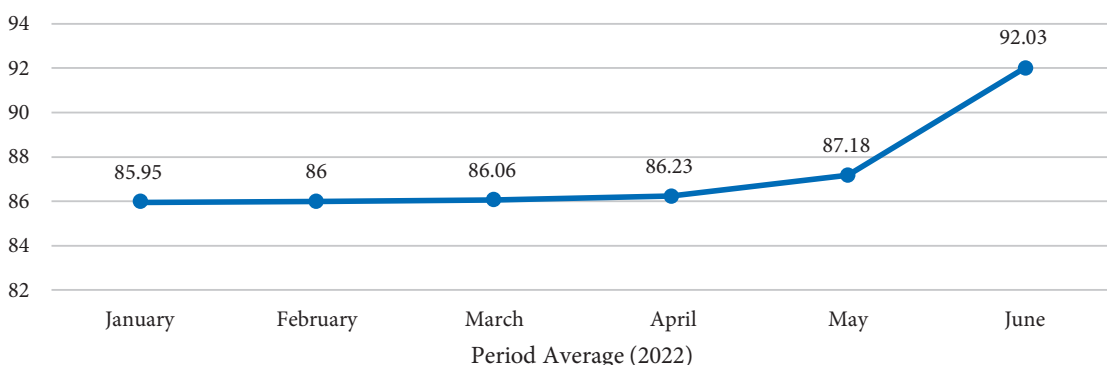
This is an extraordinary time from a global perspective. The ongoing Russia-Ukraine war and related sanctions are impacting all economies in the world. The euro has fallen below the dollar for the second time (Exchange date should be stated here) after 20 years when the first time it traded below the dollar was in December 2002. Similarly, BDT and Rupee also lost value against the dollar by 10.08% and 7.02% respectively whereas Russian Rouble gained 34.14% by July this year. The slide was mainly caused by the Federal Reserve of the USA's hiking interest rate that led foreign investors to move money to the USA and Russia's invasion of Ukraine

pushed up commodity prices globally, particularly crude oil, resulting in a higher trade deficit. The Bangladesh Bank's policy to fix the exchange rate heavily without adjusting following inflation differences further thronged the problem in Bangladesh. Also maintaining a fixed interest rate made it harder to cope with increasing interest rates gradually from negative to positive in developed economies to curb inflation.

Ruble and USD Movement Against Taka

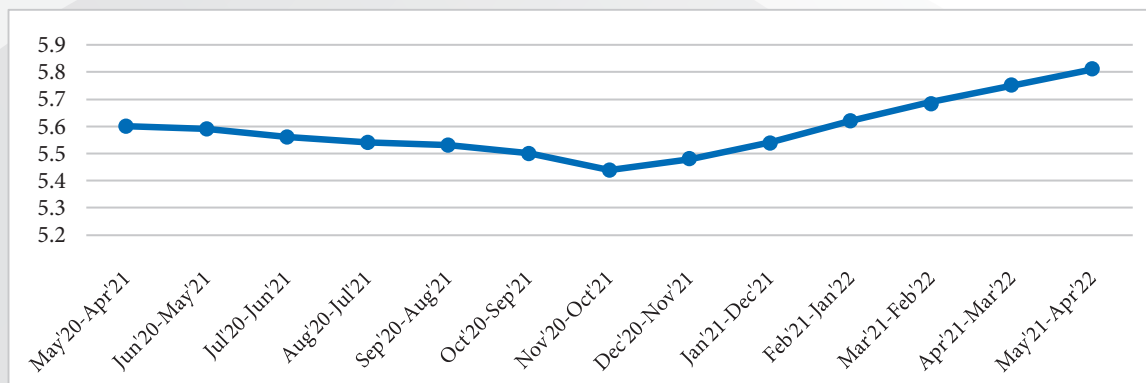
The volatility in the forex market has reached a new height. The supply and demand imbalance and panic purchases made it look harder. The pressure can easily be felt by the numbers causing higher trade deficits during the first nine months (July-March) of the 2021-22 fiscal year where import payments increased by 44% whereas export income increased by 33% and remittances has fallen by 18%. The forex market is the major determinant of inflation which is highest in recent years at 7.56% as of June 2022 from 7.42% in the past month. It was the highest inflation rate since July 2013 caused by soaring prices of both food items (8.37% vs 8.30% in May) and non-food items (6.33% vs 6.08%). Also, the trade deficit is the highest ever in the history of Bangladesh. If a high current account deficit persists for a longer period in this way, the exchange rate will fall under further pressure straining forex reserve.

There is pressure on foreign currency from multiple ends since borders were reopened such as higher foreign travel and avoiding formal channels of remittance along with regular debt servicing. As consequence, this led to higher costs to the

Rouble movement against Taka**USD movement against Taka**

businesses ultimately passing on to common consumers. Being a trading country and highly import-dependent for fuel and industrial raw materials, many companies facing trouble in opening LCs since banks are unwilling to open LCs due to forex shortages. Part of the crisis heightened

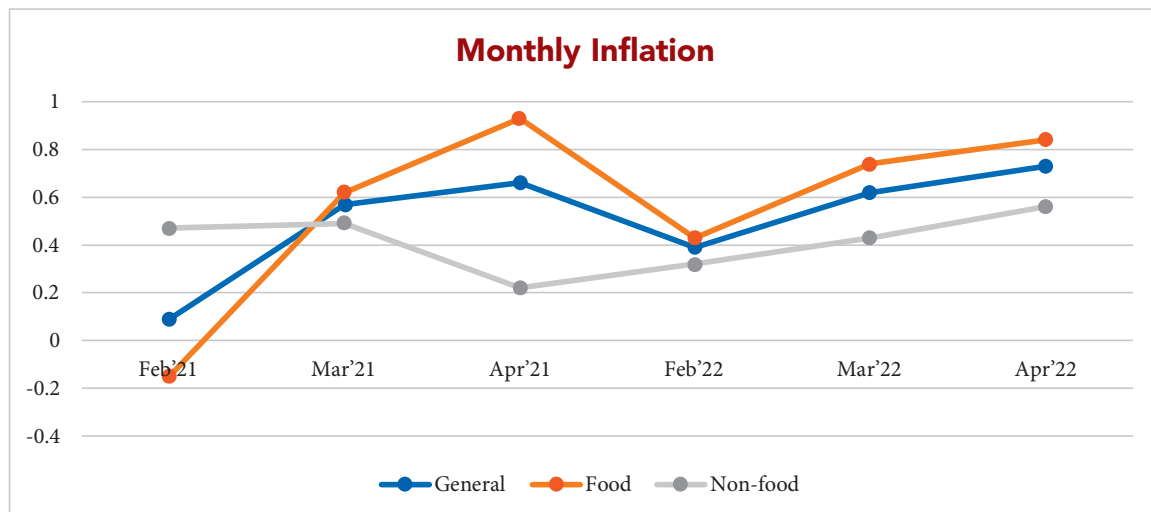
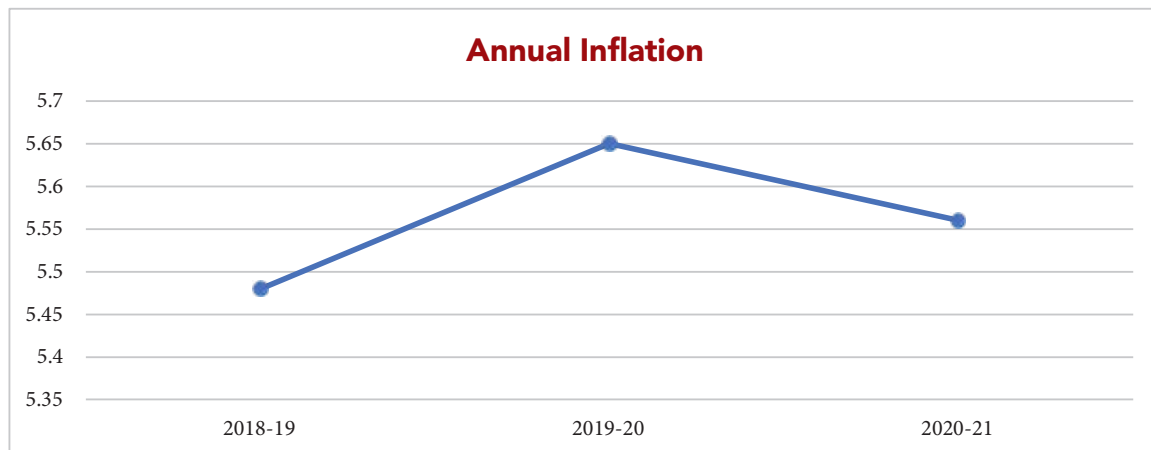
due to the Bangladesh Bank's maintaining lags in exchange rates. Price stability largely depends on a stable exchange rate. Despite many efforts and initiatives by the government and Bangladesh Bank regarding forex management, the situation is still gloomy.

Findings and Discussion**The monthly and average inflation rate of CPI from May'21 to Apr'22
(12 Months moving average)**

Ful operational economic activities without any COVID-related restrictions slowed down the rate of inflation by the end of 2021. Borders were fully opened, and businesses were recovering in full swing with people moving freely at that time. However, since the onset of the Russia-Ukraine war, the clock of inflation is ticking up. The forex market got volatile, commodity price was soaring at a bull and overall supply-demand hampered the world order. Almost every country was feeling the heat and Bangladesh was no different. The rate of inflation

raised to a decade high in many countries which in real terms would be double-digit. The price of many commodities skyrocketed with multiple times price hikes. This situation made all economic indicators look gloomy such as the balance of payments, remittance, national reserve etc. The policy response was obvious but for an import-dependent country like Bangladesh, it was hard to choose. People got nervous with the unprecedented level of inflation since it created a hue and cry in the market felt from macro to micro level.

Consumer Price Index (CPI): Bangladesh (National) (Over Previous Year/Month)



Annual inflation spiked a bit in 2019-20 from 2018-19 mainly due to COVID 19 impact first outbreak in China from December 2019. The spike curbed through opening trade and borders in 2020-21. However, the scenario is much different now since the rate of inflation is undergoing above 7% in 2022. The Domino effect from multiple factors starting from the war between Russia and Ukraine

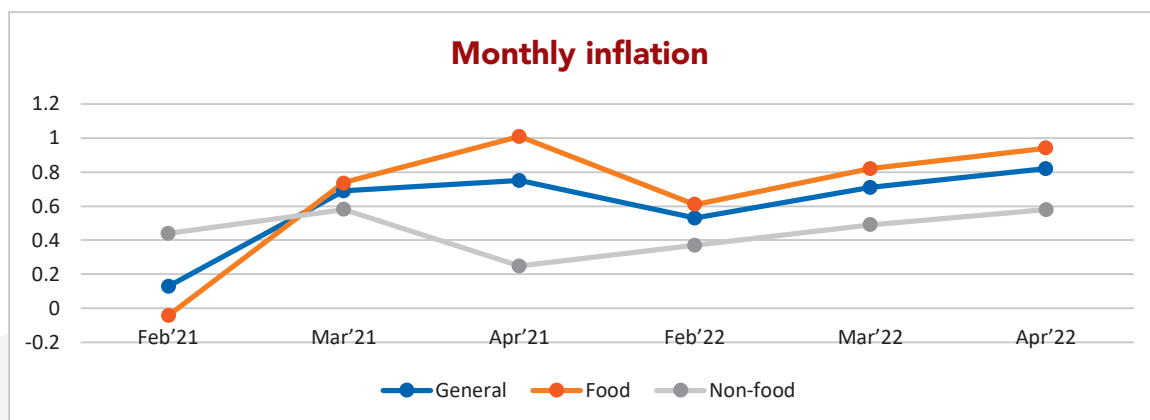
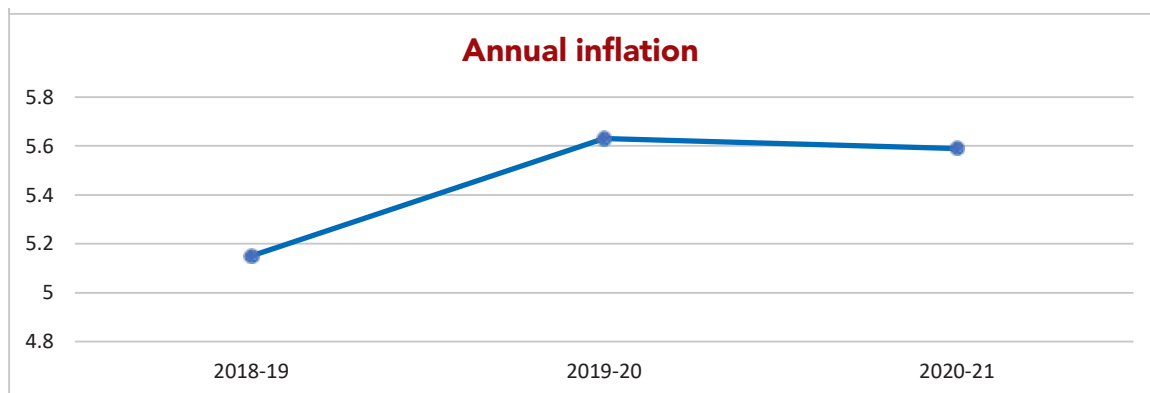
flared commodity prices higher and higher. Following the other parts of the world, Bangladesh is also going through the troughs of supply crisis, forex volatility and blown remittance. Policy responses have played an instrumental role, but Bangladesh is a price taker compared with developed economies. The difference in inflation made BDT weaker historically, however, now coupled with other crises,

BDT got far weaker ever crossing 100 BDT per dollar. This might be temporary but still shows the vulnerability of the economy.

Monthly inflation also shows the same peaks and troughs in the economy. With the economy opening and business activities picking up after COVID-19 pandemic-related restrictions, month-on-month inflation came down to a great extent at the onset of 2021. However, since restrictions came in due to the second wave of COVID-19, general and food inflation kept rising. On the other hand, due to reduced optional activity with worsening pandemic

conditions non-food inflation came down with further movement restrictions. Whereas in the war impacted time the economic scenario became different with all the indicators general, food and non-food inflation kept rising steadily. The price of all the essential and non-essential goods and services has been spiraling and mounting pressure pinched every class of people. Businesses fall into margin pressure and in many terms lose competitiveness to some extent. With the higher cost of imported raw materials, the economy is bound to absorb that as a price taker import-dependent trading country.

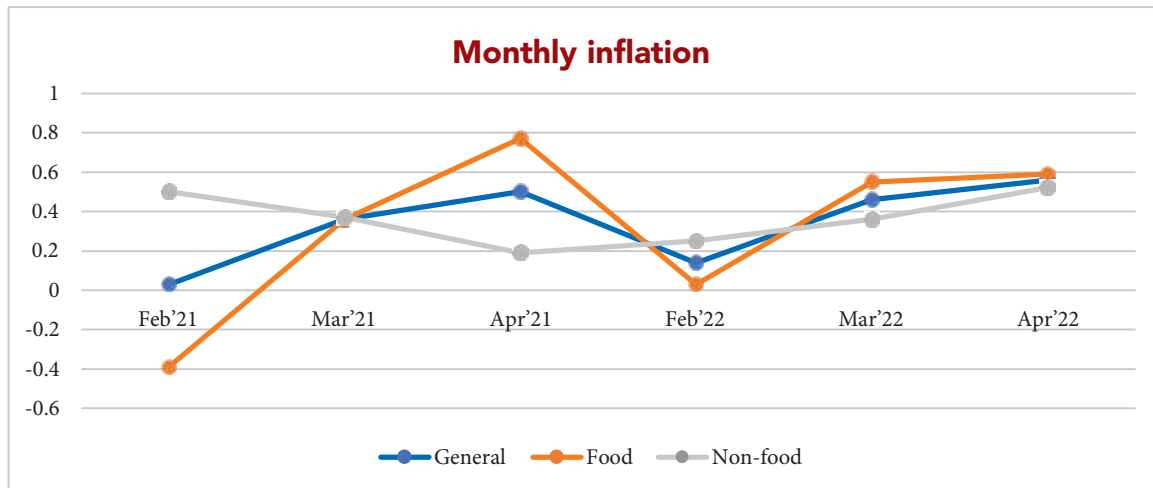
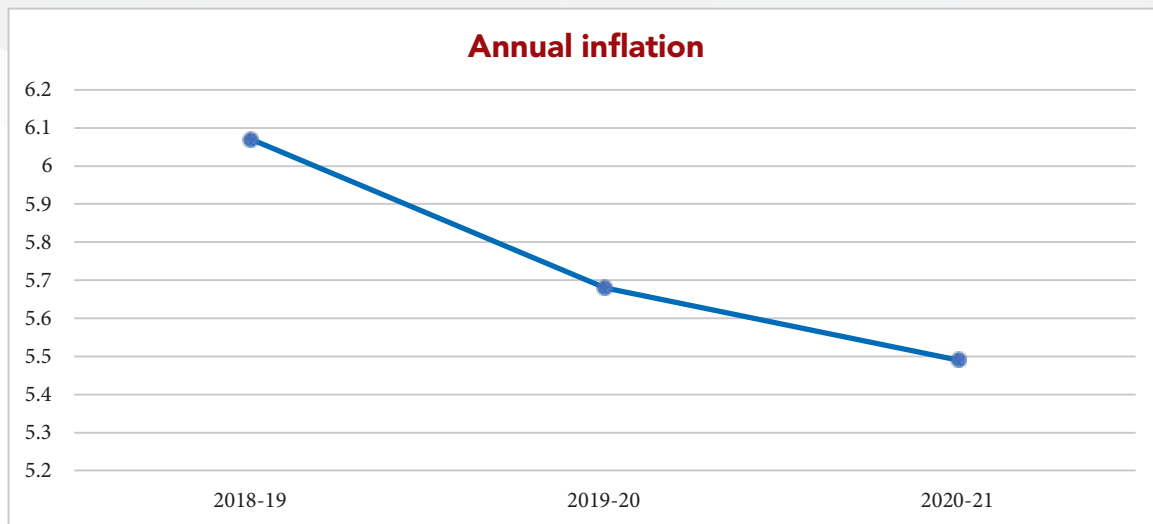
Consumer Price Index (CPI): Rural (Over Previous Year/Month)



As we know and consistent with the graph rural is more impacted by inflation than urban. Hence rural people need to spend more on life necessities which stand adversely in their resilience. All of the inflation indicators general, food and non-food rural inflation went higher than urban inflation. The people of the village have to spend higher food, transportation and medical etc. Last two years' inflation has repeatedly spiked due to external factors. The BBS report shows that prices of almost all types of daily necessities

including rice, pulse, and flour are higher in rural areas than in urban areas which seems to be unjustified considering the level of income. The BBS showed that average inflation in village areas rose to 6.2% last November while the average inflation in the urban areas stood at 5.59%. At first pandemic, then fuel price increased and finally Russia Ukraine war led crisis kept the curve higher again and again. With soaring inflation rural taking the higher load will lead to a vulnerable economic resilience.

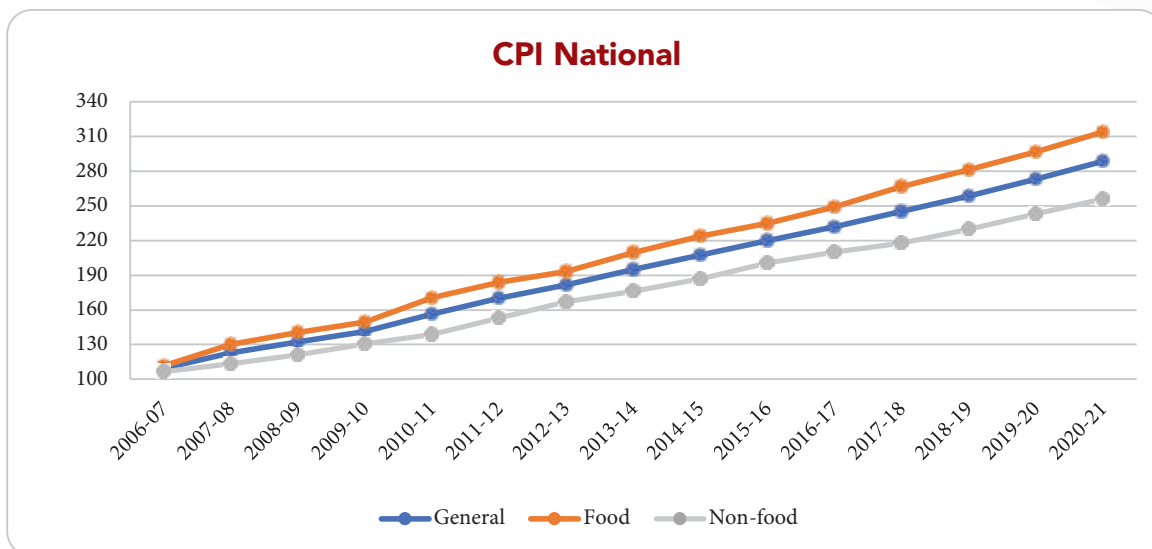
Consumer Price Index (CPI): Urban (Over Previous Year/Month)



Inflation in urban areas though a bit less impacted than in rural areas however, overall inflation due to external factors have been spiraling hoping with difficult times. In 2021, with fresh lockdown general and food inflation went up whereas due to decreasing demand nonfood inflation went down. But in 2022 inflation for general, food and non-food all kept increasing steadily as the price of almost everything increased at varied rates. Since the war impacted mainly in 2022, inflation in 2021 seems going down easing the pressure led by the COVID-19 pandemic in 2020. The current supply

crisis getting so linger and seems the solution is not near. Hence the pressure will hit some more hard times. Moreover, excessive currency devaluation moves a country to a losing position. Spiraling trade deficit leads to waning economic resilience of a country. It is presumed that the current crisis may deepen further however, any forecast for a major economic crisis has not been made so far. In face of this difficulty, if we fail to act appropriately with judicial measures of conservative approaches, we may fall into a harder position.

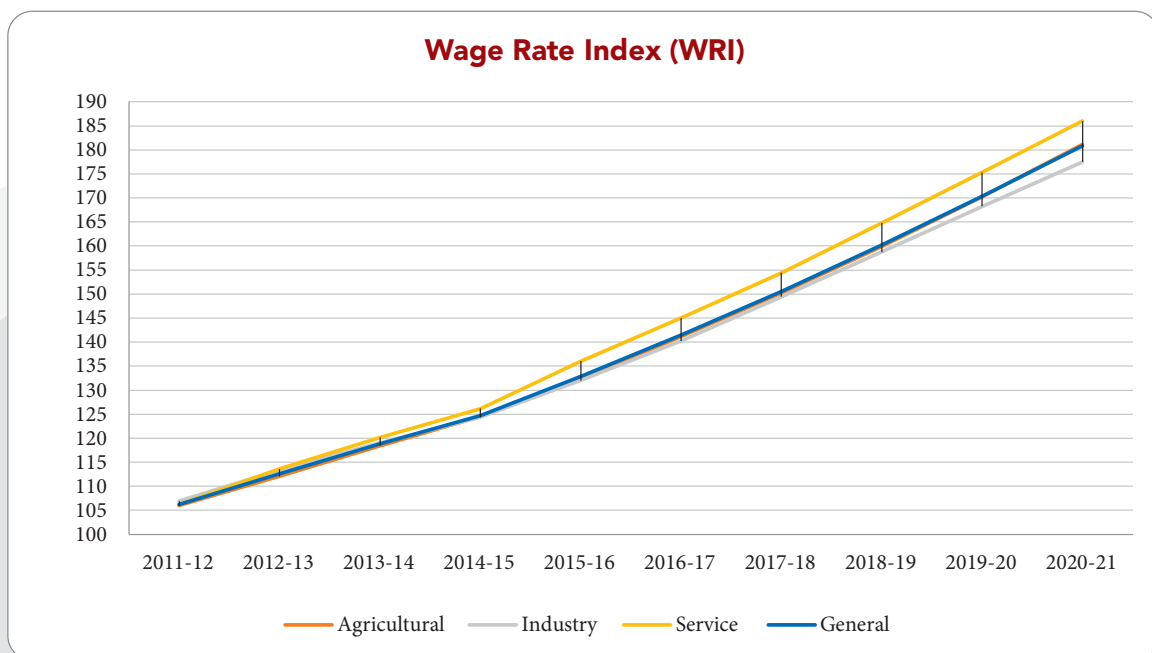
Historical Data (Time Series) of CPI National



Historically inflation rate of Bangladesh has always been on the positive side which to some extent is favorable for the growth of the economy. However sudden spikes or abnormal inflation due to external factors led to a moment of a crisis situation. Other than a few of those cases, Bangladesh had steady growth and inflation in the past decade. The average inflation over those years was around or more than 6% which was pretty stable except for a few scenarios like climate challenges or political turmoil. Bangladesh as a developing country tried to follow a fixed exchange rate whereas developed countries had

low inflation than developing countries led to a real appreciation persistently. The cost-push inflation can be managed somewhat by reducing tariffs for importing food and energy. Also, in this situation, a rise in interest becomes vital to cope with the inflationary pressure which is also done by developed economies at a varied rate to come out of decade-long low inflation and near-zero interest rate. On the side, due to high prices whether managed or not, demand has been coming down which become a necessity to improve current account imbalances.

Historical Data (Time Series) of Wage Rate Index (WRI) Bangladesh



The movement of wages was almost in line with inflation. The wage rate in service has grown faster than in other sectors especially double that of agricultural sectors. However, growth in the industry was not as expected which is slightly above that agricultural sector. There is a gross gap between general and service on one side and industry and agriculture on the other side. This also shows that Bangladesh is moving towards higher value addition. Sudden inflationary pressures fell heavy on people to cope with crises.

Conclusion

In light of the current scenario, the strategy of a conservative approach toward expanding the economy would be a prudent step. To tackle these record-breaking hits, at first, the government must rationalize spending and prioritize more sustainability of economic growth and resilience. Spending in unproductive sectors should be eliminated with a tough hand. On the other hand, a better inflow of capital must be ensured. To stimulate investment, taxes need to be aligned with global practices as well currency value should not be artificially held but rather place in market valuation into it. Bangladesh is already toughened its stint regarding the import of luxury and non-essential items. Again, for a long time, Bangladesh Bank held interest rate on a cap however it is time to increase

interest as a policy response toward an inflationary pressure time. However, those are not the only solution rather we have to keep finding optimal points. Finally, Bangladesh is in no way in a position of a failing country rather she always has shown her resilience in any crisis in history.

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Towards Inclusive Growth Challenges and Policy Imperatives for Bangladesh

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ABSTRACT

Over the past several decades, Bangladesh has withstood overwhelming odds to emerge as a 'development surprise' that only a few could have predicted. From a war-ravaged country in 1971, Bangladesh has transformed itself into a \$465 billion economy. Robust economic growth, impressive health and educational attainment, strong export and remittance growth, prudent macroeconomic management, and improved capacity to manage natural disasters, among others, contributed to the country's remarkable development. Despite its impressive achievements on many fronts, numerous challenges and vulnerabilities remain. The Covid-19 global pandemic has exacerbated some of the longstanding challenges. Numerous reasons are driving inequality in Bangladesh. Rather than focusing on many different micro and sector-specific issues, in this paper, we highlight a few broad factors that include policy instruments for tackling inequality and ensuring inclusive growth, inadequate spending on health and education, lack of access to quality health and education, limited capacity to generate productive jobs, women's limited participation in the labour market, and climate-change-induced inequalities. In light of these challenges, related policy recommendations are set out to address the underlying issues and build forward a better society with shared prosperity.

I

ntroduction

In 1971, through a bloodstained war, Bangladesh earned its independence with the objective of building a nation in which all of its citizens would enjoy basic human rights and have fair participation in the political, economic, and social development processes underpinned by the rule of law, equality, and justice. Inheriting a fragile and war-devastated economy, Bangladesh faced a herculean task of moving forward dealing with poverty, deprivation, natural disasters, and political instability. Fast forward five decades, Bangladesh is now often cited as a development success story for its phenomenal socio-economic progress. Robust economic growth, impressive health and educational attainment, strong export and remittance growth, prudent macroeconomic management, improved capacity to manage natural disasters, among others, contributed to the country's remarkable development. Despite its impressive achievements on many fronts, numerous challenges and vulnerabilities remain. The Covid-19 global pandemic has exacerbated some of the longstanding challenges. Against this backdrop, this paper highlights some of Bangladesh's major areas of socio-economic progress and identifies several broad factors that confront the country's attaining its inclusive growth and development objectives.

Methodology

This paper utilises a mixed-method research technique to analyze data collected through desk research, key informant interviews (KIIs) and in-depth interviews. At first, an extensive desk review of relevant documents was conducted to collect quantitative and qualitative data and develop questions for interviews. Quantitative data

were collected from various reports of the Bangladesh Bureau of Statistics, Export Promotion Bureau, Bangladesh Bank, World Development Indicators, and IMF economic outlook data, among others. Then, a consultative and participatory approach was adopted using a semi-structured questionnaire to acquire informed inputs from diverse stakeholders, including the Ministry of Planning, Ministry of Finance, central bank, National Board of Revenue, trade bodies, district woman chambers, and local government agencies. The findings were presented in a stakeholder consultation event to finalize the recommendations.

A Snapshot of Bangladesh's Socio-Economic Progress

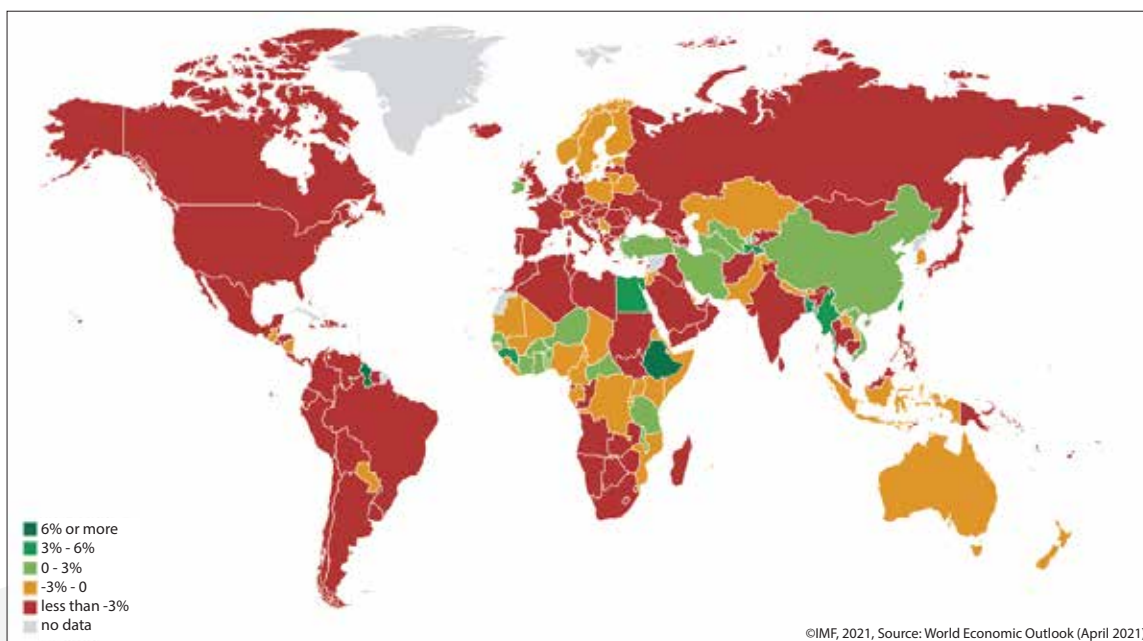
Over the past several decades, Bangladesh has withstood overwhelming odds to emerge as a 'development surprise' that only a few could have predicted. The economy clocked a stable growth rate, averaging above 5 per cent in the 1990s, more than 6 per cent in the 2000s, and about 7 per cent in the 2010s. Persistent economic growth has driven a \$30 billion economy in the mid-1990s to a sizeable one of more than \$460 billion in 2022. Per capita GDP during the same period increased from around \$300 to more than \$2824 in 2022. Bangladesh is one of the few low-income countries that never faced any precarious external debt condition and was not included in the group of Heavily Indebted Poor Countries (HIPC) that received support from international debt relief initiatives. Even amid the Covid-19 global pandemic, Bangladesh has remained relatively resilient, posting a rather solid growth of 3.6 per cent at a time (in 2019-20) when most global economies experienced an economic decline (Figure 1).

Bangladesh at 50: Key Numbers

	1971-72	2021-22
 Population	76 million	166.6 million
 Population growth rate	1.82%	1.37%
 Per capita income	\$70	\$2824
 GDP	\$8 billion	\$465 Billion
 GDP Growth Rate	2.5%	7.25%
 Forex reserve	Nil	\$39 billion
 Poverty rate	82%	20.5% (Pre-COVID)
 Fertility rate	6 children	2 children
 Life expectancy	47 years	73 years
 Infant mortality rate (per thousand)	141	21

Source: Authors' illustration using data from the Bangladesh Bureau of Statistics, Bangladesh Bank, World Bank.

Figure 1: Real GDP growth of countries during pandemic (annual percent change), 2020

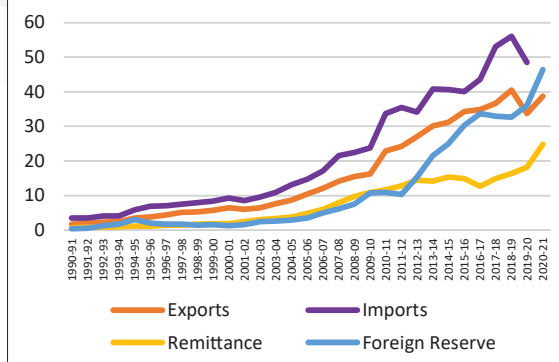


Bangladesh's export sector has contributed to the country's impressive economic performance. Merchandise exports, driven by readymade garments, increased rapidly from about \$1 billion in 1990 to a peak of \$40.5 billion in 2018-19, before being hit by the pandemic. Like in all other countries, pandemic-induced disruptions dealt a blow to Bangladesh's foreign trade, as reflected in falling exports and imports in fiscal year (FY) 2020. Since then, a robust recovery has fetched all-time

high export earnings of \$50.32 billion in FY2022. Remittance inflow has steadily risen, hitting a record high of more than \$24 billion during the pandemic (Figure 2). Along with this, Bangladesh boasts of a good track record of maintaining a sizeable foreign reserve.

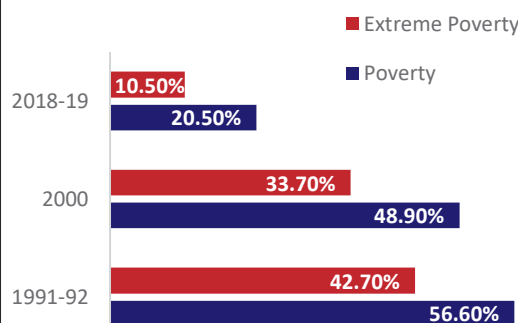
One of the major successes of Bangladesh is the rapid reduction in poverty incidence over the past three decades. The headcount ratio

Figure 2: Exports, imports, remittance and foreign reserve in Bangladesh (\$ billion)



Source: BBS, Export Promotion Bureau, Bangladesh Bank

Figure 3: Poverty Reduction in Bangladesh



Source: Based on Bangladesh Bureau of Statistics (BBS) data

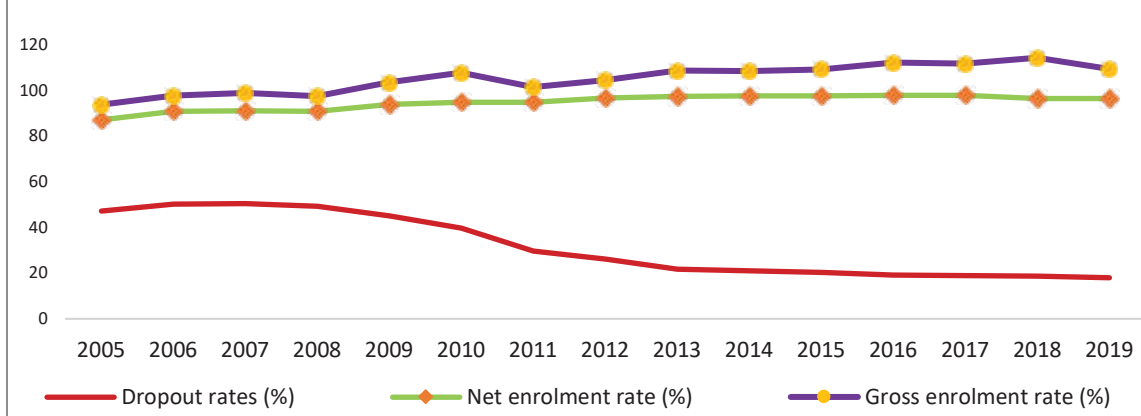
(HCR)—measured as the proportion of the population living below the nationally defined poverty line income—fell from more than 50 per cent in the early 1990s to 20.5 per cent in 2018-19 (Figure 3). During the same period, extreme poverty declined from 42.7 per cent to 10.5 percent.

Bangladesh has made phenomenal progress across various human development indicators. In ensuring access to education, particularly at the primary level, Bangladesh's progress has been remarkable: the net enrolment rate in primary education jumped to 97 per cent in 2019 from 75 per cent in 1990 (Figure 4), and the secondary enrolment more than tripled to 66 per cent. In both primary and secondary enrolment, the gender parity index has reached above one, meaning that girls are enrolling in a higher proportion than boys. Slashing the dropout rate in primary education from around 50 per cent in 2005 to less than 18 per cent in 2019 and increasing the

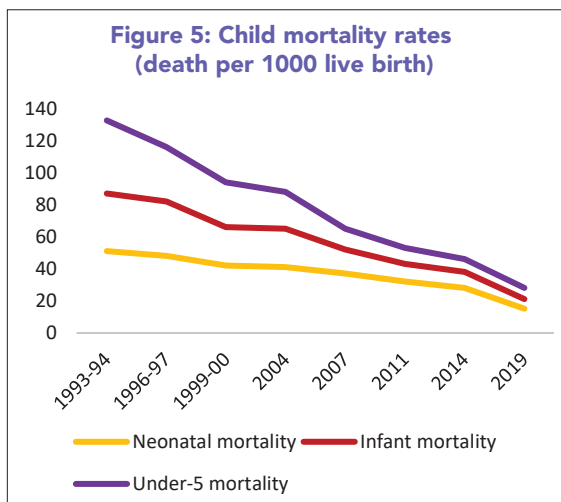
adult literacy rate from just 35 per cent in 1990 to 74 per cent in 2018 constitute two significant achievements of Bangladesh.

Bangladesh has also made impressive progress in various health outcome indicators. The average life expectancy at birth registered an increase from about 58 years in 1990 to above 72 years in 2019. A persistent decline in maternal, infant, and under-5 mortality rates, and improved child nutritional outcomes all contributed to the increased life expectancy. The infant mortality rate fell from as high as 99.6 per 1,000 live births in 1990 to just 21 per 1,000 live births in 2019 (Figure 5). During the same period, the maternal mortality rate--measured as the number of women who die from any reason related to pregnancy or childbirth--declined from 594 deaths per 100,000 live births to 165 per 100,000 live births. There has also been substantial improvement in child nutritional outcomes: during

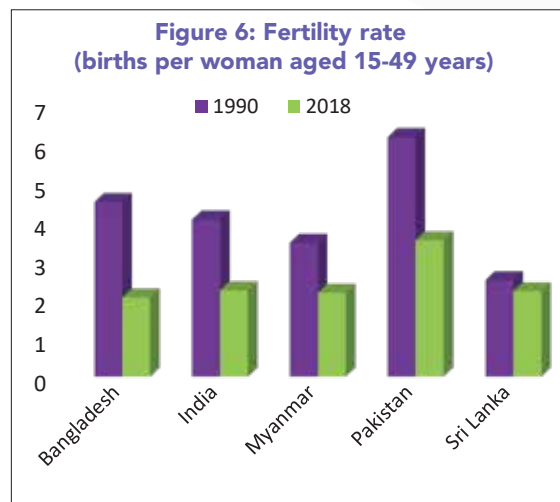
Figure 4: Gross enrolment, net enrolment and dropout rate in primary education (%)



Source: Bangladesh Bureau of Statistics (BBS).



Source: Bangladesh Demographic and Health Survey (BDHS) and Multiple Indicator Cluster Survey (2019).

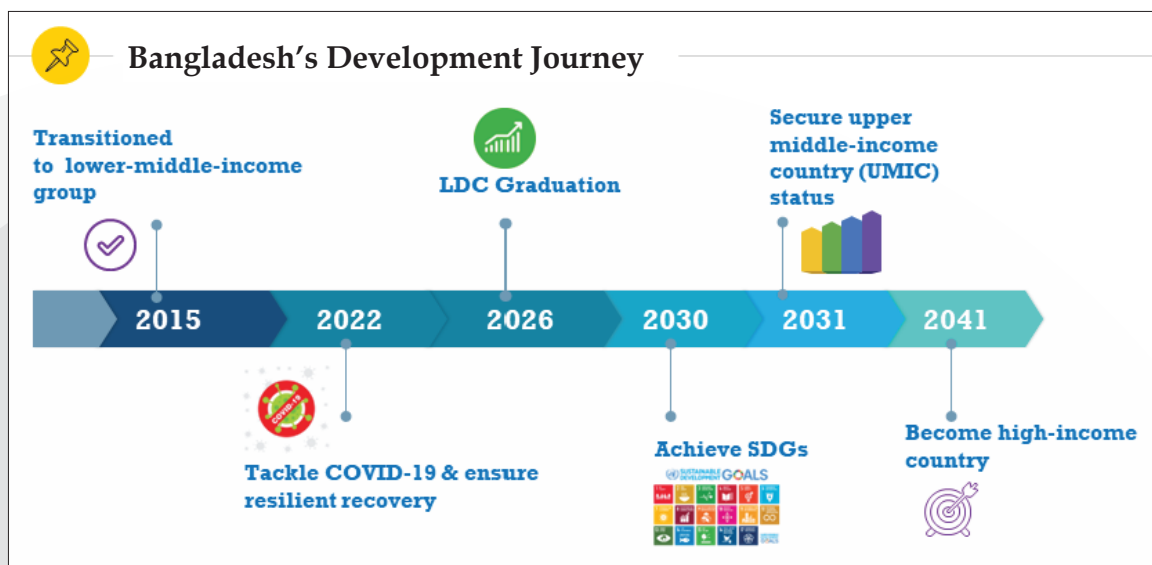


Source: World Development Indicator (WDI).

Note: Data on 2019 are taken from the Multiple Indicator Cluster Survey (MICS).

1996-2018, the prevalence of stunting in children dropped from 55 per cent to 31 per cent while the incidence of underweight children declined from 56 per cent to 22 per cent. Bangladesh's progress in lowering the total fertility rate (TFR) has been remarkable: it fell from as high as 4.5 births per woman of reproductive health (age 15-49 years) in 1990 to just 2.04 births in 2018 (Figure 6). An effective state-sponsored family planning programme, supportive social campaign, and interventions by non-government organizations (NGOs), reduced child mortality incidence, women's education, and employment were major driving forces that shaped the impressive health outcomes.

Bangladesh is now internationally acclaimed for advancing women's economic empowerment. Investment in female health and education has been translated into long-term positive outcomes as mentioned earlier and played an enabling role in championing the cause of women's economic empowerment. According to Global Gender Gap Report 2022, which ranks countries based on their performance in reaching gender equality, Bangladesh has stayed ahead of its South Asian counterparts in closing the gender gap since 2014. It is worth noting that Bangladesh closed 71.4 per cent of its overall gender gap so far.



The phenomenal economic progress, built on the foundation of human development, has enabled Bangladesh to achieve two important development transitions. It became a lower-middle-income country in 2015 after being alleviated from the ranks of 'low-income' countries as per the World Bank classification of global economies. Then, in 2021, having met qualification criteria in two consecutive triennial reviews (in 2018 and 2021), the country has been recommended by the United Nations to graduate from the group of least developed countries (LDCs) in 2026. According to its development aspirations, Bangladesh wants to become an upper-middle-income country (UMIC) by 2031 and a high-income country by 2041 (Infographic 2).

Longstanding and Emerging Challenges Hindering Inclusive Growth and Development

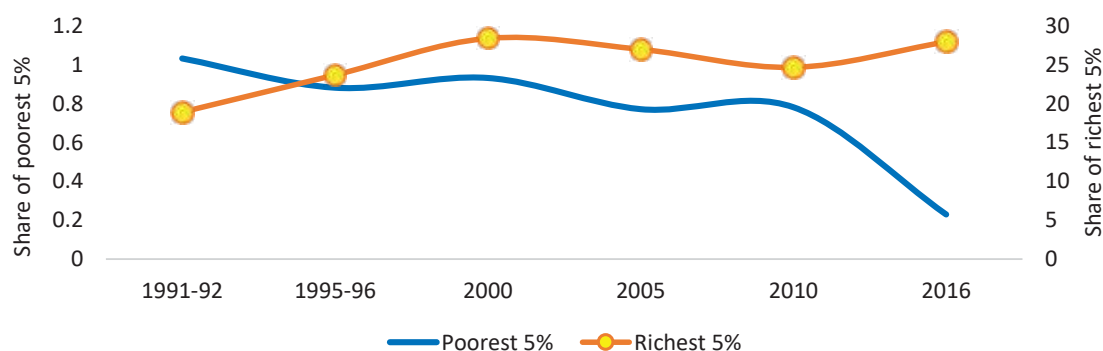
Despite the remarkable socio-economic progress of the past decades, there are challenges that confront Bangladesh's objective of achieving inclusive growth and development. Indeed, rising inequality among different socio-economic groups is a pressing concern. Between 1991-92 and 2016, the income share of the poorest 5 per cent of households got further squeezed from already a paltry 1 per cent to just 0.23 per cent (Figure 7), while the corresponding share held by the richest 5 per cent rose from 19 per cent to 28 per cent during the same period. The Gini index calculated based on household income registered a substantial rise from 0.39 in the early 1990s to 0.48 in 2016.

Although the overall poverty incidence over the past three decades before the onset of Covid-19 declined at a brisk pace, certain areas could not register much progress, indicating regional disparities. The district-level poverty data for 2016, the latest year for which such information is available, portrays a dismal picture for Kurigram with the poverty incidence being as high as 71 per cent, followed by Dinajpur (64.3%), Bandarban (63.2%), Magura (56.7), Kishoreganj (53.5%), Khagrachhari (52.7%) and Jamalpur (52.5%).

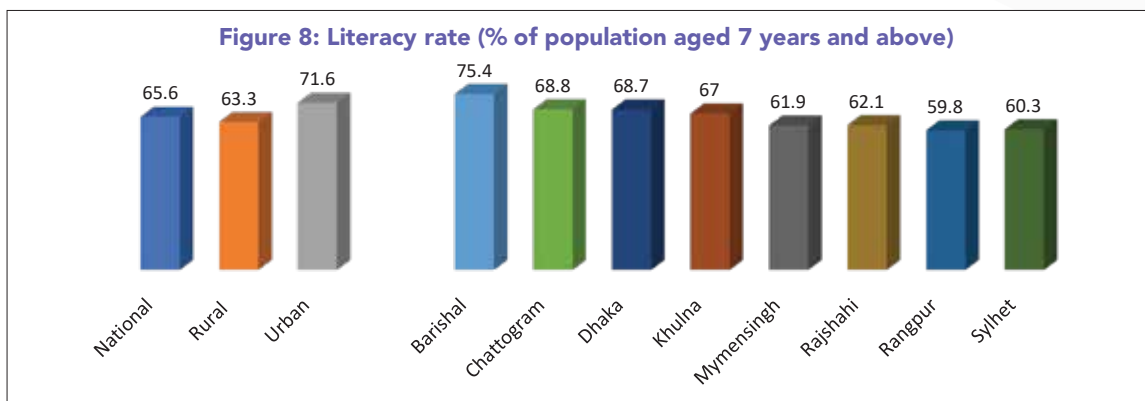
Pandemic-induced shocks and the resultant poverty incidence might have deteriorated the inequality situation. Prior to Covid-19, around 35 million people lived in poverty in 2019. According to one estimate, the pandemic could create at least 16.4 million new poor (Sen et al., 2020). One issue that is not clear yet is whether any new rise in poverty would be permanent or transient. The post-pandemic growth process and the nature of recovery will determine how fast the lost gains in poverty reduction can be reversed along with any implications for inequality.

Inequality is also evident in educational outcomes among different socio-economic groups across geographical locations. The literacy rate among the rural population (63 per cent) is about 7 percentage points lower than that of their urban counterpart, as reported by the Household Income and Expenditure Survey 2016 (HIES 2016) data. The district-level disparity is also observed with Rangpur recording the lowest at 59.78 per cent and Barishal having the highest literacy rate of 75.4 per cent (Figure 8).

Figure 7: Income shares held by poorest 5 per cent and richest 5 per cent households in Bangladesh



Source: Razzaqueet al. (2020) using Household Income Expenditure Survey (HIES) data, various years.



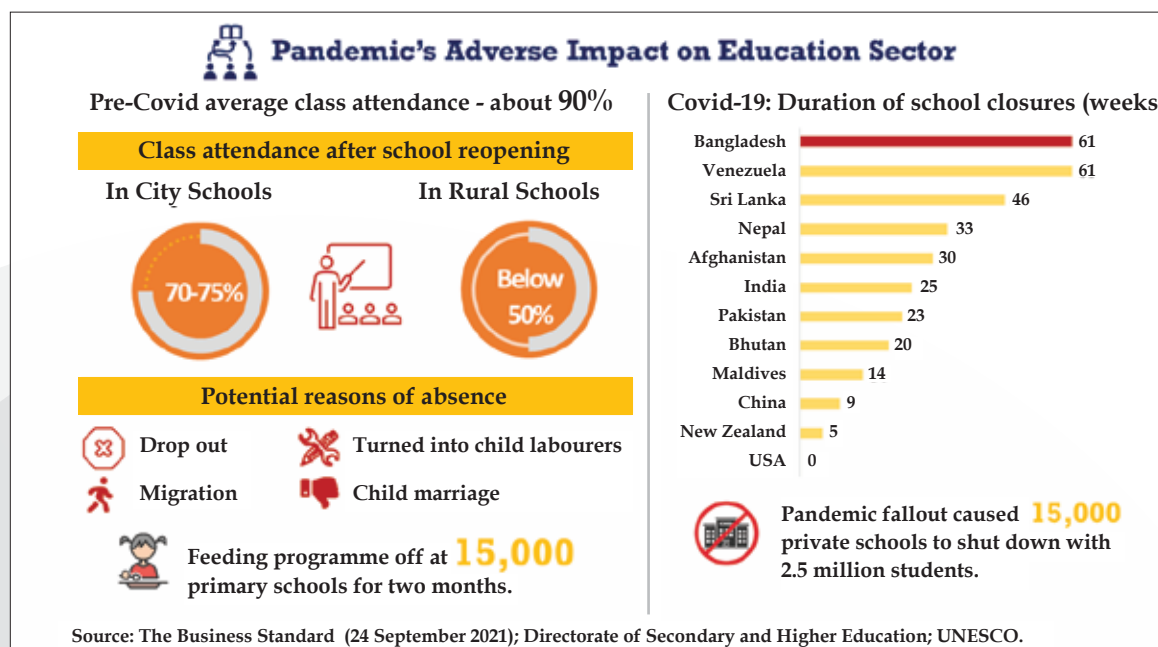
Source: Authors' presentation using HIES 2016 data.

Covid-19 has caused serious damage to education (Infographic 3). To contain virus infections, Bangladesh had to enforce a school closure of 61 weeks (schools reopened only part-time in September 2021). Various media reports point toward a drastic fall in school attendance immediately after school reopening: it has been reported that attendance in rural areas was below 50 per cent whereas the same in urban schools was in the range of 70-75 per cent. There has been an apprehension that the protracted shutdown of schools would trigger excessive dropout rates, migration to other areas, increased incidence of child labour, and child marriage. Therefore, the

impact of the pandemic is likely to exacerbate the inequality in educational outcomes.

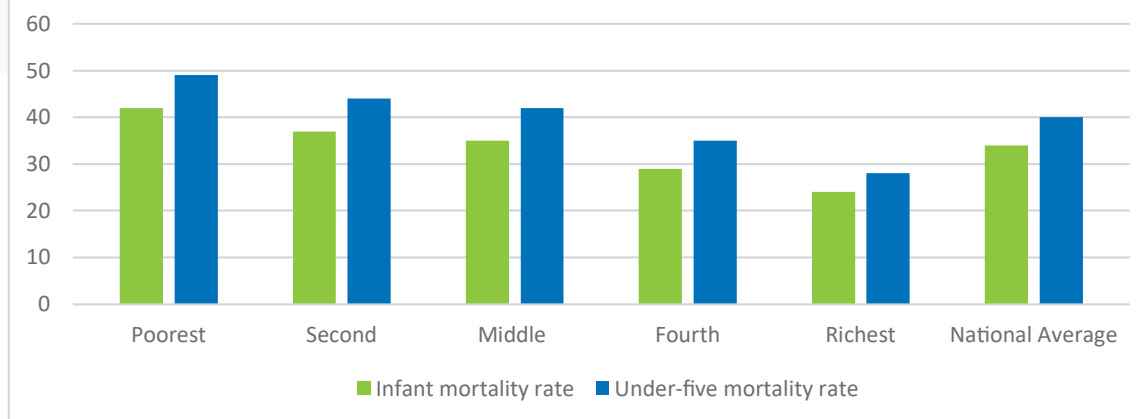
Inequality in different health outcomes and in accessing various health services is also quite prevalent. Data from the Multiple Indicator Cluster Survey (MICS) 2019 reveal that the population from the poorest wealth quintile has substantially higher infant and under-five mortality rates than those associated with the top two quintiles (Figure 9). Therefore, mortality and malnutrition are still dependent on the overall household wealth and income status.

Infographic 1: Impact of Pandemic-induced School Closure



Note: The class attendance statistics shown here are taken from a news report by The Business Standard on 24 September 2021. Attendance data were collected right after school reopening.

Figure 9: Infant and under-five mortality rate by wealth quintile (deaths per 1,000 live births)



Source: Authors' presentation using MICS 2019 data.

Underlying Factors Contributing to Rising Inequality

There are numerous reasons that are driving inequality in Bangladesh. Rather than focusing on many different micro and sector-specific issues, in this paper we highlight a few broad factors. **First and foremost, policy instruments for tackling inequality and ensuring inclusive growth have not been effectively utilized.** With economic growth being achieved, any country would need an effective income taxation system complemented by a strong social protection system. Dealing with inequality would require raising more government revenue through direct taxes (such as income, wealth, and corporate taxes). Dependence on indirect taxes (e.g., value-added and customs duties) can make the existing income distribution worse. Bangladesh has one of the lowest tax-GDP ratios amongst global economies—just about 9 per cent in comparison with more than 15 per cent for lower-middle income developing countries—along with a public revenue generation process, in which almost two-thirds of the revenues are currently sourced from indirect taxes, which can disproportionately affect households in low-income groups. In a country with a population of over 165 million, less than two million individuals submitted tax returns in 2018–19. Between 2012–13 and 2018–19, while per capita income almost doubled, tax revenue per taxpayer declined (Razzaque & Khan, 2021). As of April 2022, the number of Taxpayer Identification Number (TIN) holders stood at 7.5 million while only about 39 per cent of TIN holders submitted their tax returns. Bangladesh has thus so far not been

able to use its taxation system to generate more gains for the poor and disadvantaged groups.

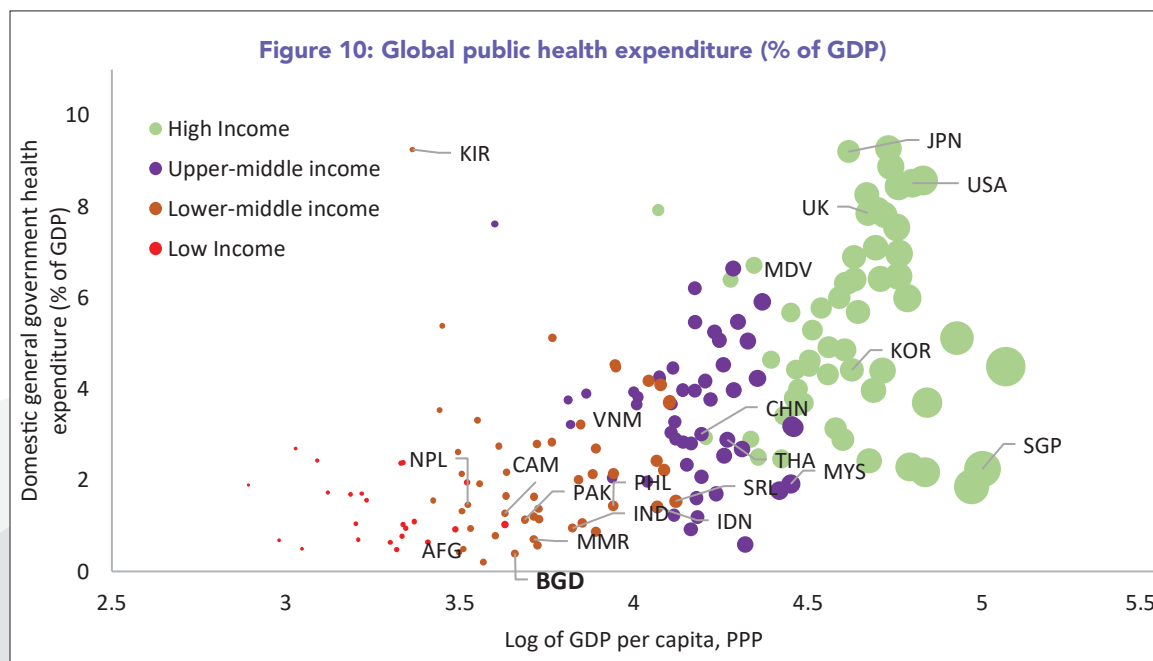
On the other hand, the overall low tax revenue can only provide for a limited fiscal space thus severely constraining government efforts to put in place adequate redistributive policies. This is reflected in the low public expenditure on social protection programmes (about 2 per cent of GDP after excluding pensions for retired government employees). A major consequence of this is that the average benefit of social protection programmes is marginal. For instance, the regular monthly transfers for the elderly population, persons with disabilities, pregnant women and mothers of young children are just in the range 3–6 per cent of Bangladesh's per capita income. For these allowances, inflation adjustments are not undertaken and thus the transfer values keep declining in real terms. Consequently, the impact of redistributive support measures to address poverty and inequality is small.

Lack of access to quality education and health services by poor and vulnerable population is likely another broad factor contributing to rising inequality. It is through educational and health endowments that human resource development takes place which is so important for enhanced income earning opportunities. In Bangladesh, despite the improvements in primary enrolment, the education system has lagged behind in terms of infusing cognitive skills and analytical ability as the students often lack basic skills even after completing tertiary education (General Economics Division,

2020). Opportunities for technical and vocational education and training (TVET) remain very limited and these programmes have been less responsive to the skills demanded by employers. Industry leaders have consistently identified lack of relevant skillsets among potential job entrants as the main challenge constraining job creation. Public spending on education, about 2 per cent of GDP, is much lower than developing country average of 4.6 per cent.

Inadequate public health spending and the quality of public health services also disproportionately affect the poor and disadvantaged groups. Bangladesh has one of the lowest rates of government expenditure (as per cent of GDP) on health among the global economies (Figure 10). This means the out-of-pocket expenses (OOP) in Bangladesh are almost three-quarters of all current health expenditures—much higher than low income and lower-middle country averages of around 52 per cent and 56 per cent, respectively. While OOPs for global economies are declining, they have actually increased in Bangladesh. Such high out-of-pocket payments is a major source of inequality in healthcare access by different groups of population (Razzaque, 2021).

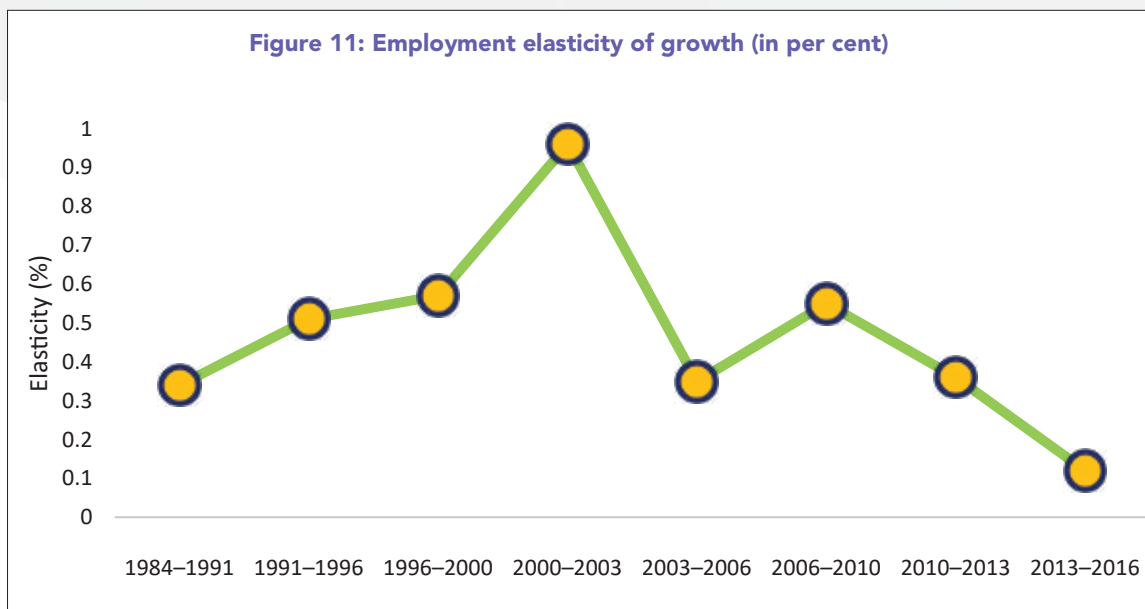
Bangladesh's limited capacity to generate adequate and productive jobs constitutes another underlying factor of the growth not being inclusive enough. The country's impressive economic growth record did not create enough jobs, as shown by the falling employment elasticity of GDP (Figure 11). Roughly 2 million additional people join the workforce each year, along with which there could be several more millions with lowly productive employment. As much as 40 per cent of workers are still employed in agriculture, whose share in the economy is already very small (less than 13 per cent) and is set to decline further. Jobs are highly concentrated in the informal sector as it employs about 85 per cent of the workforce (about 52 million). Overall, huge underemployment and shortage of decent jobs have become characteristics of Bangladesh's labour market. The employment prospects are further weakened by the deepening of capital-intensive production processes and automation. One striking example is the country's readymade garment sector (Razzaque & Dristy, 2018). Between 2010 and 2019, while Bangladesh's clothing exports almost trebled, from \$12.5 billion to \$36 billion, employment in the sector remained virtually stagnant.



Note: Countries are indicated as AFG – Afghanistan, BGD – Bangladesh, CAM – Cambodia, CHN – China, IND – India, IDN – Indonesia, JPN – Japan, KOR – Republic of Korea, MDV – Maldives, MMR – Myanmar, MYS – Malaysia, PAK – Pakistan, PHL – Philippines, SGP – Singapore, THA – Thailand, UK – United Kingdom, USA – United States of America, and VNM – Vietnam.

Source: Razzaque (2021) using data from World Development Indicators (WDI), World Bank.

Figure 11: Employment elasticity of growth (in per cent)



Source: Razzaque et al. (2018) using BBS data.

Women's limited participation in the labour market is another challenge that adds to the growing inequality. Only 36 per cent women participate in the labour market. The proportion of women engaged as unpaid family workers is 29.1 per cent against just 4.2 per cent for men. Gender-based wage discrimination is also prevalent as, according to the latest labour force survey data, the average monthly wage for men was 10 per cent higher than that of women. Lack of decent jobs, workplace safety, and social norms, among others, are some significant reasons leading to the low level of female labour force participation.

Natural disasters and climate change-related challenges have been a major longstanding factor affecting certain population groups, particularly those living in coastal and riverbank areas, and thereby aggravating the inequality situation. The phenomenon of global warming continues to constrain economic and livelihood opportunities for many people in Bangladesh. According to the Global Climate Risk Index (GCRI) 2020, Bangladesh is the 7th most-affected country due to climate change-induced calamities (i.e., storms, floods, heatwaves, etc.) of the past two decades of 1999-2018. As per the latest Groundswell report 2021 of the World Bank, climate-driven changes will cause almost 20 million Bangladeshis to migrate internally by 2050. The country would have about

half of the projected internal climate migrants for the entire South Asia region. As a result of sea-level rise and storm surges, nearly 40 million people from 70 Upazilas in 19 coastal districts of Bangladesh remain vulnerable to displacement (Bangladesh Planning Commission, 2017). It is worth noting the poor, children, women, elderly, persons with disabilities (PWD), and people living in geographically vulnerable areas (e.g., riverine and coastal islands, hillside, and wetland areas) are more exposed to climate-induced risks. Inequality in access to resources, capabilities, and opportunities could further aggravate such risks. Climate change can lock vulnerable population groups into adverse circumstances and severely limit their human development potential in the long run.

Policy Implications

Considering the above broad challenges that undermine the inclusive growth process and prospect for Bangladesh, the related policy recommendations are set out below to address the underlying issues and build forward a better society with shared prosperity. It is worth noting that the recommendations put forward here are largely aligned with the national priority areas identified under the Eighth Five Year Plan (General Economics Division, 2020) and a pertinent summary table has also been provided at the end.

1. Instituting an effective taxation system along with an appropriate redistributive policy mechanism is of paramount importance in attaining inclusive growth and development objectives.

The role of a progressive direct taxation system along with a redistributive public spending mechanism is extremely important for ensuring equity. Reforming the taxation system to provide the appropriate emphasis on direct taxation can help reduce income inequality and promote fairness. The current low level of tax effort in Bangladesh has had a debilitating effect on how government activities are undertaken. Lack of fiscal space has constrained increased spending in such vital sectors as health, education, and social protection, among others. The macroeconomic framework of the Perspective Plan 2041 and Eighth Five Year Plan (July 2020 – June 2025) consider increasing the tax-to-GDP ratio from the current level of about 9 per cent to more than 17 per cent by 2031 and over 22 per cent by 2041. Implementation of the tax reforms proposed in the Plans will play a critical role in attaining the targets and those should be seriously pursued. Reforming the taxation system and tax institutional capacity building therefore constitute a policy priority. This should also help create the fiscal space needed for rolling out redistributive fiscal policies tackling poverty and reducing inequality. It is also worth pointing out that further adoption of technology-intensive production processes is likely to be associated with a rising share of capital income and an increased skills premium, contributing to inequality. Therefore, policies that focus on the poor, women, and other vulnerable groups, including their better access to education, health care, and well-targeted social policies, while making tax systems more progressive, are called for addressing this area.

2. Creating an adequate number of productive jobs and upgrading the skillset of the labour force is a critical condition for addressing inequality in the medium to long term.

Going forward, an increased focus should be given towards creating productive employment opportunities and transforming the labour market to raise the significance of formal sector

jobs. Productive employment will be preconditioned by the quality of human capital, and thus supporting skill development is immensely important. How to transform the social sectors to generate productive employment should be one of the most critical policy areas. Investment in such areas as health and education remains very low, and the quality of these services is widely perceived to be far from satisfactory. The need for careful policy attention to these sectors cannot be overemphasized in relation to generating future jobs and developing the human capital needed to support socially coherent technological progress.

In the wake of the Covid-19 crisis, sectors like education and health were particularly affected. Providing attention to these sectors could help build back better. Given the existing situation, there is room for generating millions of jobs in these sectors while ensuring the quality of public services. Investment in public health and education can be seen as a major way of expanding the endowment of the poor and vulnerable population groups. A productive workforce would also help expand the tax base, creating fiscal capacities for the government in the long term.

3. Strengthening the social protection system constitutes an economic imperative for tackling inequality.

In the backdrop of the Covid-19 pandemic, underscoring the importance of strengthening the social protection system cannot be overemphasized. The existing support mechanism has numerous shortcomings. While many eligible people remain outside the coverage, a large number of ineligible recipients benefit from various schemes. The system is characterized by numerous small programmes not having enough impact. The National Social Security Strategy (NSSS), adopted in 2015, made numerous recommendations for undertaking reforms and strengthening the system. The implementation however has been slow and thus must be reinvigorated. The allocation for the overall programme is too small. Therefore, a strong political commitment is needed to make the interventions meaningful.

4. Addressing gender disparities across-the-board must be given serious consideration.

Gender disparities across various dimensions need addressing on a priority basis. Social constraints faced by women in labour market participation should be a major area for bringing in corrective measures. It has been estimated that improving women's labour force participation to just 45 per cent (from the current level of 36 percent) would increase the country's GDP growth by 1 percentage point (World Bank, 2017).

5. Climate change mitigation and adaptation initiatives should be prioritised considering

the need of the affected and vulnerable population groups.

Preparing for a long-term climate change adjustment mechanism is a reality for Bangladesh. Numerous studies and reports show that the adverse impacts of climate change disproportionately affect the poor and vulnerable, especially children and women. Furthermore, these groups from certain geographical locations are exposed to greater risks. Therefore, need-based and tailored measures should be directed to enhance the resilience of these population groups. How they can be integrated with the economic growth emanating from the sectors with relatively less exposure to climate shocks should be given due consideration.

The following table summarises the relationship between the proposed policy recommendations and the National Priority Areas as identified under the Eighth Five Year Plan (8FYP):

Proposed recommendation	National Priority Areas Under 8FYP (and SDGs)
Instituting an effective taxation system along with an appropriate redistributive policy mechanism	Inclusive economic growth through macroeconomic stability (SDG-8)
	International Cooperation and Partnership (SDG-17)
	Governance (SDG-16)
Creating an adequate number of productive jobs and upgrading the skillset of the labour force is a critical condition for addressing inequality in the medium to long term	Reducing Poverty and Inequality (SDG-1 & 10)
	Employment (SDG-8)
	Gender and Social Inequality (SDG-5 & SDG-9)
Strengthening the social protection system	Reducing Poverty and Inequality (SDG-1 & 10)
Addressing gender disparities across-the-board	Gender and Social Inequality (SDG-5 & SDG-9)
Climate change mitigation and adaptation initiatives	Reducing Poverty and Inequality (SDG-1 & 10)
	Health and Well Being (SDG-3)
	Gender and Social Inequality (SDG-5 & SDG-9)
	Environment, Climate Change and Disaster Management (SDG-13, 14 & 15)

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The Determinants of Sustainable E-Commerce in Bangladesh Challenges and Opportunities

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ABSTRACT

Competence in technology, possession of updated knowledge, and innovativeness have become the essential modules to be considered by the business for achieving competitiveness and sustainability, particularly in technology-enabled undertakings like e-commerce. This study investigates the impact of Data Analytics, Knowledge Management, and Innovation on the competitiveness and sustainability of e-commerce in Bangladesh. Considering the non-probability convenience sampling technique, data has been collected from 278 respondents using a structured questionnaire where each question scored on a 7-point Likert scale. For analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) has been incorporated with the application package SmartPLS version 3.2. Statistically significant results have been found to state that data analytics capability, knowledge management capability, and innovation positively affect both the sustainability and competitiveness of e-Commerce in Bangladesh. Further, a significant positive association between competitiveness and sustainability in e-commerce is evident in the study findings. The study also provides a list of challenges and opportunities along with some critical policy implications which will help the management of e-commerce to fine-tune their strategies in pursuit of achieving competitiveness and sustainability.

KEYWORDS

Big data analytics, Knowledge Management, Innovation, Competitiveness, sustainability, e- Commerce.

I

ntroduction

A new landscape in business has been opened up using the internet, which is called electronic commerce, mostly uttered as e-commerce. It is a paradigm shift from traditional to a new means of doing commercial activities via the internet or other electronic media. The widespread availability and, as a result, extensive usage of internet-equipped technology accelerated the pace of rising e-commerce worldwide. Bangladesh is no exception in this regard, as the country has seen a significant increase in the total value of the e-commerce market in recent years, with an astonishing number of new entries. The number of website-based e-commerce currently existing in Bangladesh is approximately 2,000, while 50,000 more are doing business using social media, particularly Facebook (Khan, 2020). And there appears to be an exponential rise in this number each day. As a matter of fact, this rapid increase in the number of businesses in this sector caused extraordinarily complex interactions among the variables that yield competitiveness and sustainability. With the growing awareness to choose environment-friendly approaches in all walks of business, it has become essential to identify the determinants of sustainable e-commerce. In the course of achieving sustainability in the online business, an adoption of modern technology must always be vivid in mind.

People's buying habits have shifted significantly in this region of the world as their living standards have improved along with their livelihood. According to the e-Commerce Association of Bangladesh (e-CAB) statistics, the e-commerce business market reached a value of Tk 17.0 billion in 2017, up from Tk 4.0 billion in 2016, and by the year 2021, it is predicted

to touch the figure of taka 70 billion. Thus, without doubt, it can be said that the sector is going to be the center of domestic and established international investors' attention. With the rise in popularity of e-commerce, even the most well-known companies are launching online stores to conduct business alongside their traditional brick-and-mortar locations. Because the sector is centered on the internet, data analytics backed by adequate knowledge management and innovativeness are anticipated to bring a significant impact. However, the inspiring ratio of the youth cohort in the total population stimulated to conduct of this study as e-commerce could be a means of economic acceleration utilizing the knowledge and drive of youth. Moreover, The significance of this study lies in its motive of listing all the factors determining the industry and to explore the extent to which those factors are correlated with e-commerce's competitiveness and sustainability in Bangladesh. Furthermore, the complex dynamism among the entities that existed in e-commerce in Bangladesh has been simplified in this study.

In this world of ever-increasing competition, Data Analytics, Knowledge Management, and Innovation have captured the sheer interest of both researchers and practitioners in developing competitiveness and sustainability for any business, particularly for those that are internet-technology-based. While knowledge management looks to be a well-known module of study, the term big data has already established itself as an inescapable component in developing competitive company strategies. Combined with innovation, these two competencies accelerate the pace, leaving the competitors far behind and transforming the company into a true

strategic asset. The days when success is entirely measured by the amount of profit generated by a corporation are long gone. Those success-revealing terminologies like profit, income, money, wealth, and so on have been replaced with sustainability nowadays, which prioritizes social fairness, environmental protection, intergenerational resource conservation, etc. The buzzword "sustainability" has captured interest, with proponents claiming that economic growth, social development, and the protection of the environment are all interconnected and mutually underpinning (Kuhlman & Farrington, 2010). Adequacy in managing knowledge in the organization, backed up by data analytics know-how and capability to be innovative, can help to create a new company model that promotes economic development, ensure social fairness, environmental protection, and overall sustainability.

Knowledge management's contribution to a firm's competitiveness has been thoroughly documented in the literature (Ordóñez & Lytras, 2018). It has been established that both implicit and explicit knowledge is crucial for the optimum performance of businesses. If the company's knowledge base is backed by the newest data processing technology, big-data analytics, it could create synergy. Big data refers to the collection of a large volume of data from every entity with which people come into contact, such as social media, machine, mobile, and GPS data; business data, such as customer, inventory, and transactional data; and datasets collected by government agencies, universities, and non-governmental organizations (Hienz, 2014). Then, by processing and analyzing this vast amount of data, it will be possible to diagnose client behavior patterns and other facts in order to simplify the marketplace trend. Despite the fact that the notion is relatively new, its application appears to be widespread, notably in sales and marketing. It aids the company in remaining competitive, innovating, growing, and capturing value. For many firms, these approaches for processing and analyzing enormous amounts of data are critical for driving value creation, new product development, market insight, and knowledge generation (Hill et al., 2015). With the improvement of data analytics, innovation is unavoidable in a corporation with suitable knowledge management ability. All of these factors contribute to a company's ability to compete. The degree to which a company is competitive and sustainable is determined by its ability to access the

required information, knowledge, and wisdom to support disruptive innovation, smart decision-making, innovative services, and new business models (Ordóñez & Lytras, 2018). As a result, big data analytic competence, knowledge management competence, and innovation capability could all be considered competitive functions that help with long-term sustainability.

The term "competitiveness" refers to a company's unique, valued, and non-identical resources and competencies (Lippman & Rumelt, 1982), and sustainability refers to a set of efforts that are coordinated across three domains: environmental, social, and economic development (Da Costa et al., 2020). These two - competitiveness and sustainability - are now the company's primary objectives, and all of its efforts are focused on achieving them. While most studies claim that competitiveness and sustainability are two consequences of a company's knowledge-based resources, few feel physical resources are more critical for creating a competitive advantage with sustainability. (Sölvell, 2015) stated that- to be profitable in a competitive environment, enterprises' competitiveness has already been established as the primary priority. Designing a new product, installing new production technology, modifying training programs, applying quality control procedures, and developing connections with suppliers are all examples of distinctive abilities that contribute to competitiveness. According to the author (Li, 2000), new technology, new products, new markets, and new management concepts are the source of competitiveness. Internal competence is the cornerstone of a company's capacity to compete successfully, which leads to its long-term viability (Corbett & Wassenhove, 1993). The firm's sources of competitiveness outside its boundaries were extended by (Dyer & Singh, 1998), and inter-firm resources and routines were offered as a source of competitive advantage.

This study aims to investigate the intricate interactions between the elements that influence competitiveness and sustainability in e-commerce in Bangladesh. Specifically, the study examines how data analytics and knowledge management innovations influence the sustainability and competitiveness of e-commerce. The advent of widely available secure payment methods through mobile banking smoothens the path for Bangladesh to accelerate its e-commerce growth. As a result of

this expansion, the sector's competitiveness and long-term viability have become an important concern. To serve the purpose and simplify the issue, this study addresses some questions. Firstly, do data analytics, managing knowledge, and innovation have a significant impact on the competitiveness of e-commerce? Secondly, do data analytics, managing knowledge, and innovation have a notable impact on the sustainability of e-commerce? And finally, does competitiveness help ensuring the sustainability of e-commerce in Bangladesh?

The study will enable the top executives of e-commerce operating in Bangladesh to understand what constitutes competitiveness and sustainability. Thus, the management of e-commerce will be able to formulate the right policy weighting different capabilities according to their worth in achieving competitiveness and sustainability. Moreover, considering the challenges and opportunities provided in this study, the appropriate body responsible for the development of e-commerce in Bangladesh will be able to set its forthcoming course of action. In connection with methodology, this study employs Structure Equation Modeling (SEM), a powerful tool for estimating and running the model, resulting in an addition of dimension to this particular research arena.

The study begins with an introduction which is followed by an extensive literature review and the development of hypotheses to be tested. The next section provided the objectives of the study, research questions, and methodologies. The subsequent portion presents the analysis, findings, and discussion of the result. The final part of the study describes the policy implications, conclusion, and future research scope.

Literature Review and Hypothesis Development

Due to its huge number in the young aged segment of the population and high rate of internet access, Bangladesh has become a promising market for global e-commerce companies. Since a significant portion of the total population are young adults with a high internet access rate, the country is getting potential destinations for a global e-commerce giant. Many Bangladeshi organizations have been attempting to construct infrastructures to assist the development of e-commerce in recent years,

emulating the e-commerce models of nations that have already reached maturity in this specific commercial field (Hasan, 2017). In the current and recent past years, many domestic e-commerce enterprises invested in developing infrastructures following the business models that are at their maturity level in this particular commercial sphere (Islam, 2020). The country is connected to the information superhighway due to exponential expansion in the young population cohort that has high usage of the internet and the execution of the government's intentions for mass digitalization in various divisions. As a result, conducting commercial transactions via e-commerce has grown more convenient. Due to the rapid expansion in internet subscribers, social networking sites such as Facebook have become increasingly popular, playing an indisputable role in the expansion of e-business in Bangladesh (Haque, 2019). However, a large number of competitive firms from within the country, as well as the advent of a worldwide online business behemoth, heightened the competitiveness. All of them are struggling to achieve a competitive advantage using the resources and competencies they have. Firms are consequently considering how to achieve competitiveness and sustainability through mechanism such as data analytics, knowledge creation and its use under the head of knowledge management, and promoting innovation throughout the business.

Data Analytics

Presently, the term data analytics is getting a lot of traction because of its role in setting corporate strategy and delivering useful insight into designing and developing new products and services (Thuethongchai et al., 2020). It's a massively uttered word that's been thrown around a lot lately, and it's defined as vast volumes of high-velocity, complex, and variable data that necessitate cutting-edge technologies and know-how to allow for data capturing, circulation, management, and analysis. However, a growing number of businesses have begun to use big data analytics for an improved understanding of their clients and ensure their greater engagement with the firm (Hooi et al., 2018). Data analytics facilitates managing customer experience, as it assists firms in gaining a prompt and more precise understanding of the customer's journey and taking initiatives to improve it (Wedel & Kannan, 2016). Customer Experience Management (CXM) has been considered as a

higher-order resource focused on strategic directions for designing customer experience and organizational capabilities to continuously improve customer experience, customer satisfaction, and customer loyalty with the goal of achieving and maintaining profitable customer relationships in the long run (Homburg et al., 2017). A better experience is the precondition for achieving customer satisfaction, which is a long-term source of competitive advantage (Holmlund et al., 2020). Firms use data analytics to take a huge volume of data under consideration through analysis and fine-tune their strategies on the basis of market moves seen in the competitive marketplace and transform them into actionable directions (Mikalef et al., 2019). The insights generated from data analytics will not yield any competitive advantage and sustainability if the firm fails to make necessary transformations such as infrastructure in Information Technology (Abbasi et al., 2016). Though data analytics have been considered a game-changing technology in corporate circles and academia, there is confusion on whether or not such technologies may contribute to competitive performance increases under certain circumstances (Mikalef et al., 2019). Though some early research suggests that Big Data Analytics Capability (BDAC) has a positive impact, additional research is needed to fully comprehend the mechanisms by which information based on data is translated into action (Sheng et al., 2017). As a result of the foregoing, two hypotheses have been developed:

H₁: In e-Commerce, BDAC positively affects the firm's competitiveness.

H₂: In e-Commerce, BDAC positively affects the firm's sustainability.

Knowledge Management

What defines a Sustainable Competitive Advantage (SCA)? - is the central question in the current business strategy management study. Similarly, the knowledge-based perspective on SCA's source has recently attracted a lot of attention (Yu et al., 2017). Knowledge management competence has long been seen as a strategic asset that enables firms to gain a competitive advantage by guiding and improving organizational decisions (Frey, 2001). Organizations continuously need to exploit prevailing knowledge, produce new information, and explore concrete visions to attain and maintain competitiveness and

sustainable growth (Nonaka et al., 2014). In addition, the fast advancement and prevalent application of sophisticated technologies like data analytics, machine learning, and cloud computing have resulted in a high-paced accretion of knowledge and knowledge stock; as a result, the ability to create a knowledge base that can accelerate a company's development has come to be central to achieve competitiveness (Parveen et al., 2016). Knowledge as "people embodied know-how" generates human capital that determines a firm's competitiveness (Prahalad C. K., 1983). To attain competitiveness, management of knowledge needs to be integrated with the company's innovation initiatives, latest Information Technology infrastructure, and effort for developing human resources. Prior research has shown that the coordination of a company's physical and conceptual resources is critical for the successful application of strategy, which ultimately yields sustainability and competitiveness (Carneiro, 2000); continuous development of product and employee (Kiessling et al., 2009) to enjoy product leadership, customer engagement, operational superiority and competitive position (Lee & Choi, 2003). As a result, two more hypotheses have been proposed in this debate:

H₃: Capability of Knowledge Management positively affects e-Commerce's competitiveness.

H₄: Capability of Knowledge Management positively affects e-Commerce's sustainability.

Innovation

In the knowledge-based environment, innovation is the only thing that can make a big difference. It is the foundation of all development and dynamism (Dogan, 2016). As it has been stated for many years, innovation is the critical determinant of the dynamics of capitalism's evolution (Schumpeter, 1939). In a world of 09 billion people with a continuously uplifting need for foodstuff, safety, energy, and resource provision, as well as dealing with climate change and global warming, ecosystem degradation, a widening economic divide, and a host of other interdependent issues, massive changes in products, services, and processes will be required (Song et al., 2009). However, innovation in terms of products and services with which organizations do business is no longer enough. To thrive in this day of globalization and to stand out, a firm must

incorporate some level of innovation into every aspect of its operations, from designing the website to illustrating a booklet as a means of promotion. To have competitiveness in possession, innovation capability is the most vital component, and it has been considered a fundamental prerequisite for businesses to remain viable in the global market (Dogan, 2016). To establish and maintain competitiveness, ongoing innovation is required, particularly in e-commerce, which is technology-based and where change occurs every second. In this industry, competitiveness is built on a broader strategic management model that works in tandem with the company's attempt to be innovative, which must be fostered, maintained, and developed through various business strategies. It is often assumed that organizations must mix ecological and social considerations with commercial issues to innovate toward sustainability (Hall & Vredenburg, 2003). Whatever approach is taken, it goes without saying that innovation is essential for long-term sustainability (Seebode et al., 2012). As a result, innovation has been identified as one of the enablers of competitiveness and sustainability. While numerous studies identifying the determinants of innovation within the organization are available in the literature, a few represent the relationship between innovation with competitiveness; and sustainability by applying a comprehensive model (Bogdan, 2016). The circumstance supports drawing two assumptions:

H₅: Capability for Innovation positively affects e-Commerce's competitiveness.

H₆: Capability for Innovation positively affects e-Commerce's sustainability.

Competitiveness

The topic of competitiveness of e-Commerce has already captured considerable attention as an arena of research in academia and industry, as it is a growing phenomenon in countries, particularly those of developing status. Many business research demonstrated that those firms consider achieving competitiveness as a performance indicator, making them better performers (Garelli, 2006). Lowendahl (2005) stated Competitiveness encompasses all the assets and capacities of an organization, the organization's work processes, information resources and knowledge base, and all other factors that a company controls. It enables it to devise and

implement plans to turn a firm effective and efficient. Hence, competitiveness refers to a multifaceted notion required to be viewed as a routine course of developing and maintaining competitive advantage and the leading indicator of a company's performance (Barney, 2001). The method of receiving and fulfilling the order, securing transactions, related Information and Technology infrastructure, application of the web to speed up response to customer's query, and flexibility and availability through operating 24/7 basis are all critical components that contribute to e-business competitiveness (Duffy et al., 2002).

Sustainability

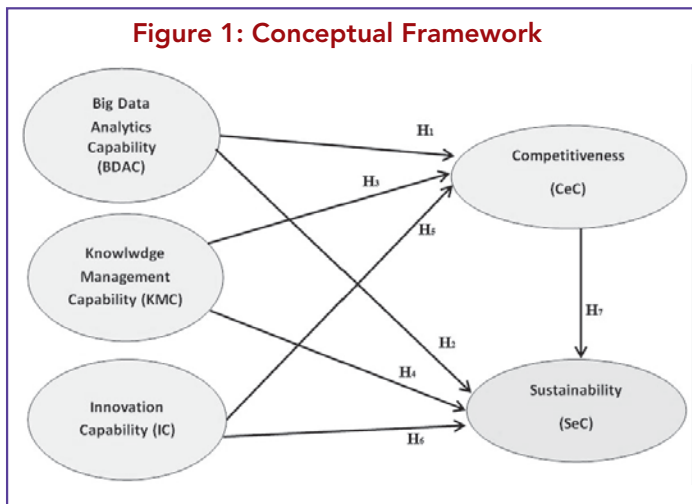
In business, sustainability has been considered as the maker of change and to create a difference from the rival. The major conviction of sustainability is that the resources are limited, so they need to be consumed sparingly. However, conservationism toward the environment is not the be-all and end-all of sustainability, as most definitions suggest; rather, it is concerned with both social equality and economic progress. Yu Chuanpeng believed that an organization with competitiveness is more likely to be sustainable (Yu et al., 2017). On the contrary, there are numerous reasons for the organization at its maximum capacity, including a growing consumer class wanting to share, price conscience, robustness in business structure, and a sense of the eco-friendly economy (Hasan & Birgach, 2016). All of these together is vital for making an organization competitive. Thus, sustainability can be termed as an outcome of competitiveness, which is drained from intelligent formulation and application of plans and policies coupled with massive productive effort. And these are the results of a company's high-quality personnel with an innovative attitude, and smoother information flows across the firm, doctrine of sharing knowledge, a business-friendly philosophy of the state, improved infrastructure, research-driven initiatives, and so on (Kisefáková et al., 2019).

H₇: Competitiveness accelerates the sustainability of e-Commerce.

Conceptual Model

Reviewing available literature related to this study, a conceptual model has been developed. The model depicts the variables' directions and correlations, which are clearly pertinent in the literature.

Figure 1: Conceptual Framework



Methodology of the Study

Selection of Constructs

All latent constructs- Big Data Analytics Capability (BDAC) (Akram et al., 2018; Behl, 2020), Knowledge Management Capability (KMC) (Martins et al., 2019; Carneiro, 2000), and Innovation Capability (IC) (Guan et al., 2006; Sriboolue, 2015) were adopted from past research to develop the research model. As shown in Figure 01, the exogenous constructs are Big Data Analytics Capability (BDAC), Knowledge Management Capability (KMC), and Innovation Capability (IC) to measure the endogenous construct-Competitiveness(CeC). Similarly, those exogenous constructs have been used to calculate another endogenous construct – Sustainability (SeC). Furthermore, the model has been extended to measure the link between competitiveness and sustainability.

Sampling Design and Data Collection

As followed by (Arrindell, 1985), the sample size for this research has been computed as ten times the total number of items in the questionnaire. The number of items in the questionnaire is 23, so a sample size of 230 seems to be adequate. However, to ensure more reliability and validity of data, 70 more samples have been considered. That means the sample size of the research is 300. The sample has been drawn from six districts under the two most advanced divisions of Bangladesh. Under Dhaka division- Dhaka, Narayangonj and Gazipur has been considered where the districts under Chottogram

division were Chottogram, Cumilla and Brahmanbaria.

For collecting primary data, most of the respondents had been approached physically, but due to lockdown for COVID-19, some questionnaires were sent through email and courier. A total of 300 respondents were approached for their response to the questionnaire; among them, 22 did not answer (11% non-response rate). T-test results in all the construct measures represent an insignificant ($p < 0.05$) statistical difference between the first 20% response and the last 20% response of the respondents.

Therefore, the research is free from non-response bias. Thus, the total number of respondents who duly filled the questionnaire and sent back is 278 which include 62 e-commerce managers, 20 researchers of e-business, 35 academics of e-Business, 55 e-commerce owners, and 101 customers of e-commerce and 05 personnel from the governing body of e-business in Bangladesh.

To overcome the common method bias, some measures were taken under consideration, focusing on designing and administering the questionnaire. Firstly, respondents were assured that their personal information and the response in the questionnaire would only be used for academic purposes, maintaining strict confidentiality. Moreover, the questionnaire had been drafted avoiding jargon or any ambiguous term that may be unfamiliar to the respondent. Furthermore, the order of questions in the questionnaire had been set out in such a way so that respondents could not create any correlation between preceding and succeeding questions. Finally, probable collinearity among the constructs has been checked, and Variance Inflation Factors (VIF) were calculated where the highest value was found, 3.224, which is below the threshold limit of 3.3. Thus this study is free from common method bias.

Measurement of Constructs

The survey was conducted using a non-probability convenience sample method using a structured questionnaire. The data collection instrument used in this research is divided into two parts. The first one contains questions to develop a demographic profile of the respondents, and the second part

comprises 23 questions (items) to measure the constructs. The instrument used for the survey was adopted from prior studies. Questions to know demographic information about the respondents were related to age, occupation, year of experience, education, location etc. All the 23 closed-ended questions covering five constructs, a seven-point Likert scale has been used to quantify the informant's opinion. To ensure reliability, validity, discriminating power, and respondent preference, a seven-point scale is preferred over a five-point scale (Preston & Colman, 2000).

However, before administering the survey, a pre-testing of the questionnaire was carried out with 10 respondents as it is recommended (Burns & Bush, 2003). Opinions from 02 researchers and 02 industry personnel have been taken regarding the filled

questionnaires sent for pre-testing. Their suggestions have been incorporated before finalizing the survey questionnaire.

To measure Big Data Analytics Capability, 04 questions were adopted from Gupta (2016). The next four questions in the questionnaire were adopted from Chuang (2004) for measuring Knowledge Management Capability. Another 04 questions were used to measure Innovation Capability(IC) taken from a study by Fruhling (2007). Competitiveness in e-Commerce (CeC) as a construct has been measured with 05 questions, all of which were adopted from Ciarniene (2015). Finally, the last 06 questions were taken from Chen (2015) to measure the construct Sustainability in e-Commerce (SeC).

Table 1: Demographic Profile of the Respondents

Items	Categories	Frequency	(%)
Age	15-24 Years	35	12.59
	25-34 Years	150	53.96
	35-44 Years	85	30.58
	45 Years or above	8	2.88
Gender	Male	177	63.67
	Female	101	36.33
Level of Education	SSC	17	6.12
	HSC	43	15.47
	Graduation	116	41.73
	Master	87	31.29
	Others	15	5.40
Occupation	Private Service	112	40.29
	Govt. Service	42	15.11
	Business	102	36.70
	Others	22	7.91
Year of Experience	Below 5 years	95	34.17
	5-10 years	121	43.53
	10-15 years	46	16.55
	Above 15 years	15	5.40
Location	Dhaka	165	59.35
	Chottogram	113	40.65

Analysis and Findings

To analyze the data collected through the survey instrument, SmartPLSv 3.2 has been used. PLS-SEM is the most appropriate method for the analysis of this study as it enables researchers to test relationships among various constructs simultaneously (Habidin et al., 2018). Moreover, PLS-SEM is suitable to measure the mediating effect

and able to test a theory with the goodness of fit. When the model seems complicated with numerous constructs and items, and includes a formative concept that violates the data set's normalcy assumption, PLS-SEM is a better choice (Hair et al., 2011). The following sections present the model's reliability, convergent and divergent validity as all the results obtained from the analysis are satisfactory.

Table 2: Construct Indicators and Measurement Model of Latent Variables

	Code	Mean	SD	FL
Big Data Analytics Capability α : 0.824; AVE: 0.892 ;CR: 0.914	BADC			
BDAC is critical for successful e-commerce.	BDAC1	4.41	1.318	.904
BDAC specifically enhance the competitiveness	BDAC2	4.37	1.264	.926
BDAC enables to conduct business in a sustainable way.	BDAC3	4.44	1.415	.869
BDAC strengthens the sustainability of e-commerce	BDAC4	4.85	1.183	.790
Knowledge Management Capability α :0.866 AVE: 0.924 ;CR: 0.931	KMC			
KMC is the key to take the right decision.	KMC1	5.09	1.205	.828
KMC qualifies businesses to develop a competitive edge	KMC2	5.43	1.263	.758
Having KMC a firm is more likely to be sustainable in e-business conduction.	KMC3	5.13	1.413	.736
KMC enhances sustainable e-commerce	KMC4	4.80	1.530	.586
Innovation Capability α : 0.784 AVE: 0.933 ;CR: 0.943	IC			
IC is the most influential entity to make a difference in business	IC1	4.87	1.372	.654
IC is central to be competitive in e-business	IC2	4.90	1.386	.684
Eco-innovation stimulates towards sustainability.	IC3	4.61	1.496	.558
IC significantly determines the degree of sustainability in e-business.	IC4	4.79	1.392	.604
Competitiveness of e-Commerce α : 0.823 AVE: 0.934;CR: 0.954	CeC			
BDAC simplifies extensive volume of high-velocity data in e-business.	CeC1	4.24	1.655	.641
BDAC facilitates e-commerce to become competitive	CeC2	4.66	1.470	.657
KMC eases firms getting the right indication regarding rivals	CeC3	3.98	1.714	.574
KMC helps e-commerce to fine-tune strategies.	CeC4	3.88	1.436	.643
Continuous marketable innovation keeps e-commerce competitive	CeC5	4.29	1.527	.511
Sustainability of e-Commerce α : 0.810 AVE: 0.936 ;CR: 0.952	SeC			
KMC enables to respond to any social, environmental, and financial issue.	SeC2	4.32	1.412	.755
KMC helps to develop strategies to be sustainable	SeC3	4.08	1.307	.815
IC is viewed as a catalyst for achieving sustainability	SeC4	4.35	1.385	.765
Competitiveness enables to achieve the financial, social, and economic goal	SeC5	4.92	1.572	.570

SD: Standard Deviation; FL: Factor Loadings;

All the items were measured on a 7 point Likert scale, 1(Strongly Disagree) to 7(Strongly Agree)

Reliability and Validity

To check the reliability of the constructs, Average Variance Extracted (AVE), Cronbach Alpha(α), and Composite Reliability (CR) have been calculated, as shown in table 02. Moreover, Factor loadings have also been measured for each item under all the five constructs. Most of the factor loadings were found above 0.50, while only 02 items calculated loadings less than 0.50. To get the finest model, the items (SeC1 & SeC6) having factor loading less than 0.50 have been removed and Structural Equation Modeling (SEM) has been carried out again to obtain the final results as shown in table 02. Convergent validity of the model is assured since all the measures of Cronbach Alpha, AVE & CR are more than threshold limits ($\alpha > 0.7$, AVE > 0.5 & CR

> 0.7) (Tavakol & Dennick, 2011; Fornell & Larcker, 1981). Moreover, Cronbach Alpha and Convergent validity (CR) can be used to measure the consistency of data (Latan & Nooman, 2017), which means items loaded under each construct are reliable.

The validity of the model has been measured by the heterotrait-monotrait (HTMT) ratio of correlations criterion (Hair et al., 2017). In this study, all the values of HTMT were found to be less than the threshold limit of 0.90, which indicates discriminant validity. In addition, the square root of respective AVE values of the correlation matrix shown in table 03 reveals all the diagonal values are higher than the values shown below in the same column. Thus, discriminant validity is supported.

Table 3: Discriminant Validity

	BDAC	KMC	IC	CeC	SeC	AVE
BDAC	0.944	0.849	0.753	0.867	0.811	0.892
KMC	0.735	0.961	0.822	0.859	0.794	0.924
IC	0.761	0.839	0.965	0.835	0.857	0.933
CeC	0.722	0.818	0.898	0.966	0.827	0.934
SeC	0.791	0.893	0.763	0.734	0.967	0.936

Goodness of fit

Performance of the model and the goodness of fit have been measured through R² (Coefficient of Determination), Standardized Root Mean Squared Residual (SRMR), and Normed Fit Index (NFI). A value of R² ranging from 0.25- to 0.50 is considered good, while a value above 0.20 is acceptable (Latan et al., 2018). Table 04 shows R² =0.692 means 69% of

the variation in the Competitiveness of e-Commerce(CeC) can be explained by Big Data Analytic Capability (BDAC), Knowledge Management Capability (KMC), and Innovation Capability (IC). In the same way, BDAC, KMC, IC, and CeC together account for 63.50% of the total variation in sustainability in e-Commerce(SeC) as R² =0.635 in Table 04.

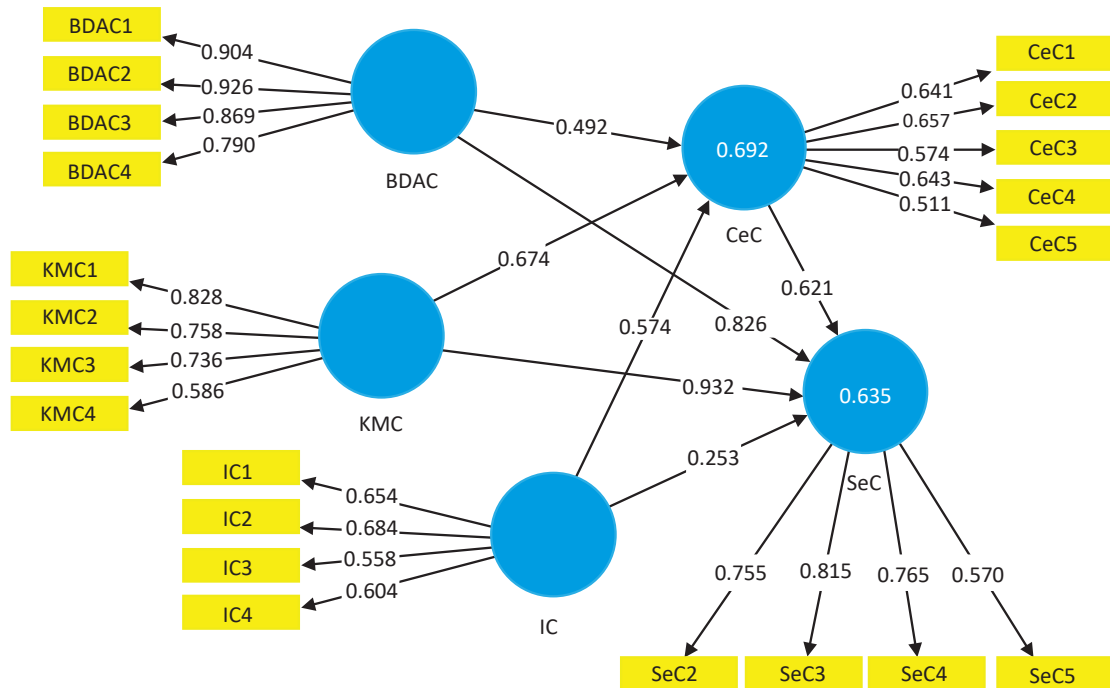
Table 4: Results of Structured Model

Constructs	R ²	SRMR	NFI
BDAC			
KMC			
IC			
CeC	0.692	0.051	0.879
SeC	0.635	0.051	0.879

SRMR needs to be less than 0.01 (Henseler et al., 2014), while the value of NFI close to 01 is treated as a good model fit. Since the SRMR calculated 0.051

(Table 04), which is less than the threshold limit of 0.08, and the value of NFI is 0.879 (close to 01) this model is fit (Latan et al. 2018).

Figure 2: Standardized Factor Loadings, R² (inside the circle) & Beta Coefficient



Test of Hypothesis

For hypothesis H₂, H₃, H₄, H₅, H₇ shown in Table 05, p values are less than 0.05, which indicates significance. Thus all of the mentioned hypotheses have been accepted, and respective null hypotheses rejected. However, for hypotheses H₁ and H₆, calculated p values are slightly more than 0.01 while respective coefficient beta (β) is 0.492 and 0.253 can be titled accepted as it is evident in previous studies (Journeault et al., 2016). Thus, the competitiveness of e-commerce is significantly influenced by data

analytics capability (Behl, 2020), knowledge management capability (Carneiro, 2000), and innovation capability (Guan et al., 2006), which are in the same directions that appeared in the prior studies. Further, the relationships between the Sustainability of e-commerce with Data analytics capability (Akram et al., 2018), knowledge management capability (Martins et al., 2019), and innovation capability (Sriboolue, 2015) are also significantly positive and in line with some recent studies. Finally, according to the result of the hypothesis testing, the competitiveness of

Table 5: Hypothesis Testing Results

Hypothesis	Relationships	Coeff. Beta(β)	t. Statistics.	p values	Comments
H ₁	CeC < --- BDAC	0.492	12.452	0.016*	Supported
H ₂	CeC < --- KMC	0.674	10.331	0.000 **	Supported
H ₃	CeC < --- IC	0.574	15.572	0.000 **	Supported
H ₄	SeC < --- BDAC	0.826	11.403	0.000 **	Supported
H ₅	SeC < --- KMC	0.932	11.821	0.000 **	Supported
H ₆	SeC < --- IC	0.253	3.384	0.026*	Supported
H ₇	SeC < --- CeC	0.621	13.462	0.000 **	Supported

p:significance: * $p < 0.05$; ** $p < 0.01$

e-commerce substantially enhances its Sustainability. This is also evident in previous studies (Wagner & Schaltegger, 2003).

Discussion

The present study investigated the effect of data analytics, knowledge management, and innovation on competitiveness and Sustainability in e-commerce in Bangladesh. The study also explored how competitiveness influences e-commerce to become sustainable. As per the findings of the study, data analytics capability, knowledge management capability, and innovation capability positively and significantly affect the competitiveness and Sustainability of e-commerce in Bangladesh. While previous studies in the literature considered a single factor with Sustainability and competitiveness, this study brought about a clearer picture covering multiple actors affecting e-commerce's Sustainability and competitiveness. Therefore, the comprehensive model developed in this study could be a source of vital guidelines for all the concerns of e-commerce to fine-tune strategies and prioritize their actions in order to achieve Sustainability and remain competitive in this fastest-growing segment of the 21st century business.

Challenges

Since e-commerce is a relatively new and growing industry in Bangladesh, many hurdles prevent from getting the most out of it. Firstly, the absence of international payment gateway like PayPal, WorldPay, Amazon Pay, etc., is lingering the entry of globally reputed e-commerce giants to launch their operations here in Bangladesh. Availability of a secured payment system is one of the major issues that global standard companies consider as a precondition before starting their operation in any country. Consequently, the industry still remains local and isolated from the world market. Thus, the local e-commerces do not feel the pressure of being upgraded to the international standard to compete with a giant like eBay or Amazon. Secondly, there is an absence of legal guidelines for the conduction of e-business in Bangladesh. There is only a mere description of e-commerce in some laws aiming at the protection of Consumer Rights, but it appears very insufficient to make the customer realize that they will get proper treatment if any fraud happens while shopping online. This is why e-commerce is still not regarded as an alternative to brick and

mortar setting of business here. Thus, in Bangladesh, mass people are still away from using e-commerce as a mainstream way of shopping. Thirdly, though, Bangladesh has been experiencing notable development for the last 10 years in its infrastructure like information technology, transportation, road, rail facilities, etc. but it is still found unequally distributed over the country. This is why e-commerce's geographical scope in Bangladesh remains limited only to the major cities like Dhaka, Chottogram, etc. Moreover, traffic jams in overpopulated cities are among the major challenges for e-commerce in the course of prompt delivery of products to customers.

Opportunities

Bangladesh is a country of ample opportunities with endless possibilities. The pace at which information technology is growing here every day, is so impressive. According to BTRC the total number of internet subscribers has reached 115.43 million at the end of April 2021. More access to internet facility more likely to be the customer's access to e-commerce. In recent times, many financial institutions, particularly banks, launched their mobile banking services, which have made online transactions easier. Since Bangladesh is a small country in terms of geographical area, it is easily possible to cover every corner with an e-commerce facility. The introduction of an international payment gateway enactment of an appropriate law could make Bangladesh an emerging e-commerce hub. Once when global e-commerce enters this market, the local firms will feel pressure to upgrade themselves. This pressure will stimulate the local e-business to think of quality in every aspect of business for the sake of existence. To survive and compete with world-class ventures, local e-commerce will do whatever it takes to turn their status world standard. Therefore, there is a possibility to have some world-class e-commerces originating from Bangladesh.

Moreover, in the niche level, using social media, particularly Facebook, hundreds of thousands are doing business online in Bangladesh. Naturally, young people are more curious about knowing and using new technology to get their work done. This leads them to have better technology know-how compared to other population cohorts. Since Bangladesh is enjoying a demographic dividend, having 67.61% of the total population are of 15-64

years old (Statista, 2019), e-commerce could be a huge sector to absorb unemployed productive people and contribute to an economic boom. It is very easy and could be a great option for the unemployed to start their own venture with a tiny amount of capital.

Policy Implications

The present study has two policy implications. Firstly, the study will help the top executives of e-commerce operating in Bangladesh to understand what constitutes competitiveness and Sustainability. Thus, the management of e-commerce will be able to formulate the right policy weighting different capabilities according to their worth in achieving competitiveness and Sustainability. Secondly, considering the challenges and opportunities provided in this study the appropriate body responsible for the development of e-commerce in Bangladesh will be able to set their forthcoming course of action.

Conclusion and Future Research

As a relatively newer type of business, E-commerce has a visible impact on people's lives as a result of globalization and the rapid growth of IT infrastructure. Bangladesh has seen notable growth in the e-commerce sector in line with the gradual improvement in the country's economic situation over the last decade. The comprehensive model developed in this research will provide direction in the form of meaningful insights simplifying the interactions between the key variables impacting e-commerce in Bangladesh. As a result, Bangladesh may get the most out of it by assuring proper navigation to its full potential. In addition, the policy recommendations of this research will assist the firms in fine-tuning their plans and strategies in order to attain overall competitiveness and Sustainability. Furthermore, the findings of this research will enable those involved in identifying and comprehending the players that shape the overall structure of e-commerce in Bangladesh.

Due to remarkable advances in science and technology in this part of the world, competition among small, medium, and major e-Commerce has become unavoidable, which positively affects economic expansion. Its contribution to the national economy appears to be impressive, as it promotes job creation, the inclusion of new products and

services, quality improvement as local enterprises compete with global e-commerce giants, and the acceleration of economic transactions, etc. A variety of elements appear to be so vigorous and create dynamism in the associations among the crucial role players as the sector grows at an unprecedented rate. More research on this topic will assist policymakers to have a better understanding of this rapidly growing business and develop a simplified model that addresses all of the important actors with their role intensity.

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Appendix

Demographic Information

Age: _____ years Gender: ☐ Male ☐ Female Occupation: _____ Experience: _____

Level of Education: ☐ SSC/Equivalent ☐ HSC/ Equivalent ☐ Graduate Masters ☐ Others _____

Location: _____.

INSTRUCTION

Please read the question carefully first, then indicate your degree of agreement/disagreement with each of the following statements by putting a tick (✓) mark on the right side. Note that- **Strongly Disagree (SD) =01, Partially Disagree (PD)=02, Disagree (DG) =03, Neutral (NE) =04, Partially Agree(PA)=05, Agree (AG) =06 and Strongly Agree (SA) =07**

SL	Code	Statements of Agreement and Disagreement	SD 01	DG02	SD03	NE 04	SA 05	AG 06	SA 07
Statement relating to Big Data Analytics Capability (BDAC)									
01	BDAC1	The capability of data analytics is critical for successful e-commerce.							
02	BDAC2	Big data analytics capability specifically enhances the competitiveness of e-commerce.							
03	BDAC3	Data analytics capability enables to conduct business in a sustainable way.							
04	BDAC4	Big data analytics capability strengthens the Sustainability of e-commerce.							
Statements relating to Knowledge Management Capability (KMC)									
05	KMC1	Knowledge management capability is the key right decision.							
06	KMC2	Efficient knowledge management qualifies businesses to develop a competitive edge in e-commerce.							
07	KMC3	More robust knowledge management capability is more likely to be sustainable in e-business conduction.							
08	KMC4	Knowledge management capability enhances sustainable e-commerce.							
Statements relating to Innovation Capability (IC)									
09	IC1	Innovation is the most influential entity to make a difference in business.							
10	IC2	Capability for innovation is central to being competitive in e-business.							
11	IC3	The firm's eco-innovation approach stimulates its motive toward Sustainability.							
12	IC4	Innovation capability significantly determines the degree of Sustainability in e-business.							

Statements relating to Competitiveness of e-Commerce (CeC)									
13	CeC1	The capability of data analytics simplifies the extensive volume of high-velocity data in e-business.							
14	CeC2	Data analytics capability facilitates e-commerce to become competitive.							
15	CeC3	Knowledge management eases firms from getting the right indication regarding rivals.							
16	CeC4	Efficient knowledge management helps e-commerce to fine-tune strategies and survive in competition profitably.							
17	CeC5	Continuous marketable innovation keeps e-commerce competitive.							
Statements relating to Sustainability of e-Commerce (SeC)									
18	SeC1	Advanced data analytics capability fosters the financial viability of a firm.							
19	SeC2	Firms having adequate knowledge management capability respond rightly to any social, environmental, and financial issues.							
20	SeC3	Knowledge management helps to develop strategies to be sustainable.							
21	SeC4	Innovative e-commerce is viewed as a catalyst for achieving Sustainability.							
22	SeC5	Competitiveness enables e-commerce to achieve financial, social, and economic objectives.							
23	SeC6	Competitive e- commences are more likely to be sustainable.							

SNAPS OF KEYWORDS

E-commerce refers to buying and selling of goods and services, transfer of funds, exchange of data etc., virtually using the internet or any other network. **Data analytics** is a field of study primarily focusing on the extraction of insights from an extensive volume of high-velocity data. **Knowledge management** is a multidisciplinary approach aimed at achieving organizational objectives by collecting, creating, disseminating, using, and managing knowledge and information. **Innovation** is the generation novel of ideas and its application to smoother the way of doing things. **Competitiveness** is the ability to design, develop and market such products and services valued by the customers and capable of competing with the rival. **Sustainability** is a state of conducting business and making a profit while doing no harm to the environment and society.



Opportunities and Challenges Towards Trillion Dollar Economy of Bangladesh

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ABSTRACT

Bangladesh has made exceptional economic advancements on its triumph of 50 years of independence by growing approximately 37 times between 1971 to 2020. According to the IMF, the economy of Bangladesh is currently valued at USD1,061.571 billion. Bangladesh has achieved its growth in agriculture, education, industrialization, healthcare, exports, remittance, and shipping sectors, resulting in the country's economy having recently passed 411 billion dollars. The key factors for this economic success are prudent economic governance, increasing tax revenue, technological advancement, and rapid infrastructural developments. In the FY 2020-2021, it can be noted that 3 major contributing sectors representing 100% of total GDP are agriculture (12.09%), industry (34.61%), and service (53.30%). Though we have become one of the fastest-growing countries, there are some challenges to this sustainable economic progress such as increasing debt burden, the rise of the inflation rate, wealth and income inequality, and unemployment. Putting aside these challenges, there are some good opportunities for stimulating sustainable economic development for Bangladesh such as fostering agriculture, controlling the informal remittance inflows, and shrinking imports through domestic entrepreneurship. Bangladesh may face various challenges, but it also possesses several success factors and potential opportunities which can lead its economy to 1.522 trillion dollars by FY 2026 based on PPP, according to the IMF's projection. Furthermore, Bangladesh may become a developed country by 2041 and put an end to hunger and poverty by 2030.

Introduction

Succeeding 50 years of its independence, Bangladesh has made remarkable economic advancements, the economy of the country has grown approximately 37 times between 1971 to 2020 in terms of real GDP. The country achieved approximately 5 percent annual average per capita GDP growth rate between the Financial Year (FY) 2009-10 to 2020-21. The country has achieved a subtle decline in poverty and accomplished growth in agriculture, education, industrialization, healthcare, exports, remittance, and shipping sectors. Bangladesh has also qualified the criteria to successfully graduate from the Least Developed Country in February 2021 (International Monetary Fund, 2022).

As we can see in Figure-1, between FY 2009-10 to 2019-2020, the average GDP of Bangladesh grew higher than 4 mentionable developing countries India, Pakistan, Nepal, and Vietnam. According to the IMF, The economy of Bangladesh is currently valued at USD 1,061.571 billion which is estimated through Purchase Power Parity (PPP) method. Exactly four years later, in 2026, the IMF expects Bangladesh's economy to reach 1.5 trillion US dollars. IMF also predicts that the Real GDP of Bangladesh will grow by 6.6 percent in 2022, while the UN estimates a 5.8 percent growth for the same year. At current prices, the country's economy has recently surpassed 411 billion dollars. The government plans to exceed 500 billion dollars in GDP next fiscal year (International Monetary Fund, 2022).

Figure 1: Comparative GDP growth rate FY 2009-10 to 2019-20



Source: The World Bank

Key Economic Success Factors and Indicators

Mentionable success factors for the rapid progress of Bangladesh's economy can be subdivided into multiple segments.

Prudent Economic Governance

Bangladesh has achieved remarkable economic growth through sensible economic decision-making and well-organized implementation of the adopted economic policies. For example, the continuous implementation of the stimulus packages during the Covid-19 pandemic ensured unceasing economic activities which helped the country to achieve a 5.5 percent GDP growth rate during the FY 2020-21. Well-judged fiscal and monetary policies helped the country to keep the annual average inflation rate at 6 percent during the last 10 years, between the FY 2009-10 to 2020-21. Moreover, digitalization in recording, analyzing, processing, and implementing various economic activities have initiated massive improvements in public administration.

Increasing Tax Revenues

Collection of tax revenues is considered a highly challenging public operation in Bangladesh as the tax law of the country is abundant with tax exemptions, allowances, rebates, and ambiguity. The tax revenue accounts for around 85% of the total revenue of the government. The government of

Bangladesh has been able to increase the tax revenue from approximately USD 14 billion (BDT 80,000 crore) in 2009-10 to about USD 42 billion (BDT 351,523 crore) in 2020-21. The average annual growth rate of tax collection in the last 10 years has been about 11.60 percent, and in the FY 2020-21, Bangladesh collected tax revenue of 8.5 percent of the country's GDP (The Finance Division, n.d.).

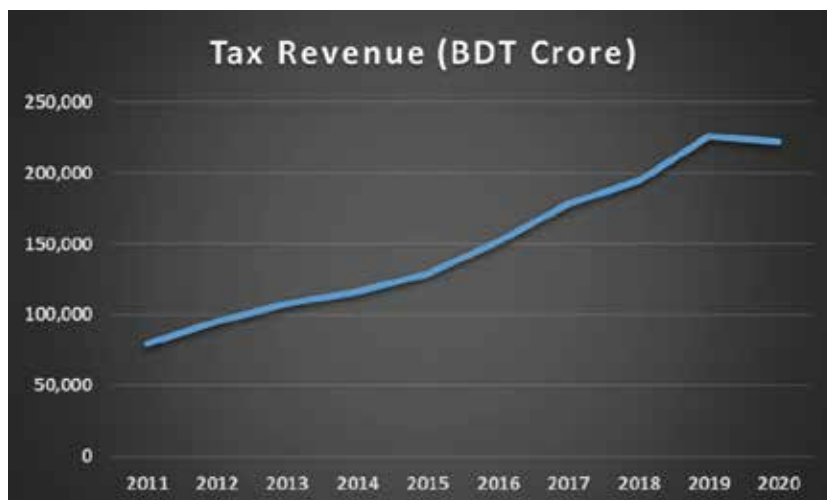
Technological Advancement

Technological improvements in Bangladesh are unambiguously visible in the lifestyle of a significant proportion of the population of the country. According to BTRC, internet users in Bangladesh are more than 110 million where 90 percent of the users are mobile internet users. As of April 2021, the country has more than 170 million mobile subscribers. As a result, Mobile Financial Services (MFS) sector has experienced a boost with an increasing number of users. According to Bangladesh Bank, there are more than 100 million registered MFS users transacting an average amount of BDT 2,000 crores daily.

Rapid Infrastructural Developments

Infrastructures are key resources to achieve long and short-term economic targets for a country. Commercially viable mega-projects and infrastructures reflect the economic progress of a country. Bangladesh has taken over several mega-projects which represent a significant proportion of the country's government expenditures. Projects such as Padma Multipurpose Bridge, Dhaka Elevated Expressway, Dhaka Metro Rail, Rampal Power Plant, Roop-pur Nuclear Power Plant, etc. are a few of the indicators that Bangladesh is experiencing wide infrastructural expansion.

Figure 2: Collection of Tax Revenue in BDT Crores.

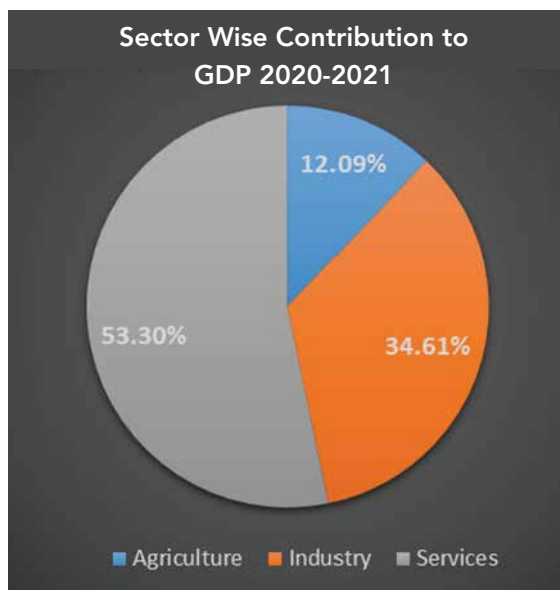


Source: Finance Division, Ministry of Finance

Significant Contributory Sectors in Bangladesh Economy

As the GDP is an accumulation of contributions from multiple sectors, it is essential to individually scrutinize several notable contributory sectors which have been playing crucial roles in the concurrent economic progress of the country.

Figure 3: Sector-wise Contribution to GDP



Source: Bangladesh Bureau of Statistics

In the FY 2020-2021, it can be noted that 3 major contributing sectors, Agriculture, Industry, and Services are capturing 100% of the total GDP of Bangladesh.

Agricultural Sector

The agricultural sector has always been one of the driving forces of the Bangladesh economy since independence. In 1971, the contribution of the agricultural sector to the country's GDP was more than 50% which gradually declined over the years, and as of 2021, the contribution of the sector to the GDP is approximately 13%. Even though the proportion has been decreasing, the agricultural productivity and the nominal value of the sector contribution have been increasing continuously. Between FY 2010-11 to FY 2020-21, the contribution of the agricultural sector to the national GDP grew at an average annual rate of approximately 8 percent. Bangladesh has been successful to achieve effective

agricultural progress through well-framed policies and encouraging enterprise entrepreneurship in the sector. Food grain production, rice varietal innovations, livestock, fisheries, and poultry have been the mainframe contributors to the agricultural improvements of the country. According to the World Bank Report, Bangladesh has made admirable progress in the agricultural sector by achieving food security despite having persistent natural calamities and burgeoning population growth. The food grain production index almost tripled from 1972 to 2019, from 29 to 109 (The World Bank, n.d.).

Industry Sector

The industrial sector of Bangladesh generally includes large, medium, and small-scale industries, construction, utilities, mining, etc. This sector has been another mentionable contributor to the country's GDP, as, from FY 2009-2010 to 2020-21, the average contribution of the industrial sector to the GDP of Bangladesh has been approximately 27 percent, and the contribution of this sector grew at an average rate of 12 percent during the similar period. The average growth rate of this sector has been the highest among all other sectors of the GDP (Bangladesh Bureau of Statistics, n.d.).

Mining and Quarrying

In the last 10 years, from FY 2010-11 to FY 2020-21 the annual average contribution of the Mining and quarrying segment to the GDP had been about 1.7 percent, and this segment controls approximately 5 percent of the total contribution of the industrial sector to the GDP of Bangladesh. This area includes natural gas, petroleum, coal, and other mining resources.

Manufacturing

This segment is the prime contributor to the industry sector of Bangladesh. Between FY 2010-11 to FY 2020-21, the average contribution from this area to the national GDP had been approximately 22 percent, and manufacturing controls around 63 percent of the total contribution of the industry sector to the GDP of the country. This Manufacturing accounts for contribution from large industry (approximately 10 percent of the total GDP), small-medium & micro-industry (approximately 8 percent of the total GDP), and

cottage industry (approximately 4.5 percent of the total GDP).

Others

Other contributors to the industry sectors are electricity, gas, steam & air condition (approximately 1.3 percent of the total GDP), water supply, sewerage, and waste management (approximately 0.1 percent of the total GDP), and the construction sector (approximately 9.5 percent of the total GDP). The construction sector is one of the fastest-growing sectors of Bangladesh with increasing housing societies, manufacturing plants, commercial spaces & malls, etc.

Service Sector

The most crucial contributor to the national GDP of Bangladesh is the service sector of the country. In the last 10-year time frame from FY 2010-11 to 2020-21, the annual average contribution of the services sector to the national GDP had been about 53 percent, and the average growth rate of this sector in a similar time frame had been around 11 percent. Wholesale and retail trade captures the largest proportion of this sector, which accommodates approximately 28 percent of the service sector's contribution to the national GDP. Other major areas of this sector are transportation & storage (approximately 7.5 percent of the total GDP), financial & insurance activities (approximately 3.5 percent of the total GDP), real estate activities (approximately 9 percent of the total GDP), education (approximately 3 percent of the total GDP), etc.

Challenges to Sustainable Economic Progress

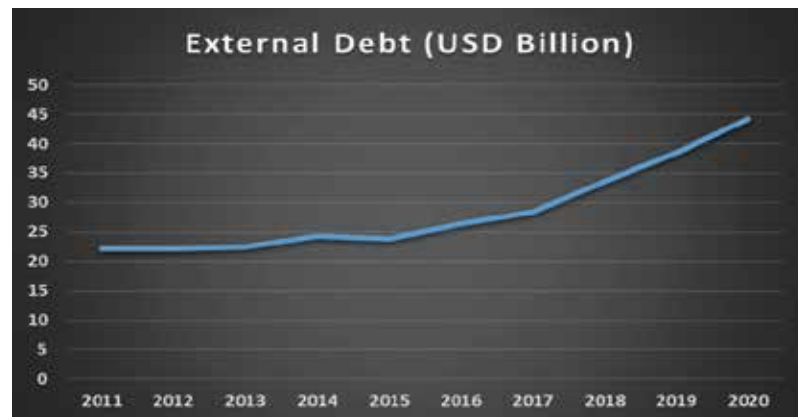
As one of the fastest-growing countries, Bangladesh does not always experience positive economic outcomes. Diverse macroeconomic challenges impede the sustainable economic progress of countries like Bangladesh.

Increasing External Debt Burden

The current fiscal deficit of Bangladesh is around 6 percent of the country's Gross Domestic Product (GDP). To finance its budget, the Bangladesh Government needs to depend heavily on debt financing from both internal and external sources.

In FY 2010-11, the net outstanding external debt of the Bangladesh government was USD 20.34 billion

Figure 4: Outstanding External Debt of Bangladesh



Source: The Finance Division, Ministry of Finance

from the foreign sources which was around 16 percent of the country's GDP in that FY. Loans from external sources remarkably increased over the next 10 years, and in FY2019-20, outstanding external debt stood at USD 44.20 billion which was 13.5 percent of the country's GDP. External borrowings grew at an average rate of 8 percent during the time frame FY 2010-11 to 2019-20. So, it is clear from the analysis that the government is gradually depending more on external sources to finance budget deficits. This consequential dependency on foreign borrowings increases the individual debt burden which may increase the significant risk for an economy when it comes to servicing the debt.

Inflation Rate

Increasing the price level has always been one of the major challenges of Bangladesh's economy, and it is also considered a mass problem for the lower-class, lower-middle-class, and middle-class people of the country. During the FY 2010-11, the inflation rate was 11.40% which is the highest recorded inflation rate in the last 30-year economic history of the country. From FY 2011-12 to FY 2019-20, the

inflation rate was stable but continuous at an average rate of approximately 6 percent.

Figure-5: Inflation Rate (CPI Index)



Source: The World Bank

In FY 2019-20, the inflation rate was 5.69 percent. Conversely, the wage increment rate has failed to cope with the continuous increase in the inflation rate which has amplified the sufferings of the poor and middle-income people of the country. According to the latest report of the World Bank, the inflation level has worsened globally due to multiple sanctions on international trades arising from the Russia-Ukraine war outbreak. Bangladesh is also a victim here; specifically, the edible oil price hike has become an intolerable national issue for the people of the country.

Wealth and Income Inequality

Even though Bangladesh has achieved laudable economic growth, income and wealth disparity remains an ongoing concern. People from the low-income group are still struggling to arrange three square meals a day. According to the latest Human Development, Bangladesh is ranked 133rd out of 189 countries. According to a report in The Daily Star, 1 percent of the people hold more than 16 percent of the total income in the year 2021 whereas the bottom 50 percent of the population could capture about 17

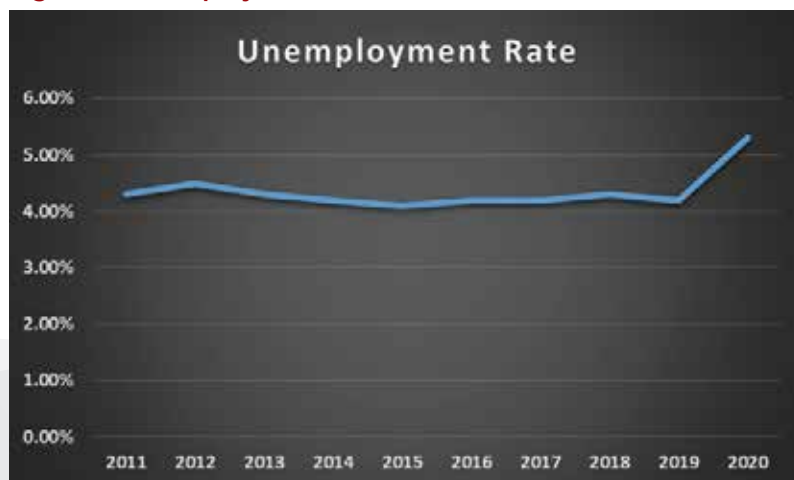
percent of the total income. The report also added that 44% of the total income is possessed by the top

10% population of the country, and this inequality is growing at an alarming rate day by day. As a result, the richer are getting richer, and the poorer are getting poorer and initiating substandard living conditions for the financially deprived people of the country (The World Inequality Lab of Paris).

Unemployment

According to the Department of Youth Development, approximately one-third of the total population represents the youth population who are within the age range of 18 to 35 years. Bangladesh Development Studies found that the graduate unemployment rate in Bangladesh is around 33.19 percent in 2019. The overall unemployment rate of the country had been

Figure-6: Unemployment rate



Source: The World Bank

consistent at around 4.2 percent 10-year time frame from FY 2010-11 to 2018-19, however, the unemployment rate rose and peaked at 5.3 percent during the FY 2019-2020. The non-technical education system and unbending desire for public jobs are some of the fountainheads in generating an unskilled human set. As a result, a notable portion of educated and energetic youth are incompetent to join the mainstream development of the country.

Opportunities for Stimulating Sustainable Economic Development

Numerous countries all over the world are suffering from copious economic crises arising from the Covid-19 pandemic outbreak, meanwhile, Bangladesh achieved a 6.94 percent GDP growth rate in the FY 2020-2021. This evinces that Bangladesh is a country with abundant resources and opportunities to proliferate economic growth further.

Fostering Agriculture

As one of the mentionable contributors to the country's GDP, agriculture also ensures a significant contribution to exports. Moreover, agriculture is considered a Raw materials source for multiple sectors such as poultry, leather, frozen food, canned food, livestock feed, etc. As the population of Bangladesh is growing at an average rate of about 1.1 percent annually, the concurrent agriculture productivity may not be adequate to ensure sustainable food security for the country. Several inefficiencies in the cultivation and related fields could be mitigated to burgeon the productivity of this sector.

Truncating High Cost of Input

Research has shown that the costs of inputs in cultivation are comparatively higher in Bangladesh than in other countries. (Boosting the low productivity in the agriculture sector in Bangladesh – The Financial Express). Due to negligence and unawareness, farmers use more inputs such as water, fertilizers, pesticides, etc. than the requirements. Such excess usage of resources escalates the production costs and results in an inefficient production system. Introducing modern crop production methods, facilitating appropriate water usage management, reducing inorganic and chemical pest control techniques, and switching to natural ways of irrigation could attenuate the arising challenges in the agriculture sector, thrive the production efficiencies, hence productivity (Hossen, 2019).

Appropriate Institution for Agricultural Control

Even though the government has implemented multiple layers of officials to address agricultural problems and challenges, there are no such institutions to closely monitor and work on the improvements in this sector. Farmers are still producing a few varieties of rice such as BR11 and

BR1 developed by the Bangladesh Rice Research Institute in 1970 (Productivity and Efficiency Issues in Bangladesh Agriculture – New Developments in Food Policy, Control and Research). No mentionable improvements have been brought regarding crop diversity in recent years. Forming dedicated research and monitoring institutions for the agricultural sector could enhance productivity by introducing more crop diversity, mitigating inefficiencies in productivity, and promoting agriculture as entrepreneurship (Rahman, 2005).

Efficacious Usage of Investments and Funds in Agriculture

Both private and public sectors are concentrating investments in the agricultural sector of Bangladesh considering the obvious potential of this sector. However, inefficient usage of these investments is hampering to achieve of the set goals by the prevailing investors and creating discouragements among existing and prospective investors in this sector. So, the specific focus should be given to the proper usage of funds, expansion of crop diversity for agricultural diversification, and appropriate training to the human resources regarding modern irrigation (Hossen, 2019).

Conserving Agricultural Lands

As one of the most densely populated countries in the world, accommodation of the thriving population has resulted in shortages of fertile lands. It is highly challenging for the government to control the individual land development through statutory regulations, but necessary steps such as green revolution technology should be promoted further to expand the productivity of in-hand lands. For example, the invention of Boro Rice Grains has resulted in higher productivity within a limited land area as it can be cultivated all over the years.

Controlling the Informal Remittance Inflows

Bangladesh is the 7th highest remittance recipient in the world according to the recent World Bank report (Migration and Development Brief, The World Bank). In 2020, Bangladesh was able to achieve 6.7 percent of its GDP as remittance (The World Bank). However, Bangladesh has been experiencing numerous drops in the remittance inflow because of informal inflow channels such as hundi, under-invoicing, etc. The Bangladesh government has already introduced incentives on formal remittance channels, but a significant proportion of the senders still prefer informal channels for

avoiding complexities and saving time. Foreign workers should be encouraged further to send their remittances through the formal banking channels to invigorate the foreign currency reserves of the country.

Shrinking Imports through Domestic Entrepreneurship

In the year 2020, the import to GDP proportion of Bangladesh was approximately 18.5 percent whereas the export to GDP ratio was about 12 percent resulting in a high negative balance of payments. Mentionable imports of Bangladesh include petroleum and oil (approximately 11 percent of the total imports), textile (approximately 10 percent of the total imports), food items (approximately 9 percent of the total imports), iron and steel (approximately 7 percent of the total imports), edible oil (approximately 4 percent of the total imports), chemicals (approximately 4 percent of the total imports), rubber and plastic items (approximately 4 percent of the total imports). As of march-2022, the trade deficit has been USD 14 billion which was only 9.56 billion in the FY 2017-18., and the deficit is experiencing a continuous increase (The Bangladesh Bank). Increasing imports are resulting in lesser foreign currency reserves and BDT devaluation. The Bangladesh Bank has taken numerous steps to control luxury imports through multiple trade barriers, but no significant impact of such controls has been noticed in the economic activities. One solution to face this issue could be promoting domestic entrepreneurship through fostering domestic SME investments to compensate for the needs of imported products.

Conclusion

The value added by an economy within a specific time frame is measured by GDP, calculated using current and base market prices. In terms of GDP, Bangladesh's economy is growing at a remarkable rate as we have seen earlier in this paper. In terms of PPP, Bangladesh's economy was more than half a trillion dollars in FY 2013-14. According to the IMF's projection, based on PPP, Bangladesh's economy will reach USD 1.522 trillion by FY 2026. In addition, Bangladesh intends to become a developed country by 2041 and eliminate hunger and poverty by 2030.

In achieving this landmark projection, various potential challenges could be faced by the country as delineated in this paper. Bangladesh also possesses several success factors and potential opportunities for improvements to reach the vision of a 2 trillion-dollar economy sooner. Stimulating improvements in the agricultural sector, promoting formal channels of remittance inflow, and discouraging imports through individual entrepreneurship could play key roles in escalating the economy of Bangladesh to an exemplary landmark of 2-trillion dollars.

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Blue Economy Beckons: Seaweed holds Prospects for Bangladesh

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ABSTRACT

Seaweed is a large aquatic algae among unlimited marine attributes. As the name indicates, seaweed grows in the sea or ocean, or on the rocks below the high-water mark as it glistens on the rocks. It is rich in iodine, vitamins, minerals and the essential antioxidants that fight diseases in the human body. Seaweed plays a major role in the marine ecosystem. It is food for hundreds of thousands of undersea creatures, including fish and shellfish. Seaweed also provides shelter for these living things, and it is sometimes used as a fertiliser to help plants grow. Seaweed has an enormous economic value. Globally, this aquatic plant is being experimented as a food supplement with intent to ensure an alternative food source and its use in the organically modified consumables. This paper makes an endeavour to look into the prospects seaweed holds for Bangladesh and beyond through analysing studies, reports and research by leading local and global entities.

I ntroduction

Seaweed is the first organism in the marine food chain and it provides essential nutrients and energy for animals in two ways. Large sea animals eat long leafy fronds directly while filter feeders take in its decomposing parts indirectly. Feeding various aquatic animals and ponies aside, seaweed serves as a harbour for fish juveniles and marine life, helping preserve marine biodiversity while providing opportunities for climate change mitigation and adaptation. Seaweed also absorbs carbon dioxide from seawater, thus helping reduce global warming and over-fertility of the oceans by absorbing excess nutrients. The fast-growing algae utilises energy from sunlight and takes up nutrients and carbon dioxide from seawater. Scientists suggest that seaweed also helps fight climate change and offset carbon emissions. Once an unexplored gem, seaweed is the next big thing in Bangladesh. The colossal seaweed economy in the commercial discourse holds enormous prospects for the country in order to unlock the potential of the multi-billion-dollar blue economy and harness its dividend. Currently, marine plants and algae like seaweed have multipurpose uses in major industries that cover food, feed, cosmetics, pharmaceuticals, fertiliser and biofuels in the local and global markets. Oceanologists, economists and experts believe that seaweed is an economic game-changer in Bangladesh as its farming will open the floodgates for the discovery of other oceanic products one day.

Marine Aquatic Products

Before delving deeper into the key topic, it is important to learn which marine aquatic products actually make up the vast oceanic expanse other than

water. Marine aquatic organisms and products comprise fish, shellfish, animals, plants and algae, among multiple others. Seaweed as a plant belongs to the algae family. Algae extracts are used in cosmetic, nutraceutical and pharmaceutical markets (macroalgae and microalgae). Polyunsaturated fatty acids like omega-3 and omega-6 that act as antioxidants are available on the shelves on the market. Macro algae producers can not only target the ever-growing human food market across the continents, but also the animal feed market by the same token. Macroalgae will be a valuable source of proteins for human and animal consumption. Algae aquaculture can contribute to advances in fish medications and contribute to shelf life improvements achieved through marine bacteriological progress. The farming of marine aquatic organisms has come to the forefront mainly for human consumption and meeting their demand across the world through all the associated primary processing activities. A vast economic opportunity across the world is unfolding gradually. With the rapid march of technology, this opportunity should be tapped to the nth degree through cultivating aquatic plants and algae, aquatic animals like oysters and mussels, marine finfish farming and freshwater finfish farming like trout, carp and eel.

Seaweed as Food Supplements

Seaweed is recognised as a fast-growing renewable aquatic food resource. There are many different types of seaweed available at the edge of the sea. Some of the seaweed species have nutritional value and are eaten as food. For centuries, Japanese people have been consuming seaweed with a mix of other food stuff like rice as they are full of vitamins,

minerals and fibre. Cascadia Seaweed believes its cornucopia of kelp could change the plant-based food world. In the plant-based world, ocean-cultivated seaweed is an obvious choice. The big question is its importance as a food, public awareness of its benefits and the easy availability of the plant. Seaweed has plenty of health benefits to offer. Fans of sea vegetables look to the plant for the perceived health benefits—high in minerals, vitamins and antioxidants—as well as its unique culinary flavour. Seaweed can be a major sustainable food supplement. In addition to this, seaweed is a significant source of carbon sequestration.

Seaweed has versatile uses in various biochemical raw materials, including food and foodstuff, pigments, enzymes, agar and medicine. But the value-added edible seaweed products and their acceptance has not gained in full popularity with mass consumers, but the indigenous communities of Cox's Bazar and the contiguous hill districts consume such products. As part of its efforts to popularise seaweed as well as its use in cosmetics, a fair was hosted earlier to showcase seaweed products made by local farmers and entrepreneurs. Twenty-five carts were also distributed among seaweed food entrepreneurs there. The entrepreneurs use seaweed in different recipes such as fried crabs and faluda. Seaweed-mixed ready-to-eat foods include salad, cookies, chips, burger, cake, chanachur (fried seasoned gram) and jelly while ready-to-cook items include soup, noodles and tea. The plant is also used as a garnish on pudding, chapati and samosa. Bangladesh should be instrumental in popularising seaweed food, consider seaweeds as a potential economic crop in the blue economy initiative.

Seaweed food has found its place on shelves in restaurants, especially in Cox's Bazar tourist spots. Local pharmaceuticals and cosmetic companies are also interested in using seaweed-derived products (carrageenan, alginic acid and gelatin) in their industries. A research work, conducted jointly by Chattogram University, and Food and Agriculture Organisation (FAO), estimated the annual seaweed utilisation in the human food, feed, manure, cosmetics and pharmaceutical industries in Bangladesh at 47,775 kilo, 11,700 kilo, 13,650 kilo and 24,375 kilo respectively. According to the research, these could potentially contribute Tk 55.87 million to the blue economy of Bangladesh in the near future. Seaweed is also in good demand among

consumers in Bangladesh's frontier neighbour Myanmar.

Seaweed Alternative to Plastic

The unabated use of global plastic sounds alarming. Available data shows 9.0 billion tonnes of plastic have been produced since the 1950s, creating 7.0 billion tonnes of waste. What is the solution to this non-biodegradable plastic then? Multiple attempts to minimise plastic use have been floated but one of them is found viable. It is seaweed. Seaweed is creating plastic that is not harmful and that is biodegradable. Seaweed has become Indonesia's answer to this global plastic crisis as it is the world's largest producer of this plant. Indonesia shows how seaweed can be the best material for use in bioplastics. The materials mostly used to produce bioplastics are corn, sugarcane, vegetable oil and starch. However, using these ingredients for plastics has given birth to some growing concerns. So, seaweed is so far the best candidate for bioplastics as an answer to all challenges, present and future. By using seaweed for bioplastics, the production of agricultural commodities for food will remain intact, so no food price hikes or food crisis. Indonesia is also the world's largest producer of red seaweed, whose carbohydrate element is the key ingredient for bioplastics. Indonesia is also one step ahead of other countries in developing seaweed-based plastics. Cups and food containers have been made from farmed seaweeds and sold commercially.

Seaweed Farming in Bangladesh and Beyond

No land, no freshwater, no fertiliser, no pesticide. Yes, you are reading right. Seaweed requires no arable land, sweetwater, fertiliser or zero external inputs like feed, fertiliser or pesticide—all it needs to grow is the sea and sunlight. Unlike other terrestrial plants, seaweed can grow without any artificial food or fertilisation. It does not take up huge space on land as it grows offshore. Seaweed does not produce methane emissions or nitrogen run-off and it has the potential to mitigate ocean acidification by absorbing carbon dioxide. Seaweed farming has taken off in Bangladesh, which means good news for the economy and the environment. Jahanara Islam of Cox's Bazar, according to a Daily Star feature item run in late 2021, is considered the pioneer of seaweed cultivation in Bangladesh. She started working with the plant back in the 1980s and then

she invented an estimated 130 types of different seaweed-based food items and products.

Before the seaweed cultivation gained ground, the residents of St Martin's coral island would collect decomposed seaweed from the shoreline. More than 300 households are now engaged in seaweed farming, primarily along the country's southeast coast, producing almost 400 tonnes of wet seaweed (nearly 100 tonnes dry weight) per annum, according to a domestic study. The current seaweed production can be boosted by some 50 per cent annually. It is possible to produce 50 million tonnes (dry weight) of seaweed from every 5,000 square kilometre farming area by the calendar year 2050. The expansion of seaweed farming will have positive impacts on poverty alleviation and ensure food security in the South Asian littoral country with vast expanse of the blue waters of the Bay to its south.

What about seaweed cultivation and harvesting on other parts of this planet earth? Some 97.1 per cent of the global production comes from the cultivation in offshore and onshore farms while only 2.9 per cent from the wild harvest. China accounts for a major stake in the globally cultivated seaweed production. Indonesia, the Philippines, South Korea, Japan, North Korea, India, Myanmar and a host of other countries also farm seaweed and contribute significantly to global seaweed production. Seaweed is used for human consumption directly and indirectly, making a big global market for the plant.

Seaweed a Ray of Hope for Fishers

Fishers in southern Cox's Bazar coastal district are becoming increasingly interested in cultivating seaweed by using local materials in a simple and low-cost manner. Seaweed culture has just become one small ray of hope for the fishing community. Experts believe that seaweed cultivation could be an alternative source of income for fishers in the near future. It is the most rapidly expanding component of global food production. Since it grows rapidly, the cultivated seaweed can be harvested for sale in two to three weeks. Seaweeds grow well at a water temperature of 25–30 degrees celsius and a salinity of 15–26 parts per thousand. International non-governmental organisations are promoting the promising seaweed farming in Bangladesh through undertaking various livelihood projects and interventions. The USAID-funded ECOFISH-II project of WorldFish Bangladesh, in collaboration

with Chattogram Veterinary and Animal Sciences University and also Falcon International Limited, is a case in point here. They have involved men, women and youths from the local fishing communities of Cox's Bazar in seaweed cultivation to help them supplement their family income.

Available documents show that the ECOFISH-II scheme has delivered necessary training and essential farming materials to the beneficiaries of Cox's Bazar Sadar, Ukhiya, Teknaf, Moheshkhali and Ramu sub-districts. Against the backdrop of the highly prospective seaweed farming, the ECOFISH-II project has involved fishers, men and women alike, in seaweed cultivation as part of a blue economy initiative to ensure alternative employment generation in the poor fishing community. In the coming days, team leader Abdul Wahab says, they are going to take various steps to scale out seaweed cultivation and promote the marketing of diversified seaweed products. A 'Seaweeds Food Festival' in Cox's Bazar in early 2022 for the coastal fishing community was aimed at helping them harness the benefits of the cultivation of seaweed fully. One of the beneficiaries is Anwara Begum, a resident of Nuniarchora neighbourhood in Cox's Bazar Sadar. According to Ms Anwara, "Apart from other income-generating activities, I earned close to Tk 80,000 by farming and selling seaweed in 2021."

How Seaweed is Farmed and Marketed

Local farmers collect seaweed seed from a wild source and set the farm near their settlements. In most cases, untrained farmers do not have any knowledge of suitable site selection for seaweed farming. Red seaweed (*gracilaria*) and green seaweed (*enteromorpha* and *ulva*) are considered for seaweed farming. In 2021, ECOFISH-II selected 200 fishermen and women, and imparted training in seaweed farming techniques, harvesting, processing and marketing. At the end of December, 9,350 kilograms (wet weight) of seaweed were harvested. The off-bottom net and the long line methods are commonly used by farmers on the Cox's Bazar coast to cultivate seaweed. Recently, the beneficiaries of ECOFISH-II activity have had tremendous success in seaweed production using the newly introduced floating raft long line and net techniques. Beneficiaries harvested a significant quantity of seaweed using the floating raft system for the first

time in Bangladesh. Seaweed seedlings can be harvested within 15 days of being tied to a rope or net and kept in a favourable environment at sea. Collected seaweed can be sold raw or dried in both the domestic and international markets. Usually, seven to eight kilogram of raw seaweed is needed to produce 1.0 kilo of dried seaweed, but the proportion may differ depending on the species.

Omar Hassan owns the WorldFish Bangladesh partner Falcon International Ltd and he is involved in the marketing of seaweed. According to Mr Hassan, “Seaweed farming is very profitable. It costs approximately Tk 4,000 to build a 15-metre x 5.0-metre piece of land using the off-bottom long line method and Tk 8,000 to build a 20-metre x 3.0-metre floating raft using the long-line method. In the most favourable environment, on average, an estimated 400 kilo and 800 kilo of raw seaweed can be produced per plot per annum, with a wholesale market value of about Tk 12,000 and Tk 24,000 from the off-bottom long-line and floating raft long-line methods respectively. Mr Hassan says the immense potential of seaweed farming in Bangladesh should be utilised.

How Bangladesh can Tap this Potential

Seaweed opens the door to the prospects of the blue economy as its cultivation has gained traction over the years in the coastal belt of the Bay of Bengal. As many as 32 types of seaweed species are abundant along the coast of Bangladesh where 14 are commercially viable but only four variants are being farmed on a small scale here. With more than 700 kilometres of its coastline and 25,000 square kilometres of coastal area, the Food and Agriculture Organisation (FAO) says, Bangladesh holds vast potential for seaweed cultivation as the country's beaches, estuaries and mangroves make it an ideal place for the plant's growth. More or less 400 tonnes of seaweed is currently cultivated in Cox's Bazar, Chattogram, Noakhali, Patuakhali, Satkhira and Bagerhat per annum. Bangladesh has 24,077 square kilometre coastal waters within 0–10 metre depth that may be suitable for seaweed production, according to a study titled ‘Seaweeds farming for sustainable development goals and blue economy in Bangladesh’ done by a group of researchers and oceanographers. Another study titled ‘Spatial prediction of seaweed habitat for mariculture in the coastal area of Bangladesh’ predicts that some 11,200

square kilometre coastal and marine area had 20-100 per cent occurrence possibility for seaweed. It, however, finds 4100 square kilometre area as the most suitable for seaweed production with 50-100 per cent occurrence possibility.

In Bangladesh, more than 300 coastal households are engaged in seaweed cultivation at Nuniarchara, Inani beach and Reju canal of Cox's Bazar, churning out 390 tonnes two years ago in 2020. If the full potential of this real economic jewel is tapped, the sector could grow phenomenally and create more than 0.1 million jobs for the people living in all the above-mentioned coastal districts in question. Globally, seaweed farming is one of the fastest-growing aquaculture sectors with an annual output from 10.6 million tonnes in 2000 to a whopping 33 billion tonnes in 2018 which was valued at an estimated \$11.8 billion. The global seaweed market is expected to be \$22.13 billion by the 2024 calendar year.

Economic Value of Seaweed at Home and Abroad

Seaweed farming is for sustainable development goals and potential blue economy in Bangladesh. Seaweeds are primary producers and among the important marine ecosystem engineers capable of modifying their surrounding abiotic and biotic environments. The southern coast of Bangladesh has an excellent prospect for seaweed farming due to favourable environmental conditions and natural availability of commercially important species. Through quantitative and qualitative analyses, studies determine the potential contribution of seaweeds to achieving several targets of the United Nations-set sustainable development goals (SDGs) and the blue economic development in Bangladesh. The current level of production is likely to bring a positive change to issues regarding food security, gender equality, economic growth, removal of nutrients, carbon sequestration, employment and aquatic environmental health. Overall, the benefits of seaweed farming could reflect on 26 targets of eight SDGs and potentially contribute \$0.7 million to the blue economy in Bangladesh.

Globally, the commercial seaweed market is expected to record a compound annual growth rate (CAGR) of 9.1 per cent from 2021 to 2028 to reach \$23.2 billion by 2028. In terms of volume, the seaweed market is expected to register a CAGR of 9.5

per cent from 2021 to 2028 to reach 11,408.3 tonnes by 2028. In another analysis, it is projected that the market will grow from \$15.01 billion in 2021 to \$24.92 billion in 2028 at a CAGR of 7.51 per cent during the forecast period. The seaweed industry provides a wide variety of products that have an estimated total annual value to the tune of \$5.5-6.0 billion. Food products for human consumption contribute an estimated \$5.0 billion of this amount. Yet another projection, according to GM Insights, a global market research and management consulting company catering to corporations, non-profits, universities and government agencies, shows the global market value of seaweed could exceed \$85 billion by 2026. Although an estimated 80 per cent of the seaweed is produced globally in Asia, Bangladesh annually produces more than 600 tonnes of natural and aquaculture sources.

Seaweed's Potential Export Market

The global seaweed production increased from 10.6 million tonnes in 2000 to 32.4 million tonnes in 2018 and the global seaweed market is expected to be \$22.13 billion by 2024. According to a study, Bangladesh currently produces almost 400 tonnes of wet weight of seaweed (more or less 100 tonnes dry weight) per annum and fetches a staggering Tk 24 million at Tk 60 per kilo. On the other hand, the price of dry weight of the plant varies depending on its usage. For example, dried seaweed for food and feed formulation sells at Tk 300 per kilo while the price is Tk 1,000 per kilo for cosmetic and pharmaceutical applications. So, seaweed has a big export market globally and Bangladesh can make the most of it to reap the benefits. Properly planned and commercially grown seaweed can play an important role in the national economy both internally and externally. What is important is ensuring quality when drying seaweed and providing vacuum packaging to bag higher prices from potential buyers. Through focusing on more seaweed growth, the country can explore markets overseas to sell algal/seaweed products there in order to earn millions of foreign currencies.

A Set of Suggestions

Seaweed farming is one of the fast-growing sectors in the world as the global production of seaweed has increased three times in the last two decades. A set of suggestions are given below for smooth production of seaweed in Bangladesh's coast and unleash its

nutritional as well as economic potential on the horizon that beckons.

- * Academics, experts and oceanographers suggest that Bangladesh produce seaweed commercially alongside fisheries and other marine resources in a bid to unlock the full potential of the blue economy.
- * The contribution of seaweed is enormous not only to the economy, but also to the environment and ecology. Keeping in mind the unlimited potential of seaweed farming, its food value, its widespread use in pharmaceuticals, animal feed and fertiliser industries, and economic prospects, the government should be instrumental in popularising seaweed food.
- * The government should consider seaweed as a potential economic crop in the blue economy initiative and take appropriate measures to explore and deliver this potential asset rightly.
- * The government should be more sea-going and take timely seafaring steps to declare seaweed farming as a thrust sector. It should give the sector a financial boost and take care of the farmers and other stakeholders in the coastal belt. Experts opine that the country needs to develop its market value chain which is missing yet to promote seaweed farming commercially.
- * The government should run a microscopic analysis to see why this world's fast-growing agricultural sub-sector still remains almost unexplored in Bangladesh despite having a vast undisputed sea area in the Bay of Bengal.
- * A dedicated seaweed farming cell should be formed in the commerce ministry to frame a policy for seaweed farming and motivate farmers to grow more seaweed.

Conclusion

Seaweed is a key edible plant in aquaculture. Popularising seaweed food through declaring seaweed as a potential economic crop in the blue economy will increase its exports to overseas markets alongside meeting the local demand. Aquaculture, especially seaweed culture and fisheries, has vast economic potential in Bangladesh and beyond. Seaweed is the fastest-growing global

food sector now providing a sizable percentage for human consumption. Seaweed offers huge potential for the provision of food and livelihoods, although greater efficiencies in provision of feed to seaweed need to be realised. Aquaculture under the blue economy will incorporate the value of the natural capital in its development, respecting ecological parameters throughout the cycle of production, creating sustainable, decent employment and offering high-value commodities for export. Aquaculture, fisheries and seaweed culture generate considerable social and economic benefits for hundreds of millions of people around the world and they have the potential to increase their contribution to human well-being, growth and prosperity based on the pillars of ecological, social and economic sustainability. In sum, the greater wellness of the human and oceanic ecosystem lies in seaweed. Let us seize the opportunity and grab it!

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Does Eco-Innovation Matter in Firm Financial Progression? A Paradigm from Bangladesh

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ABSTRACT

The goal of this study is to examine connection between eco-innovation and firms' financial growth. The current index was modified for the eco-innovation variable, and Tobin's Q was utilized as a proxy for the company financial growth. The panel data was compiled using annual reports (2015-2019). A descriptive and correlation study was conducted on three major constructs of eco-innovation (product, process, & technology). One three-dimensional econometric model was created to test the hypotheses. The findings of the study demonstrated that eco-innovation in product, process, and technology is favourably connected with business financial progression. This study suggests that industry ought to include eco-innovation into their production processes and pursue long-term innovation strategies.

KEYWORDS

Eco-innovation, Firm financial Progression, Pharmaceuticals & Chemicals Companies.

B **ackground of the Study**

Polluted air, water pollution, soil contamination, deterioration of the ozone layer, acid rain, depletion of renewable resources, wastewater treatment, & degradation have all become serious environmental issues in recent years (WEF, 2018, WEF, 2016). These environmental factors are the direct consequences of business innovation, which causes huge financial losses for the companies. As a result, industries are constantly looking for new, long-term solutions to their business processes as a result of this environmental concern, which impacts essentially the pharmaceuticals and chemicals sector among all the other sectors in emerging economics. Due to this sector is the directly related with environment for financial losses. One of the industry's environmentally friendly and sustainable alternatives for improving the firm's long-term financial success is eco-innovation (Johl and Toha, 2021, Khan and Johl, 2019).

This study on eco-innovation is motivated by two factors. To begin with, the world's 2.8 billion people are in jeopardy due to environmental and climate change concerns (WEF, 2018, WEF, 2016). As a result, there is a great need for eco-innovation that is both environmentally and industrially sustainable. Second, eco-innovation techniques and initiatives may provide greater firm financial progression and sustainability to the pharmaceuticals & chemicals sector by reducing energy and cost in the industrial production process (Johl and Toha, 2021, Ryszko, 2016).

However, traditional tactics in innovation strategies, as well as eco-innovation and environmental sustainability in the industrial system, are causing

significant worry. Given recent events in eco-innovation, ignoring proactive tactics in innovation strategies is becoming increasingly challenging (Toha, 2021, Toha et al., 2020). Despite significant investments and efforts in eco-innovation, the globe continues to face environmental and sustainability issues. This is typically since maximum businesses seem to be responsive rather than practically proactive when it comes to firm financial progression from eco-innovation.

As a result, this study fills an existing research gap by emphasizing the connection between eco-innovation and firm progression. The pharmaceuticals & chemicals industry is the focus of this study since it remains measured the pillar of every emerging economy's potential industrial and societal growth. Bangladesh is one of Asia's largest emerging nations, with a high potential economy from the pharmaceuticals & chemicals industry. Therefore, this study will focus on 31 Public listed pharmaceuticals & chemicals firms from the Dhaka Stock Exchange.

The research question of this study is that “does eco-innovation matter in firm financial progression?” The purpose of this research is to investigate the association between eco-innovation and firm financial progression. In addition to that this study will explore the dimensions of eco-innovation and its impact on firm financial growth.

The structure of this study is as follows. The study's introduction (problem statement, rationale of the study, research objectives, and research questions) is

presented first, followed by an explanation of the literature review on eco-innovation and its dimensions with a conceptual framework. Secondly, the research methodology is demonstrated, followed by a discussion and findings of the research. Finally, the study's recommendations are stated, along with future suggestions.

Literature Review

Eco-innovation

The phrases eco and innovation are combined to generate the term eco-innovation. The terms "eco" and "innovation" respectively mean "environmentally friendly sustainable" and "introducing contemporary." This third industrial revolution brought eco-innovation, which was further developed in the 4th industrial revolution, particularly focused on innovative solutions. According to the Club of Rome's study Limits to Growth as well as the United Nations' Brundtland report, sustainability is a critical way to conserving valuable capital for future generations' prosperity (1987).

The much more relevant definition and explanation, according to the researchers, is "the advancement, assimilation, or exploitation of a novel product, manufacturing methods, service, management, or

company method that results in decrease of environmental problem, contamination, and waste over its life cycle" (developing or adopting it) (Kemp and Pearson, 2007). According to them, eco-innovation has three primary dimensions: product, process, and technology standpoint.

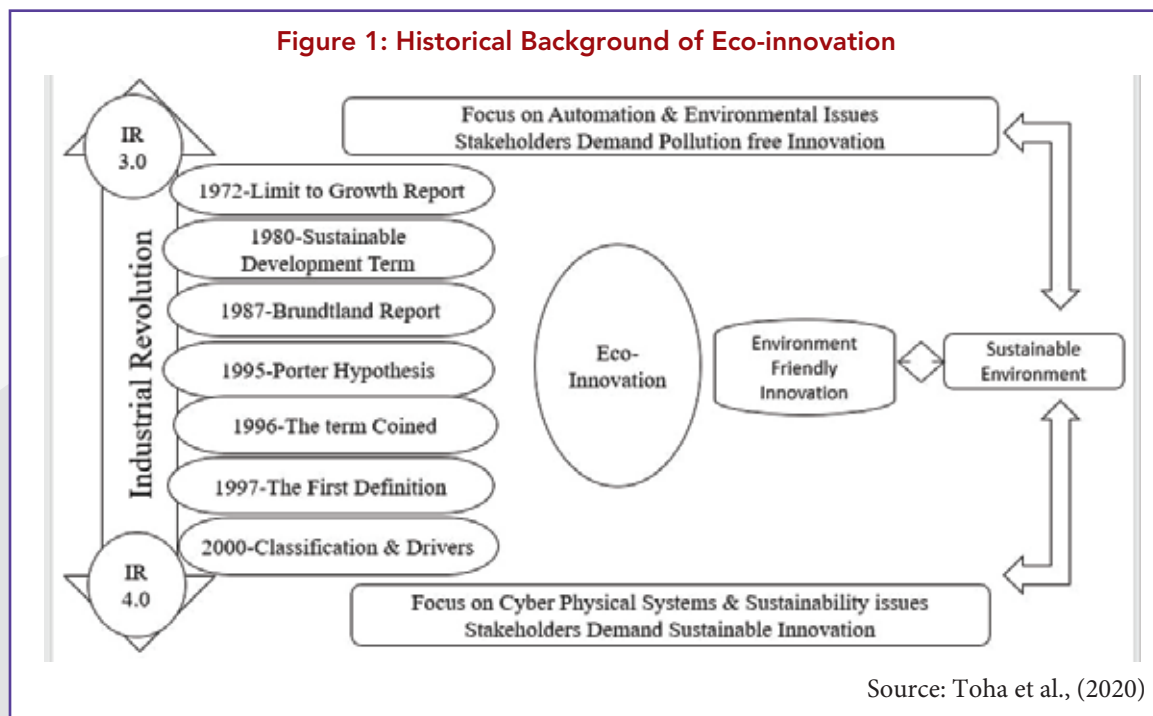
In a graphic form, Figure 1 depicts the historical sequence of eco-innovation in connection to sustainability and the industrial revolution. Followed by the details review of three dimensions of eco-innovation.

Product Eco-innovation

Product eco-innovation is linked to long-term business success (Dong et al., 2014, Bitencourt et al., 2020, Garca-Granero et al., 2018). The research listed above also identified a few particular indications connected to boosting a company's financial worth, with an emphasis on sustainability challenges.

The indicators are the use of new cleaner materials or new inputs with reduced environmental impact, the use of recyclable materials, the reduction of raw material usage, the reduction of individual parts, the eradication of dirty components, a commodity with an extended life cycle, and the ability to recycle a product. Because several studies disagreed with the notion that product eco-innovation may accelerate

Figure 1: Historical Background of Eco-innovation



Source: Toha et al., (2020)

comparative edge and sustainable development (Dong et al., 2014), According to a research by Yao et al. (2019), product eco-innovation is adversely connected with a firm's success due to the firm's reactive strategy.

However, this research advocates that product eco-innovation does not only support curb the firm sustainability and overall social development but also promotes firm financial value in the presence of assumed proactive initiatives from the board. A cross-sectional study (Yao et al., 2019) found that environmental issues are correlated with financial value and social challenges, hence, positive financial growth was found after the second and subsequent years. Improving environmental protection efforts will minimize the societal risk and financial risk, which leads to achieving societal development of the economy towards agenda 2030 and IR.

Finally, it will make an impact on the firm financial growth either positively or negatively through the three pillars of sustainability. Most of the studies based on the resource-based view theory were conducted on the macro level. Additionally, most of the studies were conducted at a micro level, demonstrating an inconclusive result. This led to a research gap that needs further investigation.

Process Eco-innovation

Process eco-innovation is defined as the use of new or considerably improved production or distribution systems that significantly reduce negative environmental effect (Toha et al., 2020). A research (Miedzinski et al., 2013) found various characteristics that improve and reinforce the firm's clean manufacturing, such as the decrease of materials utilized, fewer risks, and cost savings.

According to Bitencourt, et al., (2020), the most generally used phrases in process eco-innovation are cleaner manufacturing in the process of manufacturing and end-of-pipe technology in the production line (Rennings et al., 2006). Process eco-innovation, according to the researchers (Salim et al., 2019), is no longer limited to explicit environmental performance but also includes implicit environmental improvement and long-term performance, including company financial value.

Several attempts have been undertaken by different scholars to discover the nexus between process

eco-innovation and sustainable company performance (Yao et al., 2019, Aziz et al., 2016) (Rodriguez and Wiengarten, 2017). They all claimed that process eco-innovation is favorably associated to a sustainable firm's value (Marcon et al., 2017, Rodriguez and Wiengarten, 2017). (Garca-Granero et al., 2018) discovered a few key aspects that lead to the firm's worth increasing.

These factors include chemical waste reduction, water conservation, energy conservation, waste minimization, component recycling, waste recycling, environmentally friendly technology innovation, use of renewable energy in the manufacturing process, R&D investment, machinery acquisition, and patent acquisition (Ianni et al., 2020).

The adoption of eco-friendly factors in the manufacturing process will maximize resource efficiency and effectiveness since organizations will now be able to save their inadequate resources and conduct activities which will consequently boost firm sustainable growth regarding long-term financial value creation (Xu et al., 2020). Therefore, this research argues for process eco-innovation having the potential for firm sustainable growth in the pillars of economic, social, and environmental, which can be verified empirically through cross-sectional or panel studies by the findings from different domain researchers (Kantola et al., 2017) that this type of innovation improves and supports firm sustainable financial growth. Previous research on process eco-innovation did not include proactive measures in their scales or indices. As a consequence, the conclusion is indeed inconclusive. As a result, there is a study gap that needs to be addressed.

Technological Eco-innovation

Several researchers such as García-Granero et al., (2020); Bitencourt et al., (2020); (Liao and Tsai, 2019, Hojnik and Ruzzier, 2016) have conducted studies on the relationship between technological eco-innovation and a firm's sustainability performance, with findings that technological eco-innovation and a firm's sustainability are positively correlated. It would still be subject to debate if making environmentally friendly operational improvements would improve productivity and efficiency, reduce production time, or increase output with the same limited resources.

However, this study argues that technological eco-innovation will aid in long-term financial growth because of the advantages associated with resource efficiency management through advanced eco-friendly technology.

This study argues that technological eco-innovation may help firms achieve long-term development by influencing economic, environmental, and social factors. There are many real-world examples of technology playing a critical role in a company's long-term growth, such as mobile connectivity and the role of technology in the stock market. During the COVID-19 epidemic, for example, the whole world becomes relied on technology to enhance economic, social, and governmental operations. Due to the critical role performed by technology, robust sustainable development is continuing despite the changing economy during the COVID-19 pandemic. Likewise, prior research has shown that technological eco-innovation is significant not just for improving sustainability, but also for ensuring organizational long-term financial growth. This led to a research gap where further investigation is needed.

In conclusion of the eco-innovation literature review, the following research gaps were discovered.

- The majority of eco-innovation research has been done in industrialized countries.
- There is few research on rising economies like Bangladesh.
- The majority of eco-innovation research has taken a reactive approach. The function of

proactiveness in eco-innovation has received little emphasis.

- The majority of prior research employed a structured questionnaire to collect primary data. Secondary data collecting was used in only a few studies.
- The majority of earlier research focused on macro-level variables, such as overall country performance. Micro-level indicators like a company's financial success were given little attention. In that case, the following hypothesis is necessary to examine

H₁ product eco-innovation has a noteworthy relationship with Tobin's Q

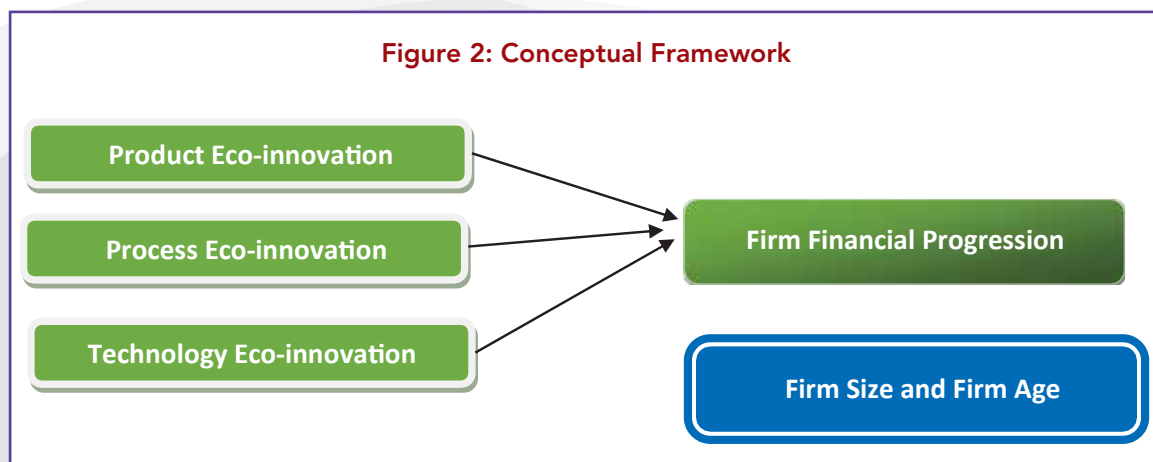
H₂ process eco-innovation has a noteworthy relationship with Tobin's Q

H₃ Technological eco-innovation has noteworthy association with Tobin's Q

Conceptual Framework

The affiliation between eco-innovation from firm perspective and firm financial progression from firm perspective is based on the RBV or resource-based view concept. Under this study, eco-innovation is the independent variable that has three dimensions such as product, process, and technology. In contrast, firm financial progression is the dependent variable which is substitution by Tobin's Q. This study considers Tobin's Q due to it employs market value. Firm age and firm size are the control variable of this study.

Figure 2: Conceptual Framework



Research Methodology

The present study has followed a quantitative research design focusing the descriptive and correlational analysis. From 2015 to 2019, this study was undertaken on 31 publicly traded pharmaceutical & chemical firms from Dhaka Stock Exchange. Purposive sampling was used to acquire the data. The representative sample was chosen using the entire population purposive sampling technique. The data for this study was gathered by content analysis utilizing the existing modified index from credible data (sustainability reports, annual reports, and corporate websites). Sustainability and

yearly reports are regarded among the most verifiable and trustworthy papers, according to worldwide accounting and auditing norms and recommendations (Uddin et al., 2020, Toha et al., 2015). The following table 2 illustrates the existing index along with the scoring technique for data collection, which was adapted for the current study.

Discussion and Findings

To proceed with the panel data, this study first presented descriptive statistics using 155 observation (31 firms * 5 years), as shown in table 3.

Table 1: Measurement Instruments

Construct	Instrument	Content Score
Product	endorsed from García-Granero et al. (2018)	0 = not found. 1= plain description 2 = Rich details. 3 = Rich details through future plans.
Process	endorsed from García-Granero et al. (2018)	
Technology	endorsed from Arundel, A., & Kemp, R. (2009)	

Source: Authors own accumulation

Following that, one econometric model (table 3) was developed to test the hypothesis using SPSS 24 and STATA 14.2.

Table 2: Econometric Model

$TQ = \beta_0 + \beta_1 \text{prod_eii} + \beta_2 \text{proc_eii} + \beta_3 \text{tech_eii} + \beta_4 \text{f_size} + \beta_5 \text{f_age} + \epsilon$	
Note, TQ = Tobin's Q prod_ei = Product eco-innovation; proc_ei = Process eco-innovation; tech_ei = Technology eco-innovation; f_size = Firm size f_age = Firm age	

Source: Authors Development

Table 3: Descriptive Figures

	Minimum Value	Maximum value	Average	Std. Deviation Value
Prod_EI	00.43	3.000	1.480	0.774
Proc_EI	00.64	3.000	1.520	0.701
Tech_EI	00.50	2.880	1.390	0.723
Tobin's Q	1.142	0.605	0.300	03.47

Source: Authors Calculation

The dimensions of IV (product, process, & technology) have favorable average values, according to the descriptive research. The mean value of product eco-innovation is 1.48, with a standard deviation of 0.77, and a minimum of .43 and a highest amount of 3. The mean for process eco-innovation is 1.52, with a standard error of 0.70 and a range of .64 to 3. With a minimum of .5 and a high of 2.88, technology eco-innovation seems to have a mean of 1.39 as well as a standard deviation 0.72. From the descriptive statistics, it was inferred that all the three dimensions of eco-innovation have

positive average values of approximately 1.5, which implies that all the pharmaceuticals & chemicals firms in Bangladesh are intended to be proactive rather than reactive in the eco-innovation approach.

Table 4 shows the relationship between the three characteristics of eco-innovation and Tobin's Q. Tobin's Q was shown to have a positive relationship with product eco-innovation, process eco-innovation, and technological eco-innovation ($r=.2988$, $r=.1428$, $r=.2725$).

Table 4: Correlation

	prod_ei	proc_ei	tech_ei	Tobin's Q
prod_ei				
proc_ei	00.603*			
tech_ei	00.649*	00.486*		
Tobin's Q	00.298*	00.412*	00.272*	

Source: Authors Calculation

For panel data analysis, the unit root test and other fundamental assumptions regarding regression analysis were performed. After that GLS model was conducted to test model and hypothesis.

Table 5: Model Analysis and Hypothesis testing

GLS model				
Model: $TQ = \beta_0 + \beta_1 \text{prod_eii} + \beta_2 \text{proc_eii} + \beta_3 \text{tech_eii} + \beta_4 \text{f_size} + \beta_5 \text{f_age} + \epsilon$				
observations	0155			
groups	031			
Observation per group:	05			
R-square:				
within	00.4331			
between	00.1002			
overall	00.2004			
Wald chi2(5)	0094.72			
Prob > chi2	00.0000			
TQ	Coef. Value	Std. Err value	Z statistics	P> z
prod_ei	.1449	.1343	1.080	0.081
proc_ei	.3711	.1107	3.350	0.001
tech_ei	.2276	.1361	1.670	0.095
f_size	.3529	.1297	2.720	0.007
f_age	.0060	.0065	0.920	0.358
_cons	-1.660	.8073	2.060	0.040
sigma_u	.4698			
sigma_e	.2858			
rho	.7298			

Source: Authors Calculation

The randomized effect GLS regression was used to assess the three hypotheses about research aims in this study. Table 5 displays the results of the dependent variable (GLS) regression. The influence of control factors (firm size and age) on the relationship between product, process, and technological eco-innovation and Tobin's Q is also described in the table. This study used the Wald Chi2 (2) and Prob > Chi2 tests to determine the model's goodness-of-fit.

The Wald Chi2 (1) = 94.72 figures, with $P > \text{Chi2} = 0.000$, are shown in table 5. The outcome ($> \text{Chi2} = 0.000$) confirms the study's eco-innovation model's goodness-of-fit, implying that the regression model is important in predicting growing company financial advancement (Tobin's Q). It is found that process eco-innovation has a strong beneficial impact on business financial performance.

In Bangladeshi publicly - listed pharmaceutical and chemicals enterprises, R-square (0.4331) depicts the amount of change in the dependent factor induced by independent factors (product, process, and technological eco-innovation) over the years 2015-2019. The eco-innovation model can anticipate around 43 percent of the variance in company financial advancement, according to the R-square (0.4331) value.

In addition to that table 5 shows that there is a positive beta (product= 0.14, process=0.37 and technology =0.22) with a p-value (product= 0.081, process=0.001 and technology =0.095) ($p > 0.10$) with Z statistics (product=1.08, process=335. And technology =1.67) for eco-innovation model which is also supported by correlation analysis (Table 4). It implies that all the null hypotheses are accepted at the cost of the alternate hypothesis.

The relationship is grounded on resource-based view theory, which states that eco-innovation accelerates a significant role in enlightening the firm financial progression. Furthermore, the findings for eco-innovation and firm financial progression also find support in earlier research such as Dong et al., (2014); García-Granero et al., (2018), whereas some studies oppose the findings (Yao et al., 2019).

It is argued that eco-innovation emphasizes eco-design ideas, which contribute towards cost-related gains by saving resources and firm

sustainability by providing a sustainable and pollution-free environment (Hu, Matsumoto, Kuo, & Smith, 2019b). This argument was supported by Ivascu (2020). These essentials can lead to the firm's products becoming eco-labeled, which could lead to achieving a positive effect on the firm's triple bottom line performance, the firm financial operations, as well as environmental performance. These factors also accelerate the actual application of limited resources which inspires the firm's involvement in economic and societal development.

Recommendations

The findings of the study demonstrated that eco-innovation in product, process, and technology is favourably connected with business financial development. As a result of the cost and energy savings, this study suggests that businesses incorporate eco-innovation in their manufacturing processes and sustainable innovation strategies.

The goal of this study is to contribute to the academic community by expanding on existing research and establishing new eco-innovation measurement methods that highlight proactiveness. Pharmaceuticals and chemical businesses should take a proactive approach to their eco-innovation efforts, according to the conclusions of this study, in order to obtain long-term market competitive advantages. However, there are limits to this study in terms of sector and geographic location. Soon, an econometric model with moderation and mediation effects of various potential variables at the micro and macro levels might be utilized to generalize this research to additional geographical locations with high sample sizes.

The current research has shed light on the Bangladesh developed country's perspective, emphasizing eco-innovation and firm financial progression. This research, it is suggested, would be a minor part of Bangladesh's vision 2030 for a developed nation. Bangladesh needs sustainability, particularly in every industrial sector, to achieve this ambition. As previously stated, one of the pre-drivers of a sophisticated economy is sustainability. Eco-innovation can provide sustainability through accelerating Bangladesh SDGs targets, via the three pillars of economic, social, and environmental sustainability. As a result, if the pharmaceuticals & chemicals companies are

proactive rather than reactive for firm financial progression, the Bangladesh economy will be benefited. Furthermore, eco-innovation motivates the circular economy through financial progression. In conclusion, it is claimed based on the empirical findings that eco-innovation is significantly mattered and worthwhile for firm financial development.

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Determinants of Corporate Social and Environmental Reporting Disclosures: A Study on the Textile Industry in Bangladesh

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ABSTRACT

The purpose of the study was to identify the determinants of Corporate Social and Environmental Reporting (CSER) disclosures and to assess the impact of the determinants on CSER disclosures of the textile industry in Bangladesh. This study was based on only secondary data. Data was collected from the annual reports of 34 publicly listed textile companies out of 51 under Dhaka Stock Exchange (DSE) Ltd. selected on the basis of the stratified random sampling technique. The study covered the time duration of 5 years (2015-16 to 2019-20). To identify the determining factors of CSER disclosures of the textile industry in Bangladesh, the study developed a model. For the assessment of the impact of the determinants on CSER disclosures of the textile industry in Bangladesh, data were analyzed by using E-Views software version 10. The result showed that there were positive associations with all the independent variables (management role, membership of industrial association, company age, company size, profitability, and financial leverage) and CSER disclosures of the textile industry in Bangladesh.

KEYWORDS

Corporate Social and Environmental Reporting (CSER), Corporate Sustainability, , Textile Industry , Management Role

I ntroduction

There was a close relationship between energy, the society, the environment and sustainable development (Dincer and Rosen, 1998). The importance of energy for the development of a nation couldn't be ignored; similarly the negative consequences of energy as a threat to the society and environment couldn't be ignored. Different sorts of gases discharged from textile factories were produced by utilizing energy. Inclusion of energy used for the social and environmental information was one of the primary concerns (inclusion in ethical funds or in sustainable indexes) (Ayuso and Larrinaga, 2003). Economic valuation, accounting and reporting system of the environmental resources was very vital to make 'sustainable development'. The study contributed to the policy makers by providing useful information regarding Corporate Social and Environmental Reporting (CSER) in the textile industry. It was also helpful to find out the considerable positioning of social and environmental reporting in this sector to different users. Development of CSER was an increasing requirement in the stock market, for disclosure of social and environmental information, a tendency that were needed of the execution of business strategies focused on sustainable financial movement (Aurelia-Aurora and Sorina-Gealina, 2012).

In today's ecological situation, the society and the environment has become a critical concern. Managers, who influenced the decision regarding society and environment, expressed their opinion that it was obvious to include social and environmental reporting, but very little had been evident in Bangladesh. There was a problem mostly with environmental costs because they had radically

augmented in recent years and were often neglected by managers (Asaduzzaman et al., 2014; Ali et al., 2010; and Boer et al., 1998).

Objectives of the Study

The general objective of the study is to identify the determinants of CSER disclosures and to assess the impact of the determinants on CSER disclosures of the textile industry in Bangladesh. The specific objectives are as follows:

- i. To present a thought about CSER disclosures.
- ii. To identify the determinants of CSER disclosures of the textile industry.
- iii. To assess the impact of the determinants on CSER disclosures of the textile industry.
- iv. To enlarge the scope of research on CSER disclosures to the context of Bangladesh.

Review of Related Literature

Choi (1998) evaluated the primary environmental disclosures in terms of quality and quantity and tested for potential connections between the propensity to disclose and various corporate characteristics. It was the first incident of corporate social and environmental disclosures made in financial report of companies listed on the Korean Stock Exchange of Korea in 1997. The research found that industry type and firm size were considerably correlated with the proneness to disclose. When the analysis was confined within the discloser group only, financial leverage appeared as

an important independent variable for the level of disclosure, particularly in high-profile industries. Clarkson et al. (2008) showed the association between corporate environmental performance and the level of environmental disclosures by testing competing predictions. They found a positive correlation between environmental performance and the level of discretionary environmental disclosures. Dai & Dong (2010) evaluated to what extent firms' financial performance was influenced by corporate social and environmental disclosures. The study found that a high relationship was existed between corporate management capacity and corporate social responsibility. Size and growth of the firm were also found to be significant with respect to CSED.

Suttipun and Stanton (2012) explored the extent and content of environmental information disclosure provided in the annual report of companies listed on the Stock Exchange of Thailand (SET). The study also investigated whether there were any interaction between the amount of environmental disclosure and a number of company characteristics. The findings indicated that 62 companies (83%) given environmental information in the annual report. Resources industry group companies were made the majority disclosure of environmental information, while agricultural and food industries group companies were made the least disclosure. The most familiar location of environmental reporting in annual report was under the issue of corporate governance. There was an optimistic affiliation between the amount of environmental disclosures and company size. Characteristics influencing environmental disclosures were such as: company size, industry type, status of ownership, country of origin and profitability.

Angelia and Suryaningsih (2015) examined the consequence of environmental performance and CSR disclosure in the direction of financial performance. They found that environmental performance had major consequence on both Return on Assets (ROA) and Return on Equity (ROE) for gold ratings. CSR disclosure had considerable impact on ROE, but had no consequence on ROA. Environmental performance and CSR disclosure at the same time had considerable impact both on ROA and ROE. Bonson and Bednarova (2015) analyzed the level to which

Euro-zone companies report on CSR factors and that could influence its use. They argued that there was no significant relationship between the company size and the level of CSR disclosure. They also pointed that there was no noteworthy connection between the extent of CSR disclosure and financial performance of the corporation. Tan et al. (2016) evaluated the consequence of size of the firm, exposure of media and sensitivity of industry to CSR disclosures and its influence on investor feedback. The outcome showed that size of the firm, exposure of media and sensitivity of industry has a momentous consequence on CSR disclosures. These factors had no effect on investor reaction directly; but, CSR disclosures had direct effect on investor reaction and mediating effect among size of the firm, exposure of media and sensitivity of industry and investor feedback.

Muttakin and Khan (2014) explored the potential firm and industry characteristics that determined the corporate social responsibility (CSR) disclosure practices by Bangladeshi listed firms. The study used a CSR disclosure checklist to measure the extent of CSR disclosure in the annual reports and a multiple regression analysis to examine the determinants of CSR disclosure. The study found that CSR disclosure has positive and significant relationships with export-oriented sector, firm size and types of industries. It also found a negative relationship between CSR disclosure and family ownership. The overall findings of the study provided empirical evidence which suggested that a number of firm and industry characteristics were important determinants of the extent of CSR disclosures in a developing country like Bangladesh.

Das et al. (2015) examined the CSR reporting practices of the listed banks in Bangladesh and discover the possible consequences of corporate governance and company characteristics on CSR disclosures. The findings illustrated that CSR disclosure was absolutely influential with size of firm, size of board, structure of ownership, and independent director in the board, while it was negatively correlated with' profitability of firms and firms age. It also revealed that all listed banks' practices social responsibility in a shapeless approach and required to take a complete format for CSR reporting such as the Global Reporting Initiative (GRI).

Literature Gap

It was observed that a good number of researches were being conducted on CSER outside Bangladesh and a few numbers were being conducted (this is a claim) on CSER in Bangladesh (reference??). Among these few numbers, determinants on CSER disclosures were very little. Review of previous works leads to a consideration of the following research deficiencies on the CSER literature in Bangladesh:

1. There was relatively limited research based on secondary data without the detailed analysis of the industrial units on the CSER practices in Bangladesh.
2. Sectoral coverage was also ignored in most cases.

The above deficiencies had led to the conduct of this research which attempts to fill the gaps by adding to the existing knowledge relating to the determinants on CSER disclosures of the textile industry in Bangladesh.

Rationale for the Study

Textile sector is one of the major export earning sectors in Bangladesh. This sector was highly responsible for social and environmental impact, since it consumed a huge amount of water and polluted through the discharges of contaminated water. Such issues needed to be accountable to secure environment and society at large. Due to the pressure from the government and the Bangladesh Securities & Exchange Commission (BSEC), only a handful of firms installed treatment plant and controlled their discharges, but most of the firms were uncaring regarding this action (The Textile Today, 2017). By analyzing the corporate social and environmental reporting (CSER) i.e.; proper environment protection planning, environment savings project and by taking various alternative course of action for corporate social and environmental reporting may improve the financial performance of the textile industry in Bangladesh. So, it is necessary for an in-depth research in CSER disclosures of the textile industry in Bangladesh.

Methodology of the Study

This study was based on only secondary data. Secondary data were collected from the annual reports of 5 years (from 2015-16 to 2019-20). By using Anderson (1996) formula, the study was determined 34 (thirty four) out of 51 (fifty one) listed textile companies as the sample from the Dhaka Stock Exchange (DSE) Ltd. in Bangladesh selected on the basis of the stratified random sampling technique. The sample companies were to be under the following 3 (three) circumstances: the companies must have issued annual report for the 2015-16 to 2019-20 financial years, the reports were available in the Dhaka Stock Exchange (DSE) Ltd. and the company must be situated in Dhaka metropolitan city. To identify the determining factors of CSER disclosures of textile industry in Bangladesh, the study developed a model. For the assessment of the impact of the determinants on CSER disclosures of textile industry in Bangladesh, data were analyzed by using E-Views software version 10.

Identification of the Determinants of CSER Disclosures and Model Development

For developing model, the study considered the hypothesized variables for determinants of CSER disclosures.

Based on the prior studies on determinants of CSER disclosures and the detailed review of literature, the following 6 (six) determinants or predictor variables of CSER disclosures were used in the study: Management Role (The number of independent directors in proportion), Membership of Industrial Association, Company Age, Company Size (Total assets), Profitability (Return on assets), and Financial Leverage (Debt to equity ratio).

This research attempted to find out the key determinants of CSER disclosures by running an independent regression model. The model was shown below:

$$CSER = \beta_0 + \beta_1 MNGR + \beta_2 MIA + \beta_3 AGE + \beta_4 SIZE + \beta_5 PROF + \beta_6 LEV + \epsilon_i$$

Table 1: Hypothesized Variables for Determinants of CSER Disclosures

Variable	STUDIES											
	Choi (1998) Korea	Haniffa and Cooke (2005) Malaysia	Yuan (2007) China	Branco and Rodrigues (2008) Portugal	Clarkson et al. (2008) USA	Song and Zu (2009) China	Dai and Dong (2010) China	Khan (2010) Bangladesh	Suttipun and Stanton (2012) Thailand	Juhmani (2014) Bahrain	Muttakin and Khan (2014) Bangladesh	Tan et al. (2016) Indonesia
Firm features												
Industry type		√*	√						√		√*	
Total asset(size)	√*	√*	√	√*	√*		√*	√*	√	√*	√*	√*
No. of employees (size)	√					√	√					
Total revenue (size)						√						
Firm age					√*	√*	√*			√*		
Location									√			
Firm performance												
Share price/EPS					√							
ROE			√*						√			
ROA	√*	√*	√*		√		√*	√*		√*		
EPS												√
Operating income							√		√			
Corporate governance												
Number of independent directors			√*				√*	√*		√*		
Management power and education	√*		√			√*			√*			
Family ownership											√*	
Audit firm size	√									√		
Member of an Industrial Association			√*			√*			√*			√*
Foreign nationalities on the board								√				
Company growth (assets, equity growth)	√						√					
Listing status												
Listed company	√	√	√			√	√					
Non-listed company												
Leverage	√		√*	√*	√*					√*		√*
Media exposure / information				√								√

Where,

CSED = the corporate social and environmental disclosures in textile industry

MNGR = the proportion of independent directors

MIA = membership of industrial association (dummy variable)

AGE = company age

SIZE = natural logarithm of total assets

PROF = return on assets

LEV = debt to equity ratio

β_0 = intercept or constant value

β_n = co-efficient of predictive values

e_i = error term or random disturbance term

Development of Hypothesis

The impact of the determinants on CSER disclosures of textile industry in Bangladesh was examined by testing of hypothesis. The 6 (Six) hypotheses that were developed based on the 6 (six) predictor variables were given below:

Management Role

Better social and environmental disclosures were often assumed to provide by more responsible managers. Managerial objectives of using legitimization strategies could differ among industries (O'Donovan, 2002). Companies were focused on greater public disclosures, thus management might elect to maintain, gain or repair legitimacy through public disclosures in sensitive industries. The level of internal control i.e., a high management role facilitated this response. On the other hand, management might take up accounting guidelines that outfit their personal advantage (Yuan, 2007). In these circumstances, they might follow immediate benefit sooner than electing legitimacy, ignoring the organizations' long-standing sustainable benefit such as welfare of employees and protection of environment. Management role was calculated by the percentage of independent directors over the total number of directors (Yuan, 2007; and Nie, 2009). This study presumed that the higher the management role, the more probable a company would issue social and environmental disclosures. In this study, the management role was the ratio between the number

of independent directors and the total number of directors accordingly.

HA₁ : There is positive association between management role and CSER disclosures.

Member of an Industrial Association

There were a number of industrial associations established by the government for supervising and monitoring purposes because of the nature of social and environmentally responsive job. Due to the direct monitoring by the state, these companies were more expected to face media disclosure and political force from the government. These companies would be more expected to be unable to find legitimacy which threatened their 'survivals' to a significant extent under legitimacy theory (Deegan, 2002). The existence of being a member of a local industrial association would have a substantial impact on performance of companies putting into practice their social contract to the society where they operate. These studies provided concrete groundwork and concept to this hypothesis (Song and Zu, 2009; and Yuan, 2007). As in preceding studies, this hypothesis was placed as a dummy variable, wherever if a company was a member of an industrial association, it was provided a score of '1' (one), otherwise '0' (zero).

HA₂ : There is positive association between membership of industrial association and CSER disclosures.

Company Age

Adult companies with longer societal survival might have taken comparatively more legitimacy. Generally grown-up companies had longer performance experience and histories and were mature (Yang, 2009). Consequently, goodwill and contribution of social responsibility of organizations became established. Because a company functioned in lengthy period, there would be more communication required for the external society. This offered companies with extensive social set of connections which influences their public figures. The longer a company had been established, the more expected the company would disclose social and environmental information. Another study found positive considerable associations between company age and the extent of voluntary social and environmental disclosures (Yang, 2009; and Yuan,

2007). In this study, company age indicated the number of years a company was founded to be steady with other studies.

HA₃ : There is positive association between company age and CSER disclosures.

Company Size

Big firms in environmentally sensitive industries were considered to be more focused on public disclosures. Frequently, they would features more lawful issues than smaller firms (Watts and Zimmerman, 1978). Accordingly, large firms could be simply subjected to “public hope of social and environmental performance, government-charged taxation, and other regulations, as well as more media awareness and exposures” (Hu, 2009). For this reason, larger firms were more likely to use definite accounting policies with the aim of improving their legitimacy. They could ensure this by reporting social and environmental information in the course of annual report. Larger firms would have more encouragement to disclose social and environmental information to administer their social contract and legitimacy (Hu, 2009). In earlier research, company size was generally measured by total assets. This study also assumed accordingly.

HA₄ : There is positive association between company size and CSER disclosures.

Profitability

The association between profitability and the social and environmental disclosures had been comprehensively discussed in existing literature (Peng, 2009; and Yuan, 2007). Firms with higher financial performance were more expected to have more sophisticated social and environmental disclosures. Optimistic news might made possible decision-making processes of investors and persuaded them to construct faith on management. This would reproduce from management’s reward in response because a considerable enhancement in profit was shown to the shareholders. Consequently, managers were more probable to disclose voluntary social and environmental information (Nie, 2009). Therefore, higher profitable companies would be more possibly to disclose voluntary social and environmental information. This study employed Return on Assets (ROA) to stand for profitability to be consistent with earlier research.

HA₅ : There is positive association between profitability and CSER disclosures.

Financial Leverage

A firm’s capability to meet financial commitments and can take into custody the significance of creditors as stakeholders in a firm’s wealth is represented by the leverage ratio (Ma and Zhao, 2009). Creditors and financial institutions might demand information to meet their debt obligations, as they may share possible liabilities. The disclosures of social and environmental information might be perceived as an acknowledgment of responsibility from the shareholders’ perspective. Hence, the higher the financial leverage, the more the company was expected to disclose social and environmental information. This also implied that if creditors were worried with social and environmental responsibility activities, the company would be more likely to disclose social and environmental information (Christopher and Filipovic, 2008; and Ma and Zhao, 2009). For the determination of financial leverage of companies, prior studies adopted debt to equity ratio. This study supposed debt to equity for financial leverage ratio accordingly.

HA₆ : There is positive association between financial leverage and CSER disclosures.

Data Analysis

The study were taken 34 (thirty four) sample companies which were indexed as 1, 2, 3 and so on. Based on the 6 (six) variables, the study checked the relationship between CSED and 6 (six) explanatory variables. The duration of the study were 5 (five) years i.e., from 2015-16 to 2019-20. So, the total observations were 170. The study analysed these panel data using E-Views software version no. 10.

From the panel least squares, the result showed that, AGE, SIZE and PROF are significant independent variables because their probability value (p-value) was less than 0.05. So, company age, firm size and profitability explained the dependent variable i.e., CSED. On the other hand, management role, membership of industrial association and financial leverage were insignificant independent variables because their p-value was greater than 0.05. The analysis showed R² is 78.1 percent, which meant that only 78.1 percent changes in the dependent variable (CSED) was explained by 6 (Six) predictor variables.

Correlation Matrix for Determinants of CSER Disclosures

Table 2: Correlation Matrix for Determinants of CSER Disclosures

Variable	CSED	MNGR	MIA	AGE	SIZE	PROF	LEV
CSED	1						
MNGR	0.127	1					
MIA	0.200	0.158	1				
AGE	0.052*	0.207	0.184	1			
SIZE	0.021*	0.079	0.300	0.007*	1		
PROF	0.005*	0.327	0.030	0.020*	0.072*	1	
LEV	0.016*	0.077	0.110	0.055*	0.037*	0.054*	1

* Correlation is significant at the 0.05 level (2-tailed).

The result found that excluding management role and membership of industrial association and other explanatory variables have a significant relationship with CSED. Company age, total assets, profitability and debt to equity ratio showed a significant positive relation with CSED. Significant positive relationship of company age, total assets, profitability and debt to equity ratio were also indicated that there was an increase in CSED by their respective values of 0.052, 0.021, 0.005 and 0.016 accordingly.

Regression Results using CSED as Dependent Variable

Table 3: Estimation of Equation using CSED as Dependent Variable

Method: Panel least squares				
Variable	Co-efficient	Std. Error	t-statistic	Prob.
C	0.510	0.148	3.443	0.009
MNGR	0.017	0.057	2.302	0.063
MIA	0.035	0.011	3.067	0.082
AGE	0.003	0.007	4.048	0.001
SIZE	0.045	0.015	2.890	0.008
PROF	0.217	0.078	2.776	0.006
LEV	0.004	0.004	2.107	0.114
R-squared	0.781	Durbin- Watson stat		1.770
Adjusted R-squared	0.607	F- statistic		2.239

Here, the study assumed that all the 34 textile companies were the same. But that normally did not happen. So, the study could not accept the outcome of the pooled OLS regression model. Because it assumed that all companies were not same. Then the study runned the second model, i.e, Fixed Effect or LSDV Model.

Fixed Effects

Table 4: Fixed Effects

Method: Panel least squares				
Variable	Co-efficient	Std. Error	t-statistic	Prob.
C	0.509	0.148	3.447	0.008
MNGR	0.038	0.058	2.658	0.513
MIA	0.036	0.015	3.155	0.202
AGE	0.003	0.078	5.033	0.700
SIZE	0.047	0.015	3.069	0.029
PROF	0.205	0.079	2.581	0.016
LEV	0.004	0.004	2.258	0.765
R-squared	0.826	Durbin- Watson stat		1.877
Adjusted R-squared	0.696	F- statistic		3.859

From the fixed effects, SIZE and PROF were significant independent variables, because their p-value was less than 0.05. So that, CSED (dependent variable) was explained by SIZE and PROF independent variables. All other variables (MNGR, MIA, AGE and LEV) were insignificant independent variables, because their p-value was of greater than 0.05.

Random Effects

Table 5: Random Effects

Method: Panel EGLS (random effects)				
Variable	Co-efficient	Std. Error	t-statistic	Prob.
C	0.081	0.120	2.671	0.503
MNGR	0.052	0.035	3.469	0.145
MIA	0.002	0.011	2.229	0.818
AGE	0.009	0.001	2.812	0.005
SIZE	0.055	0.012	3.174	0.006
PROF	0.024	0.047	2.520	0.004
LEV	0.061	0.002	2.214	0.830
R-squared	0.718	Durbin- Watson stat		1.636
Adjusted R-squared	0.501	F- statistic		0.696

From the random effects, AGE, SIZE and PROF were significant independent variables, because their p-value was less than 0.05. So that, CSED (dependent variable) was explained by AGE, SIZE and PROF independent variables. Other variables (MNGR, MIA and LEV) were insignificant independent variables, because their p-value was of greater than 0.05.

Hausman Test

Table 6: Hausman Test

Correlated random Effects- Hausman Test				
Test summary	Chi Sq. statistic		Chi-sq. d.f.	Prob.
Random	15.132		7	0.734
Random effects test comparisons:				
Variable	Fixed	Random	Var (diff.)	Prob.
MNGR	0.038	0.052	0.014	0.221
MIA	0.036	0.002	0.034	0.763
AGE	0.003	0.009	0.006	0.005
SIZE	0.047	0.055	0.008	0.050
PROF	0.205	0.024	0.181	0.093
LEV	0.004	0.061	0.057	0.443
Method: Panel EGLS (random effects)				
Variable	Co-efficient	Std. Error	t-statistic	Prob.
C	0.059	0.146	3.477	0.080
MNGR	0.038	0.058	2.656	0.532
MIA	0.153	0.011	3.155	0.022
AGE	0.209	0.071	5.033	0.010
SIZE	0.247	0.015	3.069	0.029
PROF	0.205	0.070	2.581	0.016
LEV	0.089	0.045	2.058	0.765
R-squared	0.766	Durbin- Watson stat		1.977
Adjusted R-squared	0.576	F- statistic		0.696

From the Hausman test, it was decided that random effects model was appropriate for the data. So, the equation was shown below:

$$\text{CSED} = 0.059 + 0.038 \text{ MNGR} + 0.153 \text{ MIA} + 0.209 \text{ AGE} + 0.247 \text{ SIZE} + 0.205 \text{ PROF} + 0.089 \text{ LEV}$$

It was found that comparing calculated t-value of (2.656; 3.155; 5.033; 3.069; 2.581 and 2.258 respectively) with table value of 1.96 at 95% confidently, it was concluded that the statement of hypothesis of (HA1: positive association between management role and CSER disclosures, HA2: positive association between membership of industrial association and CSER disclosures, HA3: positive association between company age and CSER disclosures, HA4: positive association between company size and CSER disclosures, HA5: positive association between profitability and CSER disclosures, and HA6: positive association between financial leverage and CSER disclosures) were accepted. Hence, there were positive association among all the independent variables (management role, membership of industrial association, company age, company size, profitability, and financial leverage) and CSER disclosures of the textile industry in Bangladesh.

Conclusion and Future Research Scope

The results indicated that most of the variables were explained the extent of corporate social and environmental disclosures in annual reports, and they influenced approximately to a similar extent across the industry. During the last few years, textile sector became one of the earning sectors in Bangladesh. This sector was highly responsible for social and environmental impact, since it consumes a huge amount of water and pollutes through the discharges of contaminated water. Such issues needed to be accountable to secure environment and society at large. Due to the pressure from the government and the BSEC, only a handful firms installed effluent treatment plant (ETP) and controlled their discharges, but most of the firms were uncaring regarding this action (The Textile Today, 2017). By analyzing the corporate social and environmental reporting (CSER) i.e.; proper environment protection planning, environment savings project and by taking various alternative course of action for corporate social and environmental reporting may improve the financial performance of the textile industry in Bangladesh. So, it is necessary for an in-depth research in CSER disclosures of the textile industry in Bangladesh.

Throughout the world, environmental conservation has become a burning topic. It is high time for Bangladesh to focus on environmental protectionism, and to put more emphasis on the accounting and reporting issue associated with environmental cost and benefit. Future study could be conducted on pharmaceuticals and telecommunication sectors to find out why there wasn't such a high level of disclosure in these areas, what the motivation was behind such CSER disclosures and why there was low CSER disclosures in textile, food and allied, and tannery industries.

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Sustainability Reporting Practices: Evidence from Listed Non-financial Companies in Bangladesh

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ABSTRACT

The purpose of this study is to explore the nature and extent of sustainability reporting practices of listed non-financial companies in Bangladesh in congruence with the latest GRI Standards. The study further investigates the extent of economic, environmental, and social dimensions of sustainability reporting practices. The research is based on 310 firm-year observations from 14 non-financial industries listed at Dhaka Stock Exchange for the years 2019 and 2020. The manual content analysis technique is used in this study to explore 72 indicators of sustainability reporting where 13 indicators are from economic dimension, 25 indicators are from environmental dimension and 34 indicators are from social dimension. The results reveal that the average sustainability performance score is 20 percent for the year 2019 and 25 percent for the year 2020, illustrating a marked increase in sustainability reporting practices of sample companies. The average performance scores of economic, environmental, and social dimensions for the year 2020 are 40, 22 and 21 percent respectively which indicate that non-financial companies are more willing to disclose economic indicators compared to social and environmental indicators. Based on industrial classification, the cement industry has obtained the highest sustainability performance score which is 33 percent in 2020 and 26 percent in 2019. Though sustainability reporting is voluntary in Bangladesh, an increasing disclosure trend of economic, environmental, and social dimension is observed during the period of review. The extensive and versatile analysis of all 3 dimensions of sustainability reporting will provide fresh insight about the extent of sustainability disclosure practices which will help the policy makers, practitioners and capital market regulators to reform national-level policies, strategic plans and strong implementation of existing laws to improve sustainability reporting practices in an emerging economic context.

KEYWORDS

Keywords: Sustainability performance, economic performance, environmental performance, social performance, voluntary reporting, GRI, Bangladesh.

I ntroduction

Sustainability reporting has achieved overwhelming importance and nowadays it has become a compelling issue in an emerging economy like Bangladesh (Kumar Das et al., 2021). Due to climate change, global warming and environmental degradation, at present people are questioning whether organizations are achieving rapid economic growth or sustainable economic growth (Orazalin & Mahmood, 2020). As people's concerns and expectations about economic, social and environmental matters are increasing day by day, corporate sustainability reporting has gained research attention among many researchers (Akhter & Dey, 2017). Due to rapid accountability pressure from stakeholders and to ensure greater transparency, the scope of sustainability reporting has been expanded recently which was previously limited to environmental issues only (Kolk, 2008). Apart from environmental issues, economic performance, market presence, anti-corruption, social issues, employment, local community engagement and many other aspects are now being included in corporate sustainability reporting. Organizations publish sustainability reports in order to legitimate their operation in the society and to avoid negative impacts which will retain their corporate reputation (Pope & Lim, 2020). Thus, analyzing the nature and extent of sustainability reporting practices including economic, environmental and social performance has become fundamental and crucial issues among managers, policymakers, academics, practitioners and other stakeholders (Orazalin & Mahmood, 2018, 2020).

Although most of the companies in developed countries are already publishing standalone

sustainability reports, many companies in emerging economy have recently commenced disclosing sustainable information in order to reap benefits of corporate sustainability reporting (Mukherjee & Nuñez, 2019; Orazalin & Mahmood, 2020). The scope of sustainability reporting is widening and changing over the years and thus research on sustainability reporting practices is required to offer insights about further improvements of GRI-based sustainable standards (Orazalin & Mahmood, 2018, 2020; Pope & Lim, 2020; Yadava & Sinha, 2016). Hence, the aim of the study is to identify the nature and extent of sustainability reporting practices of sample non-financial companies listed at Dhaka Stock Exchange.

This study contributes to the existing sustainability literature in several ways. First, it reveals the extent to which Bangladeshi companies are preparing and disseminating corporate sustainable reports using the latest version of GRI Standards. Second, on the basis of sustainable performance score, this study divulges the position of different non-financial industries and in particular, names of top-ranked companies which will encourage managers to improve their reporting practices in near future. Third, present study measures the nature and extent of economic, environmental, and social dimensions separately which will provide fresh insights about the specific indicators under each dimension. Finally, the empirical findings will authorize the policy makers, practitioners and regulators to reform national-level policies, strategic plans and strong implementation of existing laws to improve sustainability reporting practices in the context of an emerging economy.

The remainder of this paper is organized as follows: Section 2 presents the objective of the study, Section 3 provides review on prior literature, section 4 describes the research methodology, section 5 presents the empirical findings and section 6 provides the conclusion of the study.

Research Objective

The primary objective of the study is to explore the nature and extent of sustainability reporting practices of non-financial companies from 14 different studies listed at DSE in congruence with latest GRI standards. The secondary objectives of the study are :-

- To empirically investigate the nature and extent of sustainability reporting in term of economic performance
- To empirically examine the nature and extent of sustainability reporting in term of environmental performance
- To empirically examine the nature and extent of sustainability reporting in term of social performance

Literature Review

Over the past few years, sustainability reporting has become a global trend that is gradually attracting the attention of researchers (Kilic & Kuzey, 2017). Numerous studies focusing on the extent of sustainability reporting practices have been conducted worldwide, some of these studies also examined the factors that affect sustainability reporting practices. In this regard, Arayssi et al., (2016) found that the average sustainability disclosure score of all listed firms in FTSE 350 index is 30.883 percent for the years 2007 to 2012. The study also revealed that presence of women on board has considerable influence on sustainability disclosure practices. In a related study on the banking industry in Nigeria, Uwuigbe et al., (2018) found the average sustainability disclosure index of 34.13 percent for the period 2014-2016. Buallay & Al-Ajmi (2019) in their evidence from banks in the Gulf corporation Council found the mean sustainability disclosure score as 34.01 percent which indicates the moderate amount of sustainability disclosure level by the sample banks (the conclusion was drawn by using a sample of 59 banks for the years 2013 to 2017).

Garg (2015) studied the sustainability reporting practices of Indian companies for the period 2008 to 2012. The author reported a trend of continuous improvement of sustainability reporting practices by Indian firms over the 5 years. The similar trend is also found by Orazalin & Mahmood (2018) in their empirical study on sustainability reporting practices of Russian oil and gas industry. The study was conducted using 50 large publicly traded companies in oil and gas industry for the period 2012 to 2016. The authors found that the mean sustainability performance index was 13.21, 15.89, 15.20, 16.05 and 16.87% in the year 2012, 2013, 2014, 2015 and 2016, respectively. Orazalin & Mahmood (2018) reported the 3 dimensions (economic, environmental, and social) separately and showed that economic performance index is higher over the 5 years compared to environmental index and social index. For example, in 2016, the economic performance index was 28.98 percent whereas the environmental and social performance index were 18.74 and 13.28 respectively. This conclusion is also supported by Bhatia & Tuli (2014) in their analysis on sustainability disclosure practices in India and China using a sample of 17 companies from BSE-30 (India) and 19 companies from SSE-50 (China). The authors found that in India, the average sustainability disclosure was 81.34 percent and under category wise analysis the disclosure score of economic, environmental and social dimension was 87.26, 82.86 and 78.16 percent, respectively. In China the average sustainability disclosure score, economic score, environmental score and social score was 31.25, 49.14, 29.82 and 28.04 percent, respectively. Therefore, Bhatia & Tuli (2014) also found higher economic disclosure score both in India and China compared to environmental and social disclosure score.

The literature on sustainability reporting practices is showing the evidence that in order to legitimate business operation, uphold companies' reputation, meet stakeholder's expectation, get competitive advantage and for many other benefits, the number of companies publishing sustainability reports is increasing rapidly across the world. In this respect, Kilic & Kuzey (2017) in their study on sustainability reporting practices in Turkey found that the number of companies publishing sustainability reports in 2004 was 0.44 percent which increased to 11.79 percent in 2015. The authors concluded this findings by using a sample of 229 firms. Kolk (2008) also found an increasing trend of sustainability reporting

practice using a sample of Fortune Global 250 companies. The sustainability reporting was 39, 52 and 69 % for the year 1999, 2002 and 2005.

In Bangladesh, numerous studies on corporate social responsibility and environmental reporting have been conducted (Kumar Das et al., 2021) and in recent time few studies on voluntary disclosure practices and integrated reporting practices are found, but very few studies focused on GRI-based sustainability reporting practices in Bangladesh. A review of earlier GRI-based studies is presented below.

Khan et al., (2011) studied the sustainability reporting practices of 12 major commercial banks in Bangladesh for the year 2008/2009 according to GRI G3 guidelines and FSS indicators. The authors examined 5 general areas and found that 83.33, 91.67, 28.57, 0.00 and 100 percent companies reported environmental, labour practices and decent work, product responsibility, human rights and society, respectively and out of 16 FSS indicators only 7 indicators are disclosed by all banks.

Akhter & Dey (2017) examined the annual reports and website of top 50 listed companies in Bangladesh based on 40 indicators of GRI G4 guidelines. The authors found that 66 percent companies use less than 25 sentences in sustainability reporting, 16 percent companies use separate sustainability section and on specific disclosure category, 36.67, 31.33, 20.4, 2.4 and 4% companies disclose labour practices, economic aspects, societal aspects, products responsibilities, and human right issues, respectively.

Mahmud, Biswas & Islam, (2017) investigated the sustainability disclosure level of the banking sector of Bangladesh in congruence with GRI guidelines and showed that the percentage of banks disclosing sustainability report was 0, 3.33, 6.67, 6.67 and 10% for the year 2011, 2012, 2013, 2014 and 2015, respectively. The conclusion was drawn by using a sample of 30 banks listed in Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE).

Ahmed, Alam & Hasan (2018) in their empirical study on sustainability reporting practices by non-bank financial institutions of Bangladesh showed that only few companies follow GRI guidelines to publish sustainability reports and the summary of disclosure percentage is- 35.00% (full

disclosure), 28.75% (partial disclosure) and 36.25% (no disclosure). The authors concluded these findings by using a sample of 16 companies for the period 2012 to 2016.

Bae, Kim and Masud (2018) in a cross-country investigation on the drivers of sustainability reporting practices in line with GRI guidelines found a positive and significant relationship of sustainability disclosure with foreign shareholding, institutional shareholding, board independence, and board size. This study used a sample of 326 reports where 16 reports were from Bangladesh, 271 reports from India and 39 reports from Pakistan for the year 2009 to 2016.

Islam (2020) in his empirical study on sustainability reporting practices of banking industry focused on environmental aspects of sustainability reports based on GRI guidelines. For the purpose of the study the author selected 3 banks and found that the average environmental disclosure score of Prime Bank, Bank Asia and Mutual Trust Bank are 76.92, 69.23 and 65.38 percent respectively.

Hassan, Elamer, Sobhan & Fletcher (2020) investigated the supply and demand side of sustainability assurance in Bangladesh using a sample of 100 largest companies for the year 2015. The authors found that companies that publish more sustainability information, are expected greater sustainability assurance, and amalgamate sustainability information with the corporate annual reports.

Kumar Das et al. (2021) examined the annual reports of 51 listed companies based on 48 indicators of GRI G4 guidelines where 17 indicators are from environmental dimension and 31 indicators from social dimension for the year 2016/2017. The 51 companies were selected from five sectors- textile, cement, food & allied, pharmaceuticals & chemicals and Bank. The authors found that the overall sustainability reporting index is 10.70 percent, and the disclosure index of environmental and social aspect are 11.42 and 10.31 percent, respectively.

From the above evidence of the studies on sustainability reporting practices, it can be concluded that most of the earlier studies focused on financial sector only, where 3 studies focused on banking sector (Islam, 2020; Khan et al., 2011; Mahmud et al., 2017) and 1 study focused on

non-bank financial institutions (Ahmed et al., 2018). Few other studies are conducted using a sample of top listed companies based on market capitalization (Akhter & Dey, 2017; Hassan et al., 2020) but only one study used a sample of 51 companies from 5 different sectors. So far, no research has been conducted on the non-financial sector only and all the prior studies are based on GRI G3, G3.1 and G4 guidelines which have been superseded by the GRI Standards. To fill this research gap, the current study aims to explore the nature and extent of sustainability reporting practices based on GRI Standards by using a sample of 310 companies from 14 non-financial industries listed at Dhaka Stock Exchange for the year 2019 and 2020.

Research Methodology

Data

The study is based on the data collected from different secondary sources. Data on sustainability performance is collected from specific sustainability section and in the absence of sustainability section, the whole annual reports have been scrutinized. All the required financial data is assembled from the audited financial statements of the individual companies.

Sample

All the two hundred and thirty one listed non-financial companies at Dhaka Stock Exchange for the year 2019-20 is selected for initial sample. Due to unavailability of corporate annual reports for the year 2019-20 thirty two companies are excluded from the sample. Another forty four companies are also eliminated because of incomplete information, inaccessibility to websites and fiscal year inconsistency. Hence, the sample reduces to one hundred and fifty five companies for the years 2018-19 and 2019-20. Financial years before 2018-19 are not considered in this study since the study is based on recent GRI Standards which are effective on or after 1 July 2018. Therefore, the final sample consists of 310 firm-year observations from 14 different non-financial industries listed at DSE. Table-1 represents sample companies, sample percentage and population of the study on an industry basis.

Measurement of sustainability performance score

In this study, the GRI based economic aspects, environmental aspects, social aspects and a composite of these three aspects which is sustainability performance are considered as the

Table-1: Sample Description

Industry	Sample Size	Percentage	Population
Cement	5	71%	7
Ceramics Sector	4	80%	5
Engineering	32	76%	42
Food & Allied	12	60%	20
Fuel & Power	17	77%	22
IT Sector	9	82%	11
*Jute	0	0%	3
Miscellaneous	8	62%	13
Paper & Printing	4	100%	4
Pharmaceuticals & Chemicals	23	74%	31
Services & Real Estates	4	100%	4
Tannery Industries	2	33%	6
Telecommunication	1	33%	3
Textile	31	55%	56
Travel & Leisure	3	75%	4
Total	155	67%	231

* the jute industry was taken as initial sample, due to unavailability of information it is excluded from the final sample

main variables of interest. The GRI guidelines specify the required indicators to measure the economic performance, environmental performance, and social performance. The topic specific disclosure of GRI 200 series: economic aspects, GRI 300 series: environmental aspects and GRI 400 series: social aspects are followed in this study. Thirteen performance indicators from GRI-201: economic performance, GRI-202: Market Presence, GRI-203: Indirect Economic Aspects, GRI-204: Procurement Practice, GRI-205: Anti-corruption and GRI-206: Anti-competitive Behavior standards have been chosen to measure the economic performance. Twenty five performance indicators from GRI-301: Materials, GRI-302: Energy, GRI-303: Water, GRI-304: Biodiversity, GRI-305: Emissions, GRI-307: Environmental Compliance and GRI-308: Supplier Environmental assessment are selected to compute the environmental performance. Thirty four performance indicators from GRI-401: Employment, GRI-402: Labor Management Relations, GRI-403: Occupational Health and Safety, GRI-404: Training and Education, GRI-405: Diversity and Equal Opportunity, GRI-406: Non-discrimination, GRI-407: Freedom of Association and Collective Bargaining, GRI-408: Child Labor, GRI-409: Forced or Compulsory Labor, GRI-410: Security Practices, GRI-411: Rights of Indigenous Peoples, GRI-412: Human Rights Assessment, GRI-413: Local Communities, GRI-414: Supplier Social Assessment, GRI-415: Public Policy, GRI-416: Consumer Health and Safety, GRI-417: Marketing and Labeling, GRI-418: Consumer Privacy and GRI-419: Socioeconomic Compliance are taken into consideration to measure social performance. 'GRI-207: Tax, GRI-303: Water

and Effluents, and GRI-403: Occupational Health and Safety, 2018' are not considered in this study, as these standards will be effective on or after 1 January 2021 and 'GRI-306: Waste' will be effective from 1 January 2022.

In line with the prior studies of Allegrini & Greco (2013), Mahmood & Orazalin (2017), Orazalin & Mahmood (2018), Orazalin & Mahmood (2020) and Hassan et al., (2020), the dichotomous scoring system is used in this study to measure the three aspects of sustainability performance. Under this dichotomous approach, a value of 1 is provided if a specified performance indicator is disclosed in the annual report or 0 if the indicator is not disclosed. The disclosure score of each three dimensions of sustainability performance is computed as follows:

$$ECPS, ENPS, SCPS, SRPS = TPS / MPS$$

Where, ECPS is the economic performance score, ENPS is the environmental performance score, SCPS is the Social Performance Score, SRPS is the Sustainability performance score, TPS is the total performance score obtained by the company under each dimension and MPS is the maximum possible score under each dimension.

To calculate performance score under each criterion, the actual score obtained by each company is divided by the maximum possible score. The maximum possible score for ECPS, ENPS, SCPS and SRPS are 13, 25, 34 and 72, respectively. The detailed information of each indicator under the three dimensions of sustainability reporting is provided in appendix-A, B and C.

Table-2: Variable Description

Variable Name	Acronym	Source	Operationalization
Economic Performance Score	ECPS	Annual Report	Actual performance score under economic dimension divided by maximum possible score (13).
Environmental Performance Score	ENPS	Annual Report	Actual performance score under environmental dimension divided by maximum possible score (25).
Social Performance Score	SCPS	Annual Report	Actual performance score under social dimension divided by maximum possible score (34).
Sustainability Performance Score	SRPS	Annual Report	Sum of scores from above three dimensions divided by maximum possible score (72).

Analysis and Findings

This section presents the empirical findings of the nature and extent of sustainability reporting practices of sample non-financial companies. The descriptive analysis of all variables, analysis on sustainability disclosure level including the separate investigation of 3 dimensions of sustainability reporting is shown below:

Descriptive Analysis

Table-3 reports the descriptive statistics (observation, mean, standard deviation, minimum and maximum) of sustainability reporting practices of sample non-financial companies listed at Dhaka Stock Exchange for the period 2019 and 2020. Results of SRPS shows that sustainability performance score has a mean value of 22.42 percent which varies between 0 to 52.78 percent, with a standard deviation of 9.63 percent. Economic

performance score of sample company varies between 0 to 76.92 percent and the standard deviation of ECPS is 14.56 percent which is relatively high. The standard deviation of ENPS and SCPS are 12.17 percent and 8.57 percent, respectively. The average values of ECPS, ENPS and SCPS are 34.57, 18.83 and 20.43 percent which indicates that sample non-financial companies are more willing to disclose economic indicators compared to environmental and social indicators. The similar result is found by Orazalin & Mahmood (2020) where the average value of economic, environmental and social dimensions were 18.49, 8.45 and 9.05 percent respectively, illustrating that more indicators of economic dimension are reported by publicly traded companies in Kazakhstan. Yadava & Sinha (2016) in their empirical study on leading public and private Indian companies, found better economic disclosure compared to other two dimensions of sustainability reporting which also supports the findings of current study.

Table3: Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
SRPS	310	.2242384	.0963951	0	.5277778
ECPS	310	.3456576	.1454971	0	.7692308
ENPS	310	.1882581	.1217411	0	.68
SCPS	310	.2042694	.0856769	0	.5

Overall Sustainability Performance Including 3 Dimensions

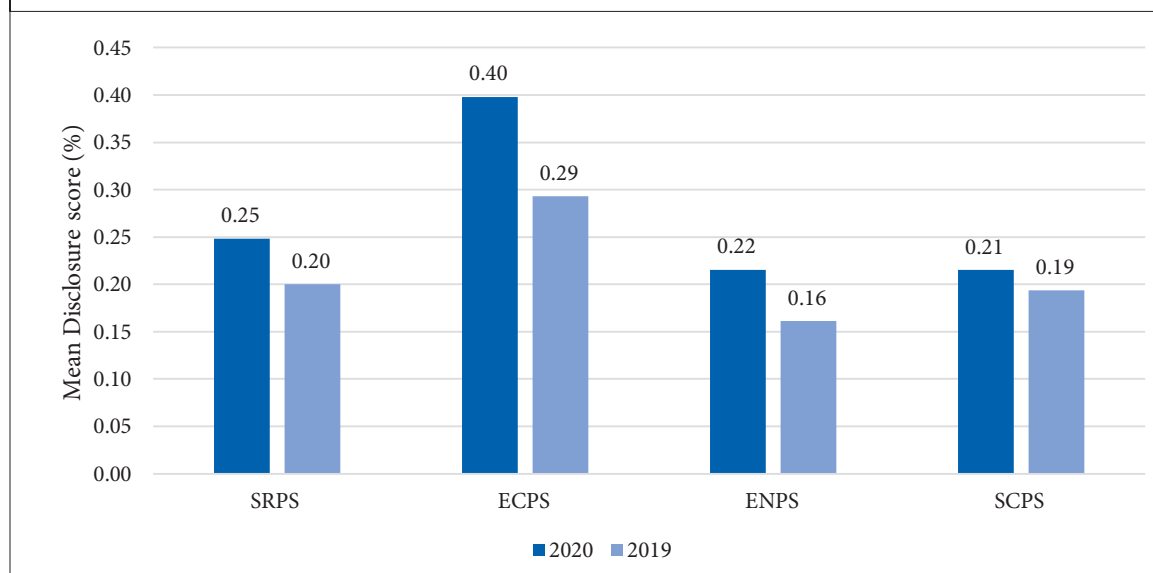


Figure 1: Overall Sustainability Disclosure

Figure-1 shows the average sustainability performance score (SRPS) of sample non-financial companies for the period 2019 and 2020 which reflects the sustainability reporting practices of Bangladeshi companies. Further, this figure provides insights about the yearly average economic performance score (ECPS), environmental performance score (ENPS) and social performance score (SCPS) for both 2019 and 2020. The overall sustainability performance score is 20 percent in 2019 and 25 percent in 2020 which indicates a marked increase in the sustainability disclosure practices of sample companies from 14 non-financial industries listed at Dhaka Stock Exchange (DSE). The mean performance score of economic dimension shows that companies developed the reporting practices in terms of economic performance during the period of review. In 2019, the average environmental performance score was 16 percent which increased to 22 percent in 2020, illustrating the similar improvement of sustainability reporting practices in terms of environmental performance as economic performance. A steady improvement of social performance score of the sample companies from 19 percent to 21 percent is observed during the study period. In aggregate, the improved sustainability

reporting practice by sample companies is supported by the segregated analysis on economic performance, environmental performance, and social performance. Regarding prior studies, Kumar Das et al., (2021) analyzed 51 listed companies based on 48 indicators in line with GRI for the year 2017 and found that the sustainability performance score, environmental performance score and social performance score are 10.70, 11.42 and 10.31% respectively. The practice of disclosing sustainable information has increased over the year since the sustainable performance score in 2017 was 10 percent which increased to 20 percent in 2019 and 25 percent in 2020. This marked improvement of sustainability performance score in 2019 and 2020 is attributable to the new GRI standards which enhances the quality of sustainable information and effective from 2018 and on ward as well as mandatory compliance of corporate governance code of 2018 by all listed companies.

Figure-2 shows industry-wise sustainability disclosure for the year 2019 and 2020. For the purpose of comparison of the level of sustainability disclosure among fourteen non-financial industries, the mean sustainability disclosure score is used in this study. The cement industry has gained the

Sustainability disclosure level by industries

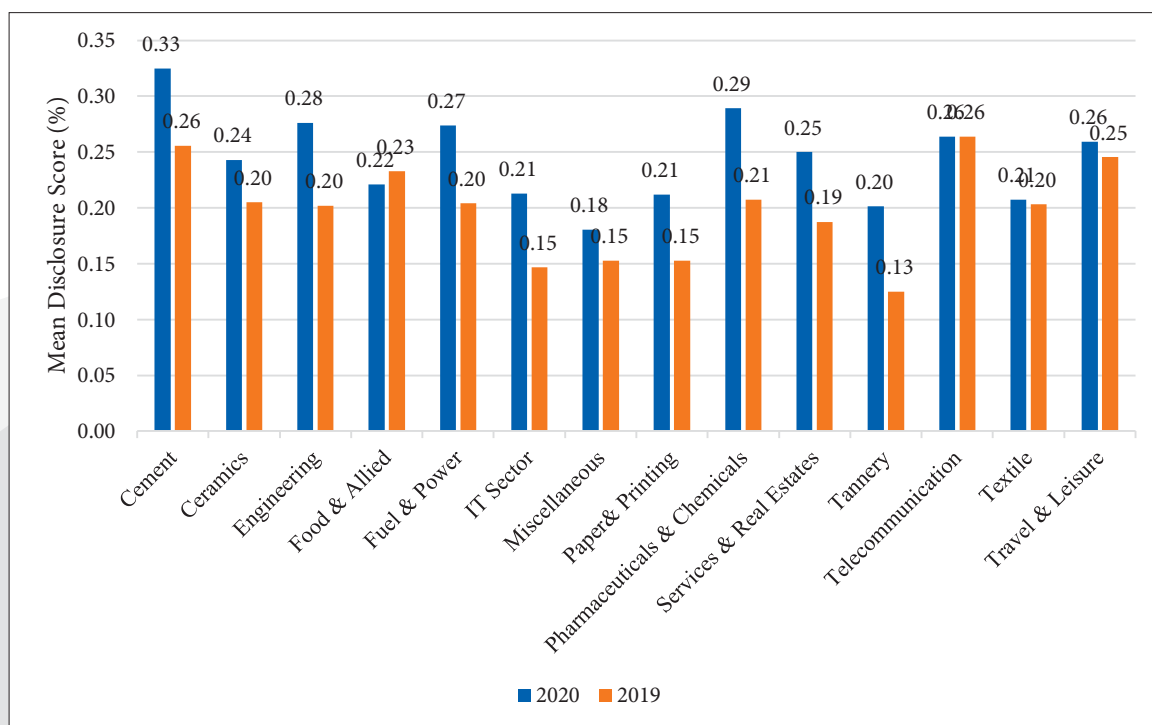


Figure 2: Sustainability Disclosure Level by Industry

highest average disclosure score in both years which is 33 percent for the year 2020 and 26 percent for the year 2019. Thus, a sharp improvement of 7 percent in the sustainability reporting practice in line with GRI standards of the mentioned industry is observed. This result is supported by the study of Kumar Das et al., (2021) where the cement industry secured the top score which is 16.67 percent in 2017 among 4 non-financial industries. In terms of yearly average disclosure score, an increasing trend is noticed for all mentioned sectors except telecommunication sector and food & allied sector. The mean disclosure score of food and allied sector is 23 percent for the year 2019 and this score is reduced by 1 percent in 2020. From 2019 to 2020, an improvement of sustainability disclosure score by 8 percent is observed in both engineering sector and pharmaceuticals & chemicals sector. This is an indication of the effort the aforementioned 2 industries to disclose sustainability information voluntarily according to GRI standards. The sustainability disclosure practice of Bangladeshi companies still needs to be improved. This poor level of sustainability performance score is attributable to companies' unwillingness to voluntary sustainability disclosure and lack of social accountability.

Sustainability disclosure level in terms of number of indicators

The total number of sustainability performance indicators is 72 which is the composite of 13 performance indicators from economic dimension, 25 performance indicators from environmental dimension and 34 performance indicators from social dimension.

Table-4 shows the distribution of sustainability performance where column 1 represents the frequency of sustainability performance indicators, column 2 and column 4 show the number of companies disclosed the ranges of performance indicators for the year 2020 and 2019 respectively. Column 3 and column 5 exhibit the percentage of companies disclosed the ranges of performance indicators for 2020 and 2019, respectively. Most of the companies disclose 11 to 20 sustainability performance indicators which is notable in both sample years. In the year 2020 only 17 companies disclosed 31 to 40 indicators and these 17 companies represent 11 percent of the total sample companies and in 2019 only 3 companies disclosed performance indicators under the aforesaid ranges. No company has reported more than 40 sustainability performance indicators both in 2019 and 2020 which is pessimistic. In this regard, Akhter & Dey (2017) in their empirical study on sustainability reporting practice, examined the annual report and website of top 50 listed companies at DSE for the year 2016 and found that 84, 12 and 4% companies disclosed less than 10, 10 to 20 and 21 to 30 indicators, respectively and no company disclosed more than 30 indicators. However, this study focuses on recent sustainability disclosure practices by non-financial companies according to GRI standards and evidence shows that companies repeatedly disclose indicators over the years which are mostly general qualitative requirements and management of the companies are reluctant to disclose quantitative information with proper analysis.

Table 4: Sustainability Disclosure Level in Terms of Indicators

Year	2020		2019	
Number of indicators	Number of companies	Percentage	Number of companies	Percentage
less than 10 indicators	17	11%	27	17%
11 to 20 indicators	90	58%	109	70%
21 to 30 indicators	31	20%	16	10%
31 to 40 indicators	17	11%	3	2%
41 to 50 indicators	0	0%	0	0%
51 to 60 indicators	0	0%	0	0%
61 to 72 indicators	0	0%	0	0%
Total	155	100%	155	100%

Top-ranked companies based on sustainability performance score

On the basis of sustainability performance score, top ten companies, performance score of these ten companies and the industry in which these companies belong to is shown in Table-5. Paramount Textile Limited has obtained the highest sustainability performance score in 2020. The second highest performance score which is 51.39 percent have been secured by Bangladesh Steel Re-Rolling Mills Ltd., BSRM Steels Ltd and Beximco pharmaceuticals Ltd. Based on the industrial category of top companies in 2020, out of 10 companies, 3 companies are from engineering sector, 2 companies from textile sector, 2 companies from pharmaceuticals & chemicals, 2 companies from fuel & power sector and 1 company from food & allied sector.

The highest sustainability performance score in 2019 which is 48.61 percent is secured by Walton Hi-Tech Industries Limited from Engineering sector. One noteworthy thing is that the highest sustainability performance score is elevated in 2020 compared to 2019 which indicates that companies are disclosing more sustainable information nowadays and this finding is supported by previous analysis. When the industrial classification of 2019 is compared with that of 2020, it is found that most of the companies

in the top ten are from some specific industries in both years, these industries are engineering, food & allied, pharmaceuticals & chemicals and fuel & power. It is unfortunate that top-ranked companies in both years are from 6 industries only out of 14 non-financial industries listed at Dhaka Stock Exchange (DSE).

Level of sustainability reporting in term of economic performance

To assess the nature and extent of sustainability reporting in term of economic performance, the industry-wise economic disclosure level, and economic disclosure level in term of number of indicators are shown below:

The disclosure level of economic dimension of different non-financial sectors listed at Dhaka Stock Exchange for the year 2019 and 2020 is presented in figure-3. The cement industry has obtained the highest mean disclosure score in 2020 and 2019 which are 58 percent and 48 percent, respectively. This result is conforming to our previous analysis on industry-wise sustainability disclosure level where cement industry has secured the highest sustainability performance score. In 2019, the highest economic performance score is obtained by cement sector followed by food & allied sector, telecommunication sector, travel & leisure sector,

Table 5: Top Companies Based on Sustainability Performance

SRPS Rankings 2020				SRPS Rankings 2019			
Ranking	Company Name	Score	Industry	Ranking	Company Name	Score	Industry
1	Paramount	0.53	Textile	1	Walton	0.49	Engineering
2	BSRM	0.51	Engineering	2	MJL Bd ltd	0.46	Fuel & Power
2	BSRM Steel	0.51	Engineering	3	Orion Pharma	0.43	Pharmaceuticals & Chemicals
2	Beximco Pharma	0.51	Pharmaceuticals & Chemicals	4	Golden Harvest	0.42	Food & Allied
5	Walton	0.50	Engineering	5	BAT	0.40	Food & Allied
5	Olympic	0.50	Food & Allied	6	Beximco Pharma	0.36	Pharmaceuticals & Chemicals
5	Al-baraqah	0.50	Fuel & Power	7	Olympic	0.35	Food & Allied
8	ACME	0.49	Pharmaceuticals & Chemicals	8	Olympic	0.33	Engineering
9	MJL bd ltd	0.47	Fuel & Power	8	Unique Hotel & resort ltd	0.33	Travel & Leisure
9	Shasha Denims	0.47	Textile	9	Summit Power ltd	0.31	Fuel & Power

Industry-wise economic disclosure

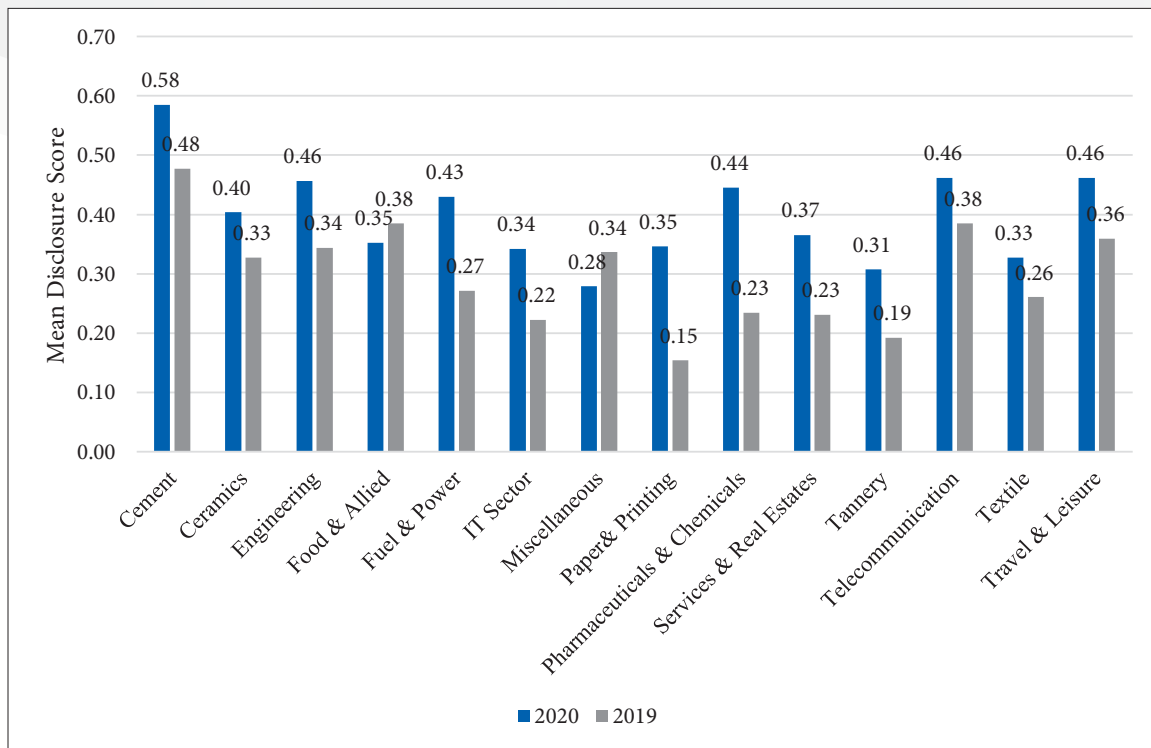


Figure 3: Economic Disclosure Level by Industries

food & allied sector, miscellaneous sector and so on. The yearly average economic performance score of the fourteen non-financial industries listed at Dhaka Stock Exchange shows an increasing trend during the period under review.

Economic disclosure level in terms of number of indicators

Table-6 presents the distribution of economic performance of sample non-financial companies for

the year 2019 and 2020. 62 companies which constitute 40 percent of the sample size disclosed less than 3 indicators in 2019 and in 2020, 35 companies which is 23 percent of the sample reported the aforementioned indicators. More than 50 percent companies in the sample period disclosed 4 to 6 indicators out of 13 indicators. No company in 2019 has disclosed more than 10 indicators and only 3 percent companies disclosed 7 to 9 economic performance indicators.

Table 6: Economic Disclosure Level in Terms of Indicators

Year	2020		2019	
Number of indicators	Number of companies	Percentage	Number of companies	Percentage
less than 3 indicators	35	23%	62	40%
4 to 6 indicators	80	52%	88	57%
7 to 9 indicators	33	21%	5	3%
10 to 13 indicators	7	5%	0	0%
Total	155	100%	155	100%

Level of sustainability reporting in term of environmental performance

To assess the nature and extent of sustainability reporting in term of environmental performance, the industry-wise environmental disclosure, and environmental disclosure level in term of number of indicators are shown below:

Industry-wise environmental disclosure

The summary results in figure-4 shows the level of environmental disclosure among different non-financial industries listed at Dhaka Stock Exchange for the year 2019 and 2020. The Engineering sectors has secured the highest disclosure score in 2020 which is 26 percent followed by cement sector, fuel & power sector and pharmaceuticals & chemicals sector and so on. The majority of the companies has obtained environmental performance score between 15 percent to 20 percent during the study period. In 2019, the environmental performance score of 3 industries (IT, miscellaneous, tannery) is less than 10 percent and 2 industries (paper& printing, services

& real estates) scored less than 15 percent but in 2020, no industry obtained performance score less than 15 percent which demonstrates a marked increase in the environmental disclosure practices of the sample nonfinancial companies.

Environmental disclosure level in terms of number of indicators

Table-7 shows that in 2020, 114 companies which constitute 74 percent of sample size and in 2019, 133 companies which constitute 86 percent of sample disclosed environmental performance indicators less than 5. So, it can be said that majority of the companies are not disclosing sufficient environmental information in compliance with GRI standards. In 2019, 10 percent companies reported 6 to 10 indicators and 4 percent companies disclosed 11 to 15 indicators in the annual reports. In 2020, an increase in the environmental disclosure practice is observed in terms of number of indicators where 15 percent companies reported 6 to 10 indicators which was 10 percent for the previous year and 9 percent companies disclosed 11 to 15 indicators which was 4 percent for the year 2019.

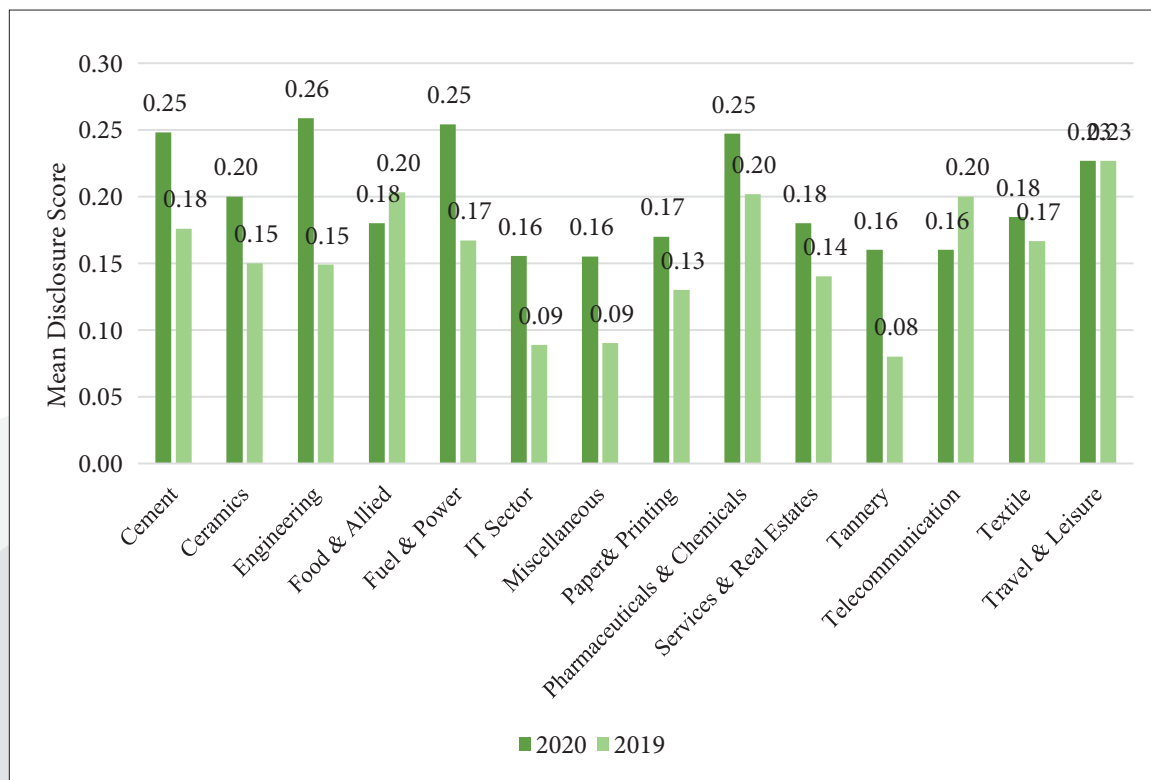


Figure 4: Environmental Disclosure Level by Industries

Table 7: Environmental Disclosure Level in Terms of Indicators

Year	2020		2019	
Number of indicators	Number of companies	Percentage	Number of companies	Percentage
less than 5 indicators	114	74%	133	86%
6 to 10 indicators	24	15%	16	10%
11 to 15 indicators	14	9%	6	4%
16 to 20 indicators	3	2%	0	0%
21 to 25 indicators	0	0%	0	0%
Total	155	100%	155	100%

Level of sustainability reporting in term of social performance

To assess the nature and extent of sustainability reporting in term of social performance, the industry-wise social disclosure, and social disclosure level in term of number of indicators are shown below:

Industry-wise social disclosure

Figure-5 shows that the cement industry has obtained the highest social disclosure score in 2020 which is 28 percent and in 2019 the telecommunication industry has gained the top score which is 26 percent.

The mean social disclosure score of all non-financial industries in 2020 is more than 15 percent and in

2019 all industries scored more than 15 percent except miscellaneous sector and tannery sector. But the admirable thing is that both miscellaneous sector and tannery sector improved their social disclosure practices in 2020 and their mean disclosure scores are 16 percent and 19 percent respectively. In 2020, 9 industries scored more than 20 percent and 4 industries obtained score more than 25 percent and these industries are cement industry (28 percent), pharmaceuticals & chemicals industry (26 percent), services & real estates (26 percent) and telecommunication industry (26 percent) but in 2019, only telecommunication industry scored more than 25 percent. This illustrates that sample non-financial companies are adopting the GRI standards voluntarily to disclose social performance indicators and hopefully these companies will disclose more indicators in the coming days to gain competitive advantage and to attract more investors.

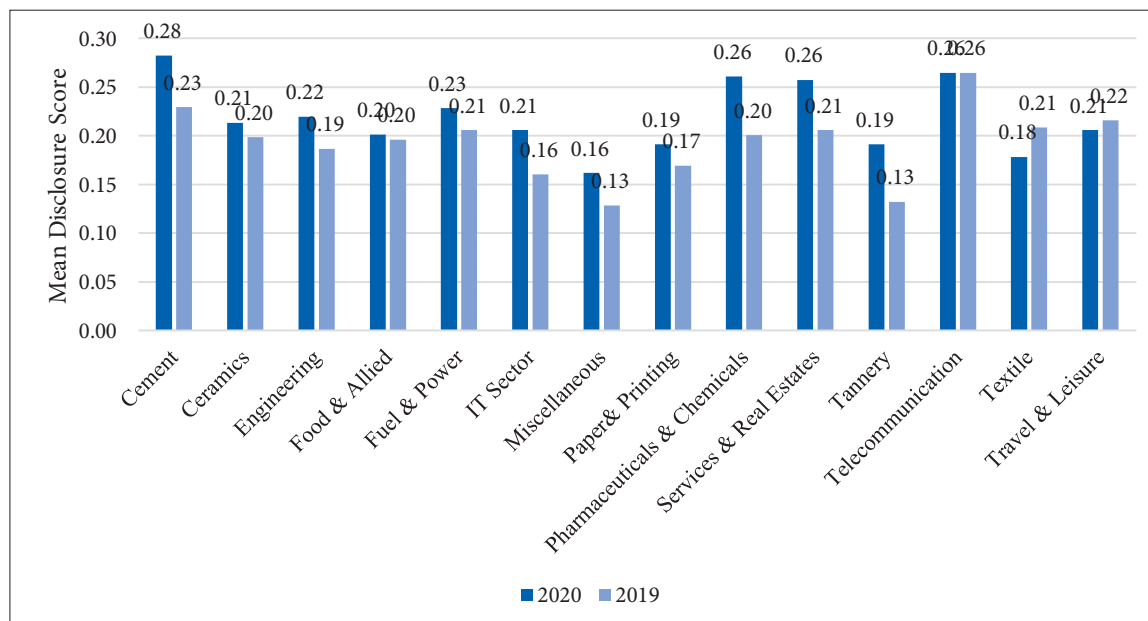
**Figure 5: Social Disclosure Level by Industries**

Table 8: Social Disclosure Level in Terms of Indicators

Year	2020		2019	
Number of indicators	Number of companies	Percentage	Number of companies	Percentage
less than 5 indicators	70	45%	57	37%
6 to 10 indicators	47	30%	86	55%
11 to 15 indicators	38	25%	11	7%
16 to 20 indicators	0	0%	1	1%
21 to 25 indicators	0	0%	0	0%
26 to 30 indicators	0	0%	0	0%
31 to 34 indicators	0	0%	0	0%
Total	155	100%	155	100%

Social disclosure level in terms of number of indicators

Results in Table-8 show that 70 companies which constitute 45 percent of sample size in 2020 and 57 companies which constitute 37 percent of sample size reported less than 5 performance indicators in annual reports. In 2019, 86 companies out of 155 companies disclosed social performance indicators within the range 6 to 10 which indicates that majority of companies disclose the minimum social requirements to retain public image. No company disclosed more than 16 indicators out of 34 indicators both in 2019 and 2020 which indicates that still there are several indicators left for developing the social disclosure practices of sample non-financial companies.

Conclusion and Discussions

This study investigates the nature and extent of sustainability reporting practices of non-financial companies in Bangladesh since disseminating sustainability information is getting immense importance in today's world. The mean sustainability performance score is 25 in 2020 and 20 in 2019. Though the performance score is relatively low, but the yearly average score is showing 5 percent increment indicating that the sustainability reporting practices of Bangladeshi companies will increase more in future years. The average performance score of 3 dimensions of sustainability reporting reveals that sample companies disclose more indicators of economic dimension compared to environmental and social dimensions. The reason for disclosing comparatively less indicators of

environmental and social dimension is that sustainability reporting is not yet mandatory in Bangladesh.

The industry-wise analysis of sustainability reporting and individual dimensions of sustainability reporting reveals that the cement industry has achieved the highest performance score in terms of sustainability performance, economic performance, and social performance. The engineering industry has obtained the highest environmental score which is 26 percent and, in this category, the environmental performance score of cement industry is 25 percent. Thus, it can be concluded that the cement industry discloses more sustainable information compared to all 14 non-financial industries listed at DSE.

Out of 72 indicators of sustainability reporting, in 2020, only 11 percent companies disclosed 31 to 40 indicators and majority of the company (58%) disclosed 11 to 20 indicators. In 2019, only 2 percent companies disclosed 31 to 40 indicators and 70 percent companies disclosed 11 to 20 indicators. In both years, no company reported more than 40 indicators which indicates that reporting and disclosing sustainability performance indicators in Bangladesh is still in its infancy.

The extensive and versatile analysis of this study has important practical implications for the regulators of the Dhaka Stock Exchange (DSE), Financial Reporting Council of Bangladesh (FRC), Bangladesh Securities and Exchange Commission (BSEC) and other regulatory bodies. The policymakers and regulators should take proper initiative to ensure

that companies disclose adequate and sufficient economic, social, and environmental information with a view to improving sustainability reporting culture. The industry wise comparison based on performance score and the ranking of top scored companies will encourage managers to improve their sustainability reporting practices in future years. The empirical findings about the disclosure level of 72 indicators propose the policy makers to encourage the adoption of GRI Standard in national level and suggest regulators to upgrade standards considering the context of an emerging economy such as Bangladesh.

Several limitations of this study pave the way for further research on sustainability reporting practices. Due to fiscal year inconsistency, financial companies are excluded from the sample. Therefore, new research including the financial companies is proposed which will provide new insights about the sustainability disclosure practices of financial companies. This study considers only 2 financial years, and an unweighted scoring system is applied to measure the sustainability performance including all 3 dimensions. Hence, further research based on weighted scoring method and a longer time span will overcome the limitations of the study. The explanation of managers behind non-disclosure of many indicators of sustainability reporting and general qualitative disclosure of indicators instead of quantitative disclosure with proper analysis is not addressed in this study. Therefore, future investigation regarding the thoughts of key personnel of management and expectation of stakeholders about the sustainability disclosure practices of Bangladeshi companies will provide fresh insight about the important aspects of voluntary disclosure of sustainability reports.

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Appendix

Appendix-A

GRI Standards	Serial	Economic Aspects	Reference
GRI-201: Economic Performance	1	Direct economic value generated and distributed (EVG&D)	Disclosure 201-1
	2	Financial implications and other risks and opportunities due to climate change	Disclosure 201-2
	3	Defined benefit plan obligations and other retirement plans	Disclosure 201-3
	4	Financial assistance received from government	Disclosure 201-4
GRI-202: Market Presence	5	Ratios of standard entry level wage by gender compared to local minimum wage	Disclosure 202-1
	6	Proportion of senior management hired from the local community	Disclosure 202-2
GRI-203: Indirect Economic Aspects	7	Infrastructure investments and services supported	Disclosure 203-1
	8	Significant indirect economic impacts	Disclosure 203-2
GRI-204: Procurement Practices	9	Proportion of spending on local suppliers	Disclosure 204-1
GRI-205: Anti-corruption	10	Operations assessed for risks related to corruption	Disclosure 205-1
	11	Communication and training about anti-corruption policies and procedures	Disclosure 205-2
	12	Confirmed incidents of corruption and actions taken	Disclosure 205-3
GRI-206: Anti-competitive Behaviour	13	Legal actions for anti-competitive behaviour, anti-trust, and monopoly practice	Disclosure 206-1

Appendix-B

GRI Standards	Serial	Economic Aspects	Reference
GRI-301: Materials	1	Materials used by weight or volume	Disclosure 301-1
	2	Recycled input materials used	Disclosure 301-2
	3	Reclaimed products and their packaging materials	Disclosure 301-3
GRI-302: Energy	4	Energy consumption within the organization	Disclosure 302-1
	5	Energy consumption outside of the organization	Disclosure 302-2
	6	Energy intensity	Disclosure 302-3
	7	Reduction of energy consumption	Disclosure 302-4
	8	Reductions in energy requirements of products and services	Disclosure 302-5
GRI-303: Water	9	Water withdrawal by source	Disclosure 303-1
	10	Water sources significantly affected by withdrawal of water	Disclosure 303-2
	11	Water recycled and reused	Disclosure 303-3
GRI-304: Biodiversity	12	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	Disclosure 304-1
	13	Significant impacts of activities, products, and services on biodiversity	Disclosure 304-2
	14	Habitats protected or restored	Disclosure 304-3
	15	IUCN Red List species and national conservation list species with habitats in areas affected by operations	Disclosure 304-4
GRI-305: Emissions	16	Direct (Scope 1) GHG emissions	Disclosure 305-1
	17	Energy indirect (Scope 2) GHG emissions	Disclosure 305-2
	18	Other indirect (Scope 3) GHG emissions	Disclosure 305-3
	19	GHG emissions intensity	Disclosure 305-4
	20	Reduction of GHG emissions	Disclosure 305-5
	21	Emissions of ozone-depleting substances (ODS)	Disclosure 305-6
	22	Nitrogen oxides (NOX), sulfur oxides (SOX), and other significant air emissions	Disclosure 305-7
GRI-307: Environmental Compliance	23	Non-compliance with environmental laws and regulations	Disclosure 307-1
GRI-308: Supplier Environmental Assessment	24	New suppliers that were screened using environmental criteria	Disclosure 308-1
	25	Negative environmental impacts in the supply chain and actions taken	Disclosure 308-2

Appendix C

GRI Standards	Serial	Economic Aspects	Reference
GRI-401: Employment	1	New employee hires and employee turnover	Disclosure 401-1
	2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	Disclosure 401-2
	3	Parental leave	Disclosure 401-3
GRI-402: Labour Management Relations	4	Minimum notice periods regarding operational changes	Disclosure 402-1
Gri-403: Occupational Health and Safety	5	Worker's representation in formal joint management-worker health and safety committees	Disclosure 403-1
	6	Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	Disclosure 403-2
	7	Workers with high incidence or high risk of diseases related to their occupation	Disclosure 403-3
	8	Health and safety topics covered in formal agreements with trade unions	Disclosure 403-4
GRI-404: Training and Education	9	Average hours of training per year per employee	Disclosure 404-1
	10	Programs for upgrading employee skills and transition assistance programs	Disclosure 404-2
	11	Percentage of employees receiving regular performance and career development reviews	Disclosure 404-3
GRI-405: Diversity and Equal Opportunity	12	Diversity of governance bodies and employees	Disclosure 405-1
	13	Ratio of basic salary and remuneration of women to men	Disclosure 405-2
GRI-406: Non-discrimination	14	Incidents of discrimination and corrective actions taken	Disclosure 406-1
GRI-407: Freedom of Association and Collective Bargaining	15	Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	Disclosure 407-1
GRI-408: Child Labour	16	Operations and suppliers at significant risk for incidents of child labour	Disclosure 408-1
GRI-409: Forced or Compulsory Labour	17	Operations and suppliers at significant risk for incidents of forced or compulsory labour	Disclosure 409-1
GRI-410: Security Practices	18	Security personnel trained in human rights policies or procedures	Disclosure 410-1
GRI-411: Rights of Indigenous Peoples	19	Incidents of violations involving rights of indigenous peoples	Disclosure 411-1

GRI Standards	Serial	Economic Aspects	Reference
GRI-412: Human Rights Assessment	20	Operations that have been subject to human rights reviews	Disclosure 412-1
	21	Employee training on human rights policies or procedures	Disclosure 412-2
	22	Significant investment agreements and contracts that include human rights clauses or that underwent human rights screening	Disclosure 412-3
GRI-413: Local Communities (CSR)	23	Operations with local community engagement, impact assessments, and development programs	Disclosure 413-1
	24	Operations with significant actual and potential negative impacts on local communities	Disclosure 413-2
GRI-414: Supplier Social Assessment	25	New suppliers that were screened using social criteria	Disclosure 414-1
	26	Negative social impacts in the supply chain and actions taken	Disclosure 414-2
GRI-415: Public Policy	27	Political contributions	Disclosure 415-1
GRI-416: Customer Health and Safety	28	Assessment of the health and safety impacts of product and service categories	Disclosure 416-1
	29	Incidents of non-compliance concerning the health and safety impacts of products and services	Disclosure 416-2
GRI-417: Marketing and Labelling	30	Requirements for product and service information and labelling	Disclosure 417-1
	31	Incidents of non-compliance concerning product and service information and labelling	Disclosure 417-2
	32	Incidents of non-compliance concerning marketing communications	Disclosure 417-3
GRI-418: Customer Privacy	33	Substantiated complaints concerning breaches of customer privacy and losses of customer data	Disclosure 418-1
GRI-419: Socioeconomic Compliance	34	Non-compliance with laws and regulations in the social and economic area	Disclosure 419-1



Padma Bridge: Vision to Reality

Masih Malik Chowdhury FCA

An Economist and Founder Partner Masih Muhith Haque & Co. Chartered Accountants and
A Former President, ICAB

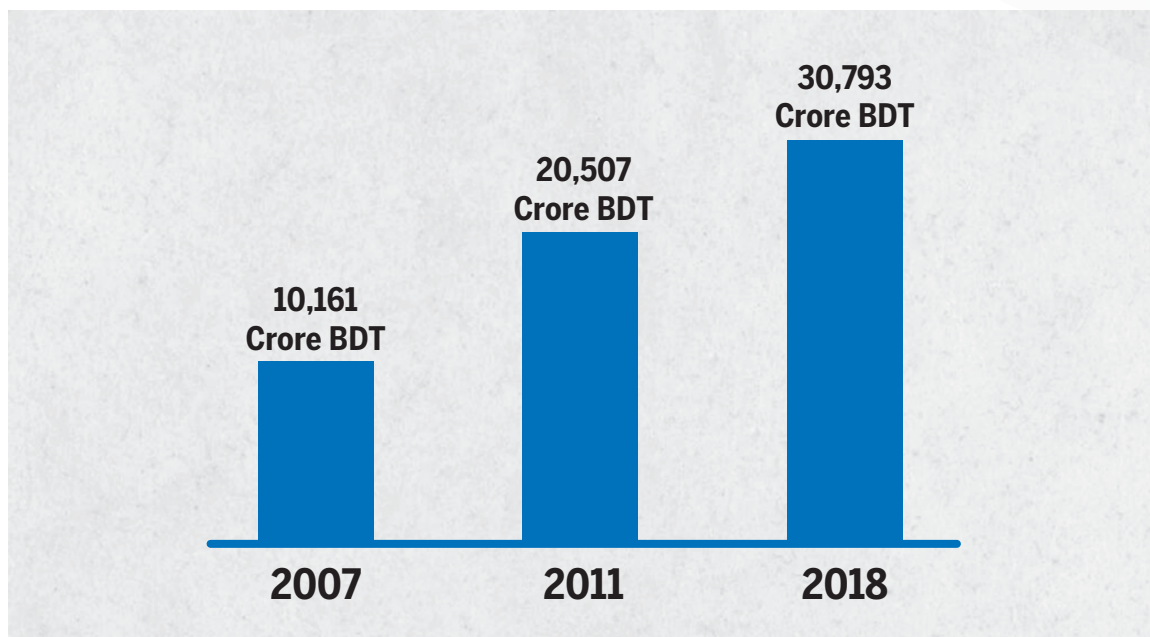
Padma Bridge is a mega project by all standards. All such projects possess many events in the background. Consultants were hired back in 2009. Development partners came out as lenders for the Bridge project. The multilateral donors offered World Bank - 1 billion ADB - 500 million, JICA pledged 300 million, US\$ at a low interest rate. The Government of Bangladesh (GoB) and Donors took a Denmark located 2 storied Bridge as exemplary to follow for the construction of the Bridge as sample to follow post discussion amongst them on it. The cost then was estimated at US\$ 2.4 billion. That was BDT 16,970 crores in Bangladesh at that time. The 4-lane road on a steel-based infrastructure with a rail line under it was finalized. The relevant papers were signed and allocations followed as by World Bank-1200, Asian Development Bank-615, JICA-430 and Islamic Development Bank -140 million in USD.

In 2010 US\$ 2972 million equivalent to BDT 20,507 crore was estimated for the project. Procrastination in multilateral agencies is widely practiced and not in governments only. Back in 2011 World Bank found credible (?) evidence of conspiracy for

corruptions in it. So, it refused to go ahead with funding of it. The transactions were not even started but WB found credible evidence while its co-donors also retreated back. Bangladesh PM requested the WB to prove or corroborate its allegations. Contrary to the request WB lodged a case in Canada while its President abrogated the contract. Such procrastination in decision by WB & donors is rampant causing deferral & delay in reaping the benefit of project to people in recipient countries.

The PM of Bangladesh on 31st January, 2013 rejected the WB loan offer & announced firmly that Bangladesh will self-finance this project. The project works were inaugurated in 2014. The first span was set on 2016 while the last on 10 December, 2020. The cost incurred on it rose to Tk. 30,193 crores over the years of execution.

From 2007 through 2011, the cost till 2022 reached at BDT 30.193 crore in its completion. Many economist, politicians, lawyers & thought provokers for public opined against this self-finance decision of the government. And again, they came out with long list of hopes & aspirations from The Bridge after or before its opening on June 25, 2022.



However, the political decision to go for it by Bangladesh own finance raised our image while it is now accepted that Bangladesh can go alone. The views and counter views & opinions of Civil Society (?) people were always against this decision. It reminds of a popular saying “Society does not get spoiled by fools; it is spoiled by the stupid attitudes of educated ones.”

The PM on the inauguration ceremony of the Bridge categorically named those Civil Society (?) Stars while inviting them to pass over the Bridge. And to utter surprise those Civil Society stars have spoken very high of the self-financed Bridge building decision of the PM. They might have of late thought about boldness of a political decision & its impacts from research methodologies on our economy. Seeing is believing became their policy.

Canada Court Verdict

An Ontario superior court justice dismissed the corruption case filed against SNC-Lavalin allegedly linked with Padma Bridge corruption (Daily Star 25-07-2022). The World Bank filed the suit alleging evidence of corruption conspiracy long before its funding & prior to transactions being opened on it.

The World Bank backtracked on its decision to offer US\$ 1.2 billion dollars as credit for the bridge on grounds of alleged corruption, later dismissed by the Canadian Court. The co-donors ADB, JICA, IDB all

echoed WB and withdrew enmasse from the credit line offer. Between the lines Anti-Corruption Commission Bangladesh made an investigation. A Senior Secretary & few others were detained. But finally, nothing guilty could be found on it. Three top executives of SNC-Lavalin were proved not guilty and were, acquitted.

The court concluded that “The suggestion of corruption is based on rumors” It further added that “Nothing that could be fairly referred to as direct factual evidence, to support the rumors and speculations was provided or investigated. The information provided by the lipsters was hearsay (or worse) added to other hearsay”.

Just before they entered their pleas, federal Crown Attorney Tanet Gilliam told superior court Justice Ian Nordheimer that “She would not be calling any evidence and would ask the judge to acquit the men”. She advised that “Without the wiretap evidence the Crown no longer had a reasonable prospect of conviction. The court held “Reduced to its essentials, the information provided in the ITO (Information To Obtain) was nothing more than speculation, gossip and rumors” Nordheimer wrote “Nothing that could be fairly referred to as direct factual evidence to support the rumors and speculation was provided or investigated”.

It is pertinent to note that way back in June 2012 the World Bank canceled its US\$ 1.2 billion credit line

for the Bridge. The co-donors followed it. And Bangladesh in 2013 decided to go for the project with its own fund. And it finally did grandly succeed on it.

Riverbed & Challenges

The mighty Padma is the second largest river of strong current (roughness) in the world after the Amazon River in Brazil. The bridge is now standing with its head high on Padma. Ignoring the strong current of mighty Padma, the work has been completed on both sides. Now, standing on both banks of the river, one can see the Padma Bridge, a reality. With the inauguration of the longest Padma bridge in the country at its own fund, overcoming thousands of local, foreign, and river's own (depth-roughness) adversity, the door of a new horizon is opened for the crossing of people of the Southern Bangladesh. The people of the country are now benefitted out of the Bridge, a bold decision of the Prime Minister.

At first, dredging was conducted at the riverbed (25 meters). Then giant sacks of sand (800 kg) were dropped in five phases, followed by another round of dropping sacks (125 kg) in three phases. Then concrete blocks, each weighing 165 kg, were placed at a height of one meter. After that, the river management was accomplished by putting geo bags, casting concrete blocks, and spreading CC blocks on them. Around 1,33,00,000 concrete blocks and 2,00,00,000 sand-filled geo bags were used in the process. About 212 crore cubic feet of sand had to be transferred because of river management, which was also a formidable task.

In short, the entire river management process was a challenging task that set a world record, which became possible because of the enormous experience of Chinese contractor Sino hydro Corporation and the vision and effective decisions of the panel of experts.

The biggest challenge, however, was encountered in piling, which compelled the concerned to change the design several times, culminating in the longer duration of the project completion. An awe-inspiring 122 meters of piling were conducted at the riverbed, making a global record. The world-famous German hammer was employed,

which had also been made in a customized way for this bridge. At the Mawa point of the Padma River, 1,40,000 cubic feet of water flow every second, ranking only after the river Amazon. During the piling design, it was also taken into account how the riverbed would change in 100 years. A study showed that the riverbed soil might shift up to 65 meters in a century. Following a rigorous calculation, the piling depth was set at 122 meters.

The piling became extra difficult because the bridge is curved. A remarkable difficulty (was faced with 14 pillars over a year due to the different composition of the soil in the riverbed of Padma. The construction process was delayed several times as the design of these 14 pillars had to be changed over and over again.

After braving a sea of man-made difficulties and engineering challenges, Padma Bridge is finally standing as a miracle above the mighty river Padma, connecting districts and promising a solid economic growth for the coming 100 years.

The Inauguration and Beyond

- The PM Sheikh Hasina inaugurated the main construction work of the 6.15 km long Padma Multipurpose Bridge on 11 December 2015.
- She also inaugurated the River Training work of the Bridge at Zajira Upazilla, Shariatpur and unveiled the places of main construction work of the bridge at the Mawa point in Munshiganj.
- At least 10 foreign consultancy firms from countries across the world provided support to Chinese Engineers who built Bangladesh's longest Padma Bridge over the mighty PADMA river.
- The countries of origin of those consultancy firms are UK, Japan, India, South Korea, the Netherlands, Colombia, Australia & New Zealand. These firms also sub consultancy services from other countries, when deemed needed hired.
- Experts & supporting personnel from 20 countries were employed.
- Experts from Japan, Denmark and Belgium also rendered services.

Investments & Countries of Padma Bridge Consultants

- The total cost of the project-Padma Bridge was BDT 30,193 crore of which BDT 600 crore was spent for consultancy services. These services were from pre-feasibility study up to design finalization and checking.
- Pre-feasibility study was done by 2 teams from UK and the Netherlands in 1998-99. They were also Consultant for 4.98 km long Jamuna Bridge, which was opened in 1998.
- The JV firm RPT worked as Management Support Consultant to aid the project Director in decision making.
- Nippon KOEI of Japan conducted the feasibility study. It proposed the Mawa-Jajira line for the bridge. A JV of Australia & NZ was Design Consultant. They were assisted by 4 other consultants.
- The checking consultants were Flint of Britain and Neil Ltd. of UK. They confirmed the design of Bridge 6.15 km long, with rail lines below it.
- Korean Expressway Company was construction Supervision Consultant in the project. It performed oversight of Chinese Contractors in main bridge construction and river training works.
- The contractor has made a breakthrough in building the longest bridge by a Chinese Company outside China.
- The bridge has 42 pillars on the whole Bridge, each one based on 6 piles. Each pillar is 150 meters distanced from the other.
- It has 415 lamp posts of which 328 are on Bridge while 87 on viaduct. In the deep root of the river 294 piles are rooted on.
- The length of the Bridge is 6.15 km and width of 22 meters.
- There are 41 spans each of 150 meters length. Each span's weight is 3,200 MT.
- The Bridge & its infrastructure spreads over 3 districts-Munshiganj, Shariatpur and Madaripur.
- The 6-lane expressway is the highway named as Father of the Nation Sheikh Mujibur Rahman Expressway including the Padma Bridge from Dhaka to Bhanga is 55 Km long. It is a 4 lanes road, with 2 service lanes for local passengers and vehicles.
- It also has 19 pedestrians under passes for crossing. This express way goes through 5 rivers via flyovers.
- This express way was approved under Dhaka-Khulna Highway Project on 3 May 2016.
- The budget for it was BDT 11,003 crore. RHD and Bangladesh Army were involved in its making.

Panel of Experts

- A 10-member Panel of Experts (PoE) was in the overall oversight & monitoring. Of them 6 were national and 4 others foreign of those 4, two were from Japan, 1 each from Colombia & Denmark. Prof. Dr. Jamilur Reza Chowdhury (late) led the Panel of Experts.

Main Bridge 6.15 Km. (20,180 ft)

Contractor	: China Major Bridge Engineering Co. Ltd.
Contract Period	: 4 years plus 1 year (defect liability period)
Contract Cost BDT	: 12,133 crore
Date of Work Order	: 26 November, 2014
Date of Completion	: 10 December, 2020

The 2 approach roads to the Bridge are as follows:

- Jagira approach road and selected bridge end facilities 10.50 km. length (6.52 miles) contract cost, BDT 10,974 crore work order issued 8 October 2013! Date of completion 31 October 2016
- Mawa approach road and selected bridge end facilities 1.50 km. (.93 miles) length, contract period 2.5 years + 1 years (defect liability period).
- Contract period BDT 1,934 crore work order issued 27 January 2014. Date of completion 31 July 2014.

River Training Contractor

- Sinohydro Corporation of China quoted BDT 9,224 crore and offered a 5.60 percent discount to finally agree at BDT 8,778 crore.

World Records

The bridge with 150.12 m (492.5 ft) long 41 spans, 6.150 km (3.821 mi) total length and 18.18 m (59.6 ft) width, is the longest bridge in Bangladesh, the second longest in the Indo-Gangetic Plain after Bhupen Hazarika Setu in Assam and the longest over Ganges in terms of both span and the total length. Along with these records three remarkable world records accrue to the Bridge as follows-

First One is the piling of the Padma Bridge. Concerned engineers say that steel piles have been placed at a maximum depth of 122 meters under the pillars of the Padma Bridge. These piles have a radius of 3 meters. No bridge in the world has ever been piled so deep and thick piles have not been laid.

The second record is that 'Friction Pendulum Bearings' have been installed to vaccinate the Padma Bridge from earthquakes. The bearing capacity is 10 thousand tons. So far, no bridge in the world has been fitted with bearings of such capacity. The Padma Bridge will be able to withstand 9 magnitude earthquakes on the Richter scale.

And the third record is river governance. A BDT 1,103 crore contract was signed with Chinese contractor Sinohydro Corporation for river management. Never before in the world has there been such a big tender for river governance alone. Besides, very fine (microfine) cement has been used in piling and some parts of poles in Padma bridge. These cements were imported from Australia. Such ultra-fine cement is not commonly used.

Impacts of Padma Bridge

- PB construction will strengthen the linkage between the southwest and north central zone. It will, being a Highway Bridge in particular, improve and enhance the freight and passenger transportation between Dhaka and major points in the southwest zone. It will contribute substantially & more properly augment the regional development of the southwest zone and so the national growth.

- PB will connect the economically depressed southwest zone to the economically more advanced eastern zone of the country.
- The distance between major destinations in the southwest region and Dhaka will be shortened by over 100 km. As a result, people from all sectors including business and agriculture will benefit, impacting the country's GDP.
- The time spent on passenger & commodity movement, vehicles' operational & maintenance costs, longer life of vehicles, decreased bill on import of fees, reduced commuting cost of passengers and commodities are all good economic impacts of the Bridge.
- Capital inflow will increase into SW zone causing expeditious activities in industries and commerce. Newer economic and employment opportunities for local populations will be flourishing at doors.
- Availability of improved Health care & Medical help facilities will be easier for and accessible to the SW zone people.
- Infusion of skills into workers would be extended. Skilled workers exports will have increased income inflow into the country.
- Poverty alleviation will be achieved especially in SW zone at a faster pace because economic mobility will show uptrend.
- The estimate of multiplier effects on investments on PB showed that it will increase GDP growth rate by 1.27 per cent. General additional employment opportunities of 743,000 persons per year which correspond to 1.2% of total labors in Bangladesh.
- In the long run the poverty reduction impact of the PB is more significant as a larger share of economic benefits generated by the Bridge will accrue to the poor as their stake in GDP.
- The PB opening will bring in increase in transportation vehicles by 20 times. ADB source stated that PB will on an average carry 24,000 vehicles per day in 2024 and 67,000 by 2050.
- It will reduce distance between Mongla Port and Dhaka by more than 100 km to only 170 km. Pertinently the distance from Dhaka to Chattogram Port is about 264 km.

- Importance & communicability between Mongla and Dhaka will save cost and time substantially. Its impact will be a visible acceleration on growth.
- According to ADB the long time (31 years) road user benefit of PB in the traffic model stood at US\$ 18,512 billion and according to the Social Accounting Matrix (SAM) the total project benefit was estimated at USD 25 (24,993) billion at the same time.
- The opening of PB will bring in movement time & freight substantially to a maximum of one day. It will impact on trading to increase by many fold/times.
- Traffic forecasts from model runs with different traffic demand scenarios and assumptions are in Table 1. The “with bridge” scenarios resulted in high traffic volumes in the opening year, taking account of significant traffic diversion from the existing ferry crossings, and additional traffic

from induced demand that had been suppressed due to lack of travel opportunities across the Padma River. While the transport model produces a forecast assuming travelers have “perfect knowledge” of the traffic conditions and induced demand instantly results in additional trips, adjustments in travelers’ behavior to new travel conditions normally take place gradually over a period of time. For economic evaluation purposes, a scenario that assumes gradual rise in induced demand in the first 10 years of bridge opening has been adopted as the base case.

- Table 2 presents the travel time savings likely to be experienced by users of the Padma Bridge for a selection of typical trips from Dhaka at Bridge opening in 2014. These travel time savings include savings in wait time at ferry landing points. Travel time for ferry routes in Table 2 includes ferry wait time weighted by vehicle classes, which currently ranges from 2 hours for cars to 5-10 hours for trucks. Due to long ferry

Table 1: Traffic Forecast for Economic Evaluation (annual average daily traffic)
(Annual average daily traffic)

Year	Without Bridge	With Bridge		Base Case ^b
		Without Induced Demand ^a	With Induced Demand	
2014	2,394	7,835	11,683	7,835
2020	3,413	11,273	22,240	20,491
2024	4,093	13,566	29,278	28,928
2034	6,748	22,590	48,691	48,691
2044	9,510	31,980	68,307	68,307

- a Forecast traffic for the Padma bridge that assumes no additional trips generated from induced demand and the origin-destination patterns remain unchanged
- b Traffic used as base case in the economic evaluation, which assumes a gradual rise in induced demand. The traffic volume at bridge opening year takes the value of traffic without induced demand, and will later gradually rise to the level of traffic with induced demand.

Source: Design Consultant

Table 2: Travel Time and Distance Savings

Destination	Paturia Ferry Route	Mawa Ferry Route	Padma Bridge Route	Savings from Paturia Ferry	Savings from Mawa Ferry
Khulna					
Time	7 hr 50 min	12 hr 45 min	3 hr 30 min	4 hr 20 min	9 hr 15 min
Distance	240 km	170 km	170 km	70 km	-
Jessore					
Time	7 hr 00 min	12 hr 55 min	3 hr 20 min	3 hr 40 min	9 hr 35 min
Distance	210 km	160 km	160 km	50 km	-

Source: Design Consultant

wait, it is expected that a large number of traffic will be diverted from the existing ferry services to the Padma Bridge.

Economics of Padma Bridge

The quantified benefits of the bridge investment are measured incrementally to the without-bridge case, i.e., they are measured as the difference between the without-project and the with-project cases. The economic analysis considers (i) benefits arising from annual savings in vehicle operating cost (VOC) and travel time to existing passengers and freight crossing the Padma River, and (ii) benefits accruing to new trips generated by induced demand. Other types of benefits include the (i) savings in costs associated with operation of the ferry services, (ii) capitalized value of service area land, (iii) capitalized value of agricultural land to be reclaimed or protected by river training works, and (iv) revenue from bridge structure usage fees levied on utilities.

Bringing huge change to the economy, the Bridge is estimated to elevate national GDP by 2% simultaneously increasing the gross product of the southwest zone. Likewise, the bridge is expected to attenuate public struggle by generating employment for 1.2% of the total labor force.

The Padma Multipurpose Bridge from the outset is forecasted to transform the landscape of the country to levels beyond imagination.

There is also an absence of direct roadways through the Tamabil-Sylhet-Sorail-Kanchpur-Dhaka-Mawa-Bhatiapara-Norail-Jessore-Benapole highway which will be resolved by the Bridge, said the appraisal report of the WB. The bridge will create connectivity of roads, railways, and energy transportation easing international connectivity to India, Bhutan, and Nepal by linking to the Trans-Asian highway (N-8) and Trans-Asian railway.

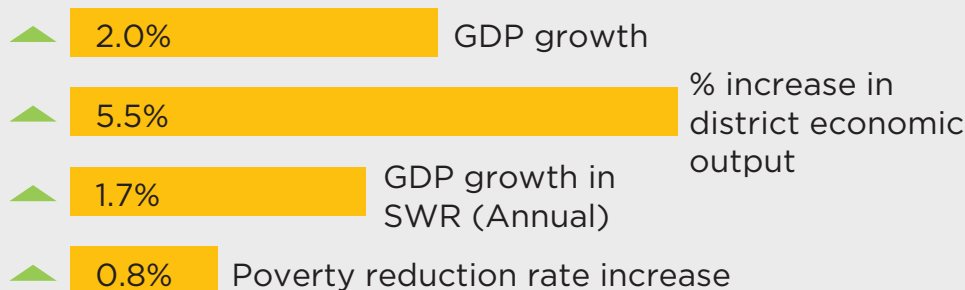
At present, there are no direct links between two major southern seaports Mongla and Payra. The Padma Bridge will bridge that gap.

Climate change has caused the poverty line in the southwest region which is 5% higher than in the rest of the country. The Padma Bridge will remedy these issues.

The Padma Bridge will cure unemployment, save travel time, decentralize megacities and vitalize marginal economies.

The long-term road user's benefit was calculated using the traffic model. This was based on the savings of vehicle operation cost and savings in travel time cost. The estimation stood at BDT 1,295,84 crore (US\$18,512 million) over the 31 years. Moreover, there were simulation tests conducted based on a Social Accounting Matrix (SAM) which signified the indirect impact of the Padma bridge over a 31-year timeline.

Two simulations resulted in a 100% and a 70% investment stimulus felt in the southwest region over a direct injection of \$2.1 billion into the regional economy. This would add a value of about BDT 45,367 crore over a 31-year period which draws a 10.6% growth. Annually this rate would be 0.33% of the national base GDP. To sum up, if we add the value generated from the traffic model with the estimation of the SAM model the total project benefit is estimated to be BDT 1,749,510 crore or USD 24,993 million over 31 years assuming 31 years as the full realization timeframe of the project benefit. The first simulation also conveyed that the construction of the Padma Bridge would lead to a reduction in annual poverty headcount at the national level by 0.84% and at the regional level by 1.01%. This intricate analysis suggests a big increment to the macroeconomy.



From a foreign trade standpoint, Bangladesh has already started receiving investments for setting up businesses near the construction. Manufacturing businesses, RMG, assembling plants, and storage facilities are most likely to be focused on. New workplaces will add to new employment serving the government's purpose.

Padma Bridge is supposed to deliver an Economic Rate of Return (ERR) of investing in the bridge of 18-22% per year which is subject to increase.

Spurring industrial revolution in 21 districts, BSCIC sources said, around 500-1000 factories of various categories are projected to be established in areas surrounding Barisal. The district is expected to contribute 2% growth to the national economy due to industrialization caused by the Bridge.

It has also been recorded that over 100 companies already bought land in Barisal BSCIC areas. Districts like Faridpur, Madaripur, Shariatpur, Bagerhat, Gopalganj, and Khulna are considered focal points for investing by industrialists.

The incorporation of both road and rail routes will help transport raw materials from Chattogram and Mongla ports at a cheaper rate coming as an advantage to local businesses. This will also bring an expeditious shift to the global supply chain.

For the rise of a myriad of possibilities from the Padma Multipurpose Bridge, there will be a sharp rise in entrepreneurial minds. Employments will fill up in droves.

There will be a rise in trained workers as wages are expected to increase. Better healthcare facilities coupled with lesser commute time will add to better living by way of increased workable hours.

From the commissioning of the bridge, industrialization would create work opportunities for at least 1 million people within five years which will add up to 3-4 million employments within the next 10 years in Barishal.

The bridge stimulating economic activity leading to demographical changes will move the country more towards progressing on the SDG goals.

The bridge will assist in maximizing farm and non-farm growth possibilities, diversified agriculture in saline-affected parts, and availing inter-country & intra-regional trade between Bangladesh, India and beyond.

With increased investment and industrial growth, integration of SMEs and MSMEs will create multiple spill-over effects in generating outcomes. All of these will result in less urbanization of megacities and decentralization of the economy caused by reduced migration.

The Padma Bridge construction by own fund has been a very & rare but prudent political decision ever taken by a leader in Bangladesh. Bold Bangladesh could explore its own potential & capacity to the world. The nation could bolster its image & clout of self-respect to go without donor in such a mega project. It learned to be self-reliant at crisis time to overcome complex situations. A solitary reaper in fund arrangement Bangladesh caught the world countries eyes by doing it alone. Bravo Bangladesh!

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