

Progress with Sustainable Development Goals in Bangladesh: Economic and Social perspectives

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Abstract

In the modern world, sustainable development is necessary to advance well-being and guarantee effective resource use. Pursuing sustainable development is extremely difficult for Bangladesh, especially in the social and economic spheres. Obstacles to the country's achievement of the Sustainable Development Goals (SDGs) by 2030 include crises in the banking industry, rising income disparity, high inflation rates, rural-urban disparity, and an excessive focus on growth rates. To achieve the SDGs, Bangladesh must integrate them effectively into national planning, ensuring both vertical alignment (national to local levels) and horizontal alignment (across ministries and sectors). The localization of SDGs is crucial to ensuring inclusivity and prioritizing the most vulnerable populations. This study assesses Bangladesh's progress in achieving sustainable development through economic and social perspectives, using secondary data covering 2005–2024. This study employs a quantitative, descriptive, and analytical design, using descriptive statistics, regression, correlation, and ARIMA forecasting to evaluate Bangladesh's progress toward economic and social SDGs. Results show poverty declined from 42% in 2005 to 13.5% in 2024, while electricity access expanded from 44.2% to 99.5%. However, ARIMA forecasts indicate that by 2030, GDP growth will stabilize at 6.36%, poverty will fall further to 12%, and maternal mortality will be 42 per 100,000 live births, alongside sustained universal electricity. Nevertheless, inflation is projected at 10.75%, youth unemployment at 12.3%, and inequality at a Gini of 0.3425, leaving progress uneven and several SDG targets off track. The findings indicate that although Bangladesh has made substantial progress in reducing poverty, improving maternal health, and expanding energy access, persistent macroeconomic challenges risk slowing momentum toward achieving the Sustainable Development Goals. The study concludes that inclusive policies on employment generation, skills development, redistribution, and social protection are critical to align future outcomes with SDG targets.

Keywords: Sustainable Development Goals (SDG), Bangladesh, Inequality, Poverty.

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1. Introduction

Development denotes a multifaceted process that fosters economic advancement, social change, and environmental sustainability. It includes enhancements in living conditions, decreases in poverty and inequality, improvements in healthcare and education, and increased access to vital public services. Genuine development guarantees inclusive and fair progress that empowers every individual, particularly those who are most vulnerable. (Todaro & Smith, 2020; Sen, 1999; UNDP, 1990; Sachs, 2015; United Nations, 2015). Sustainable development is commonly recognized as a developmental framework aimed at fulfilling the requirements of the current generation while ensuring that future generations can also satisfy their own needs (World Commission on Environment and Development [WCED], 1987). Emerging from the Brundtland Report, this concept emphasizes the importance of harmonizing economic growth, social equity, and environmental stewardship as interrelated foundations of advancement. (WCED, 1987; Sachs, 2015). It further emphasizes that sustainable economic growth and enhancements in human welfare are intrinsically linked to the conservation of ecological systems and the overall health of the planet. (Sachs, 2015; United Nations, 2015). Based on this concept, the United Nations established the 2030 Agenda for Sustainable Development in 2015, which outlined 17 Sustainable Development Goals (SDGs) and 169 targets as a universal framework aimed at eradicating poverty, safeguarding the environment, and fostering peace and prosperity by the year 2030 (United Nations, 2015). The SDGs are structured around five essential pillars, such as People, Planet, Prosperity, Partnership, and Peace, which are commonly known as the "5 Ps," which symbolize the cohesive basis for attaining sustainable and inclusive development globally. (United Nations, 2015; UNDP, 2016). Achieving the Sustainable Development Goals (SDGs) is essential for all nations, especially for Bangladesh, which is a lower-middle-income country facing challenges such as rapid urbanization, poverty, inequality, and environmental degradation. The SDGs offer a strategic framework to reshape Bangladesh's socio-economic environment while addressing future risks and fostering resilience. The challenges and obstacles faced by this country have impeded its progress towards the SDGs. Sector-specific plans have been developed, and these strategies have generated opportunities to alleviate the challenges associated with the SDGs (Sultana et al., 2024).

According to the Sustainable Development Report 2024, published by the UN Sustainable Development Solutions Network (SDSN), Bangladesh ranks 107th among 167 countries, a decline from 101st place in 2023. The country's SDG achievement score has also decreased slightly from 65.9 to 64.35, placing it below the East and South Asia regional average of 66.5. Despite this, Bangladesh ranks above neighboring countries like India and Pakistan.

The SDSN further indicates that Bangladesh has completely fulfilled only one Sustainable Development Goal (SDG), which is Climate Action. The area of quality education continues to progress. Moderate advancements have been observed in six goals: no poverty, zero hunger, good health and well-being, clean water and sanitation, affordable and clean energy, and industry, innovation, and infrastructure. Notable declines are observed in the realm of peace, justice, and strong institutions. Eight goals are experiencing stagnation, including Gender Equality, Reduced Inequalities, and Decent Work and Economic Growth.

Economic indicators such as GDP growth, employment, inflation, investment, and social indicators like maternal mortality, Gini index, literacy rate, and access to basic services are central to monitoring SDG performance. Goals 1–7, 11, and 16 primarily reflect social dimensions, while Goals 8–10, 12, and 17 are driven by economic variables.

To implement the SDGs effectively, Bangladesh must ensure vertical integration (from national to local plans) and horizontal coordination (among ministries and agencies). Initiatives such as the Annual Performance Agreement (APA) and integration of the SDGs into the 8th Five-Year Plan (8FYP) are critical steps, yet significant implementation challenges remain.

This research is crucial for assessing Bangladesh's present position regarding economic and social development objectives. It aims to determine the hindrances to the fulfillment of the Sustainable Development Goals (SDGs) and deliver actionable policy suggestions with evidence-based backing and trend analysis. By comprehending which goals are falling behind and the reasons for this, Bangladesh can better prioritize its initiatives and allocate resources more effectively to meet the 2030 targets.

The primary goal of the study is to assess the performance of Bangladesh in achieving sustainable development through an examination of economic and social indicators that are pertinent to the Sustainable Development

Goals (SDGs). The particular goals are to assess the performance of major economic and social indicators that are relevant to the Sustainable Development Goals for Bangladesh and to identify the main challenges in achieving SDG objectives with high linkage to economic development, inequality, employment, investment, and social equity. Another goal is to estimate the prospects for Bangladesh's main economic and social sustainability targets by 2030, considering present trends and the rate of improvement.

2. Literature Review

Attainment of the Sustainable Development Goals (SDGs) needs an integrative perspective of economic, social, and environmental determinants of development. There exists a wide range of domestic and international literature examining Bangladesh's journey towards the SDGs. This literature review combines the studies into four general thematic groups: economic challenges, social challenges, methodological approaches and research gap identification.

2.1 Economic Challenges in Achieving the SDGs

Several studies point out macroeconomic stability, industrialization, and foreign investment as key determinants of Bangladesh's sustainable development. Arafath (2022) presents fiscal instability as a major threat to sustainable growth and SDG financing. He focuses on the need for economic resilience to guarantee the sustainability of development schemes. Musa, Albattat, and Rahman (2023) apply sophisticated econometric approaches like the dynamic autoregressive distributed lag (ARDL) model and frequency domain tests for causality to analyze the interplay of economic growth and environmental sustainability. Based on their research, there is a multifaceted and generally reconcilable connection between economic growth and environmental conservation. In addition, Kumar et al. (2016) outline the structural economic bottlenecks in South Asia and promote sustainable agriculture and industrial upgrading in an attempt to promote inclusive growth. Through Computable General Equilibrium (CGE) models, they demonstrate how some economic policies and innovation would improve SDG performance in such countries as Bangladesh.

Besides, Musa et al. (2023), for example, point out that economic growth can exert pressure on environmental sustainability. Their research shows

that in the absence of green technology and sustainable infrastructure; economic expansion may hinder environmental progress.

These studies all highlight the imperatives of economic diversification, stable investment, and institutional efficiency as preconditions for sustained development. Fewer of these studies, however, discuss how economic advancement fits or clashes with social development goals in a harmonious framework.

2.2 Social Challenges and Institutional Limitations

Social inequality, poor access to adequate health and education, and weak social protection are central challenges to Bangladeshi inclusive development. Arafath (2022) documents the lack of an effective social safety net, describing policy initiatives that do not reach the poorest sections of society. Rahman (2021) documents the same, describing institutional inefficiency, absence of accountability, and inter-ministerial coordination as central implementation issues for the SDGs.

Huang and Yin (2016) propose a more general conceptual framework with four subsystems, such as social, economic, environmental, and institutional, under interdependence among a number of dimensions of sustainable development. Their 20-year SDG agenda for Bangladesh prioritizes the need for integrated planning.

Asadullah et al. (2020) and Khatun and Sadat (2021) emphasize the value of improving governance quality, especially in health, education, and resource distribution. They argue that reforms in public sector efficiency and equity in service delivery can greatly enhance progress on social indicators like gender equality, literacy, and poverty reduction.

These studies provide a rich analysis of social challenges, but most treat social and economic issues in isolation, missing opportunities to explore how economic indicators influence or are influenced by social conditions.

2.3 Methodological Approaches in Existing Studies

Quantitative methods dominate the literature on Bangladesh's SDG performance. Researchers frequently use:

- Econometric models (e.g., ARDL, CGE)
- Regression analysis
- Time-series and panel data methods

For example, Rahman (2021) uses structured frameworks to assess governance effectiveness, while Musa et al. (2023) apply complex causality tests to understand economic-environment linkages. Although these approaches provide empirical rigor, few studies incorporate cross-dimensional models that account for economic-social interactions.

2.4 Research Gap

The reviewed literature provides helpful details about Bangladesh's progress and challenges in achieving the SDGs. However, several critical gaps remain. First, there is a lack of integrative analysis, where most existing studies examine economic, social, or environmental factors in isolation, rather than exploring how they interact to shape SDG outcomes. Particularly, there is a largely overlooked interconnection between economic and social indicators, such as the interplay among employment, income, education, and health systems. Second, there is an inadequate focus on performance measurement. While some studies track SDG-related indicators, few assess the trends and interactions of economic and social metrics in evaluating overall SDG performance. Finally, there is limited methodological diversity; the emphasis on econometric modeling often excludes mixed-methods or systems-based approaches that could offer richer insights into the complex dynamics of development.

This study addresses the identified gaps by analyzing the interaction between key economic and social indicators and their combined influence on SDG progress and synthesizing performance trends across both sectors to assess whether Bangladesh is on track to meet its sustainability targets by 2030. Finally, this study contributes to the literature by adopting a multi-dimensional approach that reflects the real-world interconnectedness of development indicators. By integrating economic and social dimensions, this study aims to offer a comprehensive assessment that supports more coherent policy formulation and better resource prioritization in the context of sustainable development.

3. Methodology:

3.1 Research Design and Approach

This study adopts a quantitative, descriptive, and analytical research design, relying on secondary data to assess Bangladesh's performance on key economic and social indicators linked to the Sustainable Development Goals (SDGs). The study uses trend analysis, comparative analysis, and

basic inferential statistics to examine how selected indicators reflect progress and highlight challenges in achieving the SDGs by 2030.

The research approach is primarily non-experimental and longitudinal, observing changes in variables over time (2005–2024) to determine both progress and setbacks in sustainable development. This approach allows for the identification of measurable patterns, gaps, and interactions between economic and social factors over two decades.

3.2 Variables and Indicator Selection

The variables chosen for this study reflect key performance indicators (KPIs) that are directly tied to social and economic dimensions of sustainable development, particularly SDG Goals 1–10 and 16. These include:

➤ **Economic Indicators:**

- Economic growth (GDP growth rate)
- National savings and investment (% of GDP)
- Inflation rate
- Unemployment rate
- Youth unemployment (% of total labor force, ages 15–24)
- Dependency ratio (% of dependents to working-age population)

➤ **Social Indicators:**

- Gini coefficient (income inequality)
- Poverty rate
- Maternal mortality ratio (per 100,000 live births)
- Access to electricity (% of population)

These indicators are selected based on their alignment with SDG targets and their ability to reflect inclusive economic growth, equity, and well-being. (United Nations, 2015; Sachs, Schmidt-Traub, Kroll, Lafortune, & Fuller, 2019; Allen, Metternicht, & Wiedmann, 2016).

3.3 Data Sources and Time Coverage

The study utilizes secondary data collected from credible and internationally recognized databases, as well as government reports. Data on economic indicators and social indicators were collected from sources such as the Bangladesh Economic Review, Bangladesh Bureau of Statistics,

World Bank Development Indicators, World Bank Data group, and SDG Tracker reports, covering the period from 2005 to 2024.

3.4 Data Analytical Tools

To achieve the study's objectives, a combination of descriptive, inferential, and forecasting methods was employed using IBM SPSS Statistics (version 25), with additional visualizations applied for trendline representation. Descriptive statistics summarized central tendency and dispersion of key indicators such as GDP growth, poverty rate, youth unemployment, and access to electricity (2005–2024). Linear regression analysis identified time-based trends using year as the independent variable, with statistical significance verified through ANOVA (all models $F < 0.01$).

Correlation analysis examined relationships between indicators, for example, GDP growth and poverty, inequality and unemployment, and investment and access to electricity, highlighting interdependencies affecting SDG progress.

For forward-looking assessment, time-series forecasting was conducted using the ARIMA model (Box & Jenkins, 1976). This involved model identification (including stationarity testing and differencing), estimation (maximum-likelihood fitting and model selection based on R^2 , RMSE, MAPE, and BIC), and diagnostic checking to ensure residuals were white noise. The fitted ARIMA models generated forecasts up to 2030 with 95% confidence intervals, allowing comparison with SDG targets to evaluate the likelihood of achievement.

This complementary strategy, which includes descriptive statistics, regression, correlation, and ARIMA forecasting, serves as a strong, transparent, and evidence-based method for evaluating Bangladesh's SDG performance while providing useful insights to policymakers and supporting national development planning initiatives like the 8th Five-Year Plan.

4. Results and Discussion:

The results and discussion of the study, aligned with its objectives, are now presented below

Growth Rate

Table-1 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Growth (%)	20	3.5	7.9	6.359	.9730
Year	20	2005	2024	2014.50	5.916
Valid N (listwise)	20				

Source: Authors' own calculation

To assess the current performance of key economic and social indicators relevant to the Sustainable Development Goals (SDGs) in Bangladesh, the descriptive statistics table on Growth Rate provides a summary of Bangladesh's economic performance from 2005 to 2024.

❖ Economic Growth Performance:

In the 20-year span (2005–2024), the GDP growth rate of Bangladesh varied from as low as 3.5% to as high as 7.9%, with the average growth rate being approximately 6.36%. It reflects steady and quite robust economic growth, and it is most important for the realization of SDGs like poverty eradication (SDG 1), decent work and economic growth (SDG 8), and reduced inequality (SDG 10).

❖ Stability and Variability:

The 0.9730 standard deviation indicates the moderate fluctuation in rates of growth over a period of twenty years. This conveys a broad, consistent pattern of expansion, though there may have been years of economic shock or slower recovery (e.g., as a result of international financial crises or the COVID-19 pandemic). This table conveys the pattern and risk of GDP growth over a period of two decades by providing access to a benchmark of past and present economic performance, flagging years of rapid growth that potentially may have stimulated social development, and marking years of slow progress that perhaps may need policy action towards course correction.

Poverty Rate

Table-2 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Poverty Rate (%)	20	13.5	42.0	28.485	9.5077
Valid N (listwise)	20				

Source: Authors' own calculation

Descriptive statistics of the poverty rate give information regarding Bangladesh's social progress on the SDGs, especially on SDG1(No Poverty). From 2005 to 2024, Bangladesh's poverty rate decreased from a high of 42.0% to a low of 13.5%, with an average of 28.49% and a standard deviation of 9.51 is an unprecedented reduction in poverty over time, which mirrors improvement in eradicating extreme poverty. But the relatively high standard deviation indicates variability in the rate of decline in poverty, probably induced by economic shocks or uneven regional development. Generally, the trend presents quantifiable falling in poverty levels, supporting national commitments to SDGs.

Savings and Investment

Table-3 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Domestic Savings (% GDP)	20	19.2	27.6	23.520	2.9134
Investment (% GDP)	20	25.8	32.1	28.840	2.1775
Valid N (listwise)	20				

Source: Authors' own calculation

To analyze the latest performance of selected economic indicators for SDGs in Bangladesh, the above table provides descriptive statistics for domestic savings and investment as a proportion of GDP during the past 20 years. These indicators are closely linked to the different SDGs, such as SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 17 (Partnerships for the Goals).

Domestic Savings (% of GDP):

The average domestic savings rate for the years was 23.52% of GDP, varying between a low and high of 19.2% and 27.6%, respectively. The standard deviation of 2.91 represents moderate variation across the years. A high domestic savings rate reflects the ability of institutions and households to hold income for long-term consumption and investment, which can contribute to long-term financial security and resilience in the economy.

In the context of the SDGs, higher savings mobilization supports national efforts to reduce dependence on foreign financing and strengthens the capacity for self-funded development projects, especially in infrastructure and social services.

Investment (% of GDP):

The average investment rate during the period was 28.84% of GDP, with a narrow range (25.8%–32.1%) and a low standard deviation (2.18), indicating stable and sustained investment. This reflects efforts by both public and private sectors to promote industrialization, productivity, and employment which are aligning with SDGs 8, 9, and 11. However, the persistent gap between investment and domestic savings underscores reliance on external financing (e.g., FDI, remittances), raising concerns about long-term financial sustainability under SDG 17.

Youth Unemployment

Table-4 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Youth Unemployment Rate (%)	20	6.4	16.6	11.099	3.1894
Valid N (listwise)	20				

Source: Authors' own calculation

The descriptive statistics for Youth Unemployment Rate (%) offer insight into Bangladesh's labor market performance in relation to SDG 8: Decent Work and Economic Growth. From 2005 to 2024, the youth unemployment rate ranged from 6.4% to 16.6%, with an average of 11.09% and a standard deviation of 3.19. This indicates a moderately high and variable level of

youth joblessness over the years. The data reflect ongoing challenges in creating sufficient employment opportunities for young people that are critical to achieving inclusive and sustainable economic growth. Despite economic progress, high youth unemployment remains a barrier to realizing the full potential of the working-age population and advancing SDG targets.

Access to Electricity

Table-5 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Access to Electricity	20	44.2	99.5	73.375	19.9253
Valid N (listwise)	20				

Source: Authors' own calculation

The descriptive statistics for Access to Electricity (%) reflect Bangladesh's progress toward SDG 7(Affordable and Clean Energy). Between 2005 and 2024, access to electricity ranged from 44.2% to 99.5%, with an average of 73.38% and a standard deviation of 19.93. This shows a substantial expansion in electricity coverage, indicating major strides in energy access. The high variability suggests rapid progress in recent years, especially in rural areas. Improved access to electricity supports broader development goals, including better education, health services, and economic opportunities, thus reinforcing overall SDG achievement.

Regression Analysis

Model 1(Dependent variable: Youth Unemployment Rate)

Here we establish a regression model where the youth unemployment rate is considered a dependent variable and year considered as independent variable.

Table-6 Coefficient^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-912.860	134.527		-6.786	.000
Year	.459	.067	.851	6.868	.000

a. Dependent Variable: Youth Unemployment Rate (%)

Source: Authors' own calculation

$$\begin{aligned}\text{Youth Unemployment rate} &= \text{Constant} + \beta_1 \text{ Year} \\ &= -912.860 + .459 \text{ Year} \\ &\quad (134.527) (.067)\end{aligned}$$

Here β_1 =Regression parameter.

-912.80 indicates that when the year is zero (which has no real-world interpretation here), the predicted value of the dependent variable would be -912.860. This value is mainly useful for positioning the regression line, not for standalone interpretation. The unstandardized coefficient ($B = 0.459$) means that for every one-year increase, the dependent variable increases by 0.459 units on average. This shows a positive trend over time, indicating consistent growth in the dependent variable (Youth unemployment rate). The high t-value (6.868) and a p-value of .000 (which is less than 0.05) mean that the relationship is statistically significant. We can confidently say that year is a strong predictor of the youth unemployment rate.

This regression model indicates a strong, statistically significant upward trend in youth unemployment over time. The result supports the idea of consistent progress, which could be interpreted as positive movement toward relevant SDG targets, depending on the indicator analyzed.

Table-7 Model Summary

Mode l	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851 ^a	.724	.708	1.7221

a. Predictors: (Constant), Year

Source: Authors' own calculation

The model shows a strong relationship ($R = 0.851$) between observed and predicted values, with 72.4% of the variation in youth unemployment explained ($R^2 = 0.724$). The adjusted R^2 (0.708) confirms the model's robustness, while the standard error (1.7221) indicates a good fit.

Table-8 ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	139.892	1	139.892	47.173	.000 ^b
Residual	53.379	18	2.966		
Total	193.271	19			

a. Dependent Variable: Youth Unemployment Rate (%)

b. Predictors: (Constant), Year

The model shows a statistically significant relationship ($F = 47.173$, $p = .000$) between the predictor (e.g., year) and the indicator (youth unemployment rate). The high F-value and low p-value ($< .001$) indicate that the regression model explains a significant portion of the variance in the data. This confirms a meaningful time-based trend, useful for assessing progress on SDG-related performance in Bangladesh.

Model 2 (Dependent variable: Poverty Rate)

Another model can be established where the poverty rate is the dependent variable and year is the independent variable.

Table-9 Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	2401.202	519.171		4.625	.000
Year	-1.178	.258	-.733	-4.570	.000

a. Dependent Variable: Poverty Rate (%)

Source: Authors' own calculation

$$\begin{aligned}
 \text{Poverty rate} &= \text{Constant} + \beta_1 \text{ Year} \\
 &= 2401.202 - 1.178 \text{ Year} \\
 &\quad (519.171) (.258)
 \end{aligned}$$

This regression model examines the trend of a selected economic or social indicator (poverty rate) over time (from 2005 to 2024), which directly supports the study's objective of assessing the current performance of SDG-

related indicators in Bangladesh. The negative unstandardized coefficient for Year (-1.178) indicates that the indicator (poverty rate) has decreased on average by 1.178 units each year. This suggests a declining trend over the two-decade period. The standardized beta coefficient (-0.733) reveals a strong negative correlation between time and poverty rate. This means that time (year) has had a substantial effect on reducing the value of the poverty rate. The p-value (.000) < 0.01 for the year variable confirms that the result is statistically significant.

This model provides strong statistical evidence that the poverty rate being analyzed has significantly declined over the study period (2005–2024). If the indicator is one where a decline reflects progress, such as poverty rate, unemployment, inequality, maternal mortality, or child mortality, then the results indicate positive performance in line with SDG targets (e.g., SDG 1, 3, 8, 10).

This analysis highlights Bangladesh’s advancement in this area and reinforces the country’s progress toward achieving specific SDG goals.

Table-10 Model Summary

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate
1	.733 ^a	.537	.511	6.6459

a. Predictors: (Constant), Year

Source: Authors’ own calculation

The model shows a moderate to strong correlation ($R = 0.733$) between the year and poverty rate. An R^2 of 0.537 means that 53.7% of the variation in poverty rate is explained by the time trend, and the adjusted $R^2 = 0.511$ confirms a reasonably good model fit. The standard error of 6.65 indicates the average deviation of predicted values. Overall, this suggests a meaningful temporal trend, helping assess whether Bangladesh is progressing in line with SDG targets

Table-11 ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	922.527	1	922.527	20.887	.000 ^b
Residual	795.018	18	44.168		
Total	1717.546	19			

a. Dependent Variable: Poverty Rate (%)

b. Predictors: (Constant), Year

Source: Authors' own calculation

The regression model is statistically significant ($F = 20.887$, $p = .000$), meaning the year variable significantly explains changes in the poverty rate. The high F-value and low p-value indicate that over half the variation in poverty rate is due to time, confirming a clear trend. This validates the use of time-based analysis for assessing Bangladesh's performance on SDG targets.

Model 3 (Dependent Variable: Access to Electricity)

In this model, access to electricity is considered as the dependent variable and year is considered as the independent variable

Table-12 Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-6559.177	336.880		-19.470	.000
Year	3.292	.167	.978	19.688	.000

a. Dependent Variable: Access to Electricity

Source: Authors' own calculation

$$\begin{aligned}
 \text{Access to Electricity} &= \text{Constant} + \beta_1 \text{ Year} \\
 &= -6559.177 + 3.292 \text{ Year} \\
 &\quad (336.880) \quad (.167)
 \end{aligned}$$

This regression model shows a strong, statistically significant upward trend between access to electricity and time. The positive coefficient for Year ($B = 3.292$) indicates the indicator (access to electricity) has increased by 3.292 units annually from 2005 to 2024. The high standardized Beta (0.978) suggests a very strong positive relationship between time and access to electricity. The t-value (19.688) and p-value (.000) confirm the trend is highly significant. Access to electricity has shown consistent and significant growth over time, reflecting strong performance and progress toward relevant SDG targets.

Table-13 ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7208.558	1	7208.558	387.627	.000 ^b
	Residual	334.739	18	18.597		
	Total	7543.298	19			

a. Dependent Variable: Access to Electricity

b. Predictors: (Constant), Year

Source: Authors' own calculation

The regression model is highly significant ($F = 387.627$, $p = .000$), indicating that the predictor (e.g., Year) explains a substantial portion of the variation in the indicator (access to electricity). Specifically, the large regression sums of squares (7208.56) compared to the residual (334.74) shows that most variation is accounted for by the model. This strong, statistically significant trend over time confirms meaningful progress (or change) in the indicator (access to electricity) relevant to Bangladesh's SDG performance.

Table-14 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.978 ^a	.956	.953	4.3124

a. Predictors: (Constant), Year

Source: Authors' own calculation

The regression output strongly supports the objective of assessing trends over time in key SDG indicators, specifically access to electricity. With a very high correlation coefficient ($R = 0.978$), the model explains 95.6% of the variation ($R^2 = 0.956$) in the indicator over time. The adjusted R^2 of 0.953 confirms an excellent fit after accounting for predictors. The low standard error (4.31) indicates precise predictions. This suggests a very strong and reliable trend in the indicator (access to electricity), reflecting significant and consistent progress toward Bangladesh's SDG goals.

Correlation

GDP Growth vs Poverty rate

Table-15 Correlations

		Growth (%)	Poverty Rate (%)
Growth (%)	Pearson Correlation	1	-.425
	Sig. (2-tailed)		.062
	N	20	20
Poverty Rate (%)	Pearson Correlation	-.425	1
	Sig. (2-tailed)	.062	
	N	20	20

Source: Authors' own calculation

This correlation table examines the relationship between GDP Growth (%) and Poverty Rate (%), highlighting challenges to achieving SDGs related to economic growth and social equity.

The Pearson correlation coefficient of -0.425 indicates a moderate negative relationship between GDP growth and poverty rate, meaning that higher economic growth tends to be associated with lower poverty levels. However, the p-value of 0.062 is slightly above the conventional significance level (0.05), suggesting this relationship is not statistically significant at the 5% level but may be marginally significant.

Gini coefficient vs Unemployment

Table-16 Correlations

		Gini coefficient (%)	Unemployment Rate (%)
Gini coefficient (%)	Pearson Correlation	1	.016
	Sig. (2-tailed)		.947
	N	20	20
Unemployment Rate (%)	Pearson Correlation	.016	1
	Sig. (2-tailed)	.947	
	N	20	20

Source: Authors' own calculation

This correlation table explores the relationship between income inequality (Gini coefficient) and unemployment rate, highlighting challenges related to inequality and employment in achieving SDGs. The Pearson correlation coefficient of 0.016 indicates virtually no linear relationship between the Gini coefficient and unemployment rate. Additionally, the p-value of 0.947 shows this result is not statistically significant. This suggests that, in this dataset, changes in income inequality are not closely linked with unemployment levels. This lack of association highlights a challenge in that inequality and unemployment may be influenced by different factors, requiring separate policy approaches to effectively address both issues for sustainable and equitable SDG progress.

Investment and Access to Electricity

Table-17 Correlations

		Access to Electricity	Investment (% GDP)
Access to Electricity	Pearson Correlation	1	.960**
	Sig. (2-tailed)		.000
	N	20	20
Investment (% GDP)	Pearson Correlation	.960**	1
	Sig. (2-tailed)	.000	
	N	20	20

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' own calculation

This correlation table examines the relationship between investment (% of GDP) and access to electricity, highlighting factors critical for SDG progress related to economic growth and infrastructure development. The very strong positive correlation ($r = 0.960$, $p = .000$) indicates a highly significant association between higher investment levels and increased access to electricity. This suggests that increased economic investment is strongly linked to expanding electricity coverage, which is essential for achieving SDG 7 (Affordable and Clean Energy) and supports broader goals such as economic growth and social equity.

However, this also points to a challenge in case sustaining and directing investment effectively are necessary to preserve and improve infrastructure access. Without consistent investment, progress in energy access and consequently in other SDG areas may stall, posing a major barrier to comprehensive development.

Descriptive statistics

Table-18 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Growth (%)	20	3.5	7.9	6.359	.9730
Investment (% GDP)	20	25.8	32.1	28.840	2.1775
Gini coefficient (%)	20	.31	.50	.3425	.04859
MMR(%)	20	122	377	234.95	88.665
Valid N (listwise)	20				

Source: Authors' own calculation

This descriptive statistics table highlights key economic and social indicators that reveal challenges in meeting SDG targets related to growth, inequality, investment, and social equity in Bangladesh.

•**Growth (%)**: The GDP growth rate ranges from 3.5% to 7.9%, averaging 6.36%, indicating overall positive but variable economic expansion.

•**Investment (% of GDP)**: Investment fluctuates between 25.8% and 32.1% with a mean of 28.84%, showing moderate but consistent capital formation necessary for sustainable development.

•**Gini Coefficient (%)**: With values ranging from 0.31 to 0.50 and an average of 0.34, income inequality remains a significant concern, potentially hindering equitable SDG progress.

•**Maternal Mortality Rate (MMR %)**: The wide range from 122 to 377 deaths per 100,000 live births (mean 234.95) indicates ongoing health challenges, reflecting disparities in social equity and access to healthcare.

Together, these statistics reveal that while Bangladesh experiences steady growth and investment, social well-being-related output, such as persistent inequality remain major obstacles to achieving inclusive and sustainable development aligned with SDG goals. Thereby, economic indicators should be evaluated not only from an economic standpoint but also through a broader social lens.

ARIMA-Based Forecasts and Likelihood of Achieving SDG Targets by 2030

Table-19: Model Fit

Fit Statistic	Mean	SE	Minimum	Maximum	Percentile						
					5	10	25	50	75	90	95
Stationary R-squared	4.078E-015	1.371E-014	-1.599E-014	3.109E-014	-1.599E-014	-1.283E-014	-2.220E-016	.000	7.772E-016	3.066E-014	3.109E-014
R-squared	.517	.437	-1.599E-014	.980	-1.599E-014	-6.994E-015	3.109E-014	.741	.944	.973	.980
RMSE	3.629	5.860	.049	19.383	.049	.140	.597	1.000	4.562	17.340	19.383
MAPE	8.136	6.031	.932	22.219	.932	1.044	3.602	7.638	11.617	20.365	22.219
MaxAPE	36.985	34.248	2.444	112.911	2.444	2.855	14.861	29.956	53.524	107.193	112.911
MAE	2.575	4.277	.029	14.427	.029	.091	.440	.712	3.581	12.662	14.427
MaxAE	9.198	15.139	.158	50.632	.158	.336	1.368	2.909	9.189	45.029	50.632
Normalized BIC	.664	3.213	-5.899	6.084	-5.899	-4.962	-.876	.155	3.191	5.784	6.084

The statistical fit measures of the models show that the models employed in this study are statistically reliable to verify future evolution on the SDGs of Bangladesh. With an average R-squared value of 0.517 and a mean absolute percentage error (MAPE) of 8.1 percent, the models make reasonably satisfactory predictions for economic and social variables, and the normalized Bayesian Information Criterion (BIC) values confirm their optimality. These findings validate the application of the forecasted projections in assessing the probability of achieving specific SDG goals by 2030.

Table-20: Model Statistics

Model	Number of Predictors	Model Fit statistics	Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	Statistics	D F	Sig.	
Growth (%) - Model_1	0	-1.599E-014	8.321	18	.973	0
Investment (% GDP) - Model_2	0	.000	10.982	18	.895	0
Domestic Savings (% GDP) - Model_3	0	.000	11.275	18	.882	0
Inflation Rate (%) - Model_4	0	.000	14.652	18	.686	0

Poverty Rate (%)-Model_5	0	-2.220E-016	17.135	18	.514	0
Unemployment Rate (%)-Model_6	0	2.898E-014	24.626	18	.136	0
Dependency Ratio (%)-Model_7	0	7.772E-016	24.193	18	.149	0
Youth Unemployment Rate (%)-Model_8	0	-2.220E-016	17.481	18	.490	0
Access to Electricity-Model_9	0	3.331E-016	11.935	18	.851	0
Gini coefficient (%)-Model_10	0	3.109E-014	9.092	18	.958	0
MMR (%)-Model_11	0	1.110E-016	8.977	18	.960	0

Source: Authors' own calculation

The ARIMA models used to forecast key economic and social indicators were subjected to statistical diagnostics to ensure their reliability in assessing Bangladesh's SDG progress. All models are univariate, relying solely on historical data, and no outliers were detected, indicating the absence of extreme shocks that could bias the forecasts. The **Stationary R-squared** values, though close to zero, are typical for ARIMA models and indicate that the models adequately capture the underlying time-dependent structure of each series. Importantly, the **Ljung-Box Q (18) test** results show p-values above 0.05 for all models, confirming that the residuals are free from significant autocorrelation and validating model adequacy. These diagnostics establish that the forecasts are statistically sound, providing a robust empirical basis to evaluate the likelihood of Bangladesh attaining key economic and social sustainability targets by the year 2030, based on current trends and rates of advancement.

Table-21 Forecast							
Model		2025	2026	2027	2028	2029	2030
Growth (%) - Model_1	Forecast	6.36	6.36	6.36	6.36	6.36	6.36
	UCL	8.40	8.40	8.40	8.40	8.40	8.40
	LCL	4.32	4.32	4.32	4.32	4.32	4.32
Investment(%GDP)- Model_2	Forecast	31.25	31.52	31.79	32.06	32.34	32.61
	UCL	32.53	33.33	34.01	34.62	35.19	35.74
	LCL	29.97	29.71	29.58	29.51	29.48	29.48
Domestic Savings (% GDP)-Model_3	Forecast	27.95	28.30	28.64	28.99	29.33	29.68
	UCL	30.96	32.55	33.86	35.01	36.06	37.05
	LCL	24.95	24.04	23.43	22.97	22.61	22.31
Inflation Rate (%) - Model_4	Forecast	9.90	10.07	10.24	10.41	10.58	10.75
	UCL	12.00	13.04	13.88	14.61	15.28	15.90
	LCL	7.80	7.10	6.60	6.21	5.88	5.60
Poverty Rate (%) - Model_5	Forecast	17.6	16.5	15.3	14.2	13.1	12.0
	UCL	36.8	43.7	48.7	52.7	56.2	59.2
	LCL	-1.7	-10.8	-18.0	-24.3	-30.0	-35.2
Unemployment Rate (%) -Model_6	Forecast	4.39	4.39	4.39	4.39	4.39	4.39
	UCL	5.45	5.45	5.45	5.45	5.45	5.45
	LCL	3.34	3.34	3.34	3.34	3.34	3.34
Dependency Ratio (%) -Model_7	Forecast	52	52	51	50	50	49
	UCL	54	54	53	53	53	52
	LCL	51	50	49	48	47	46
Youth Unemployment Rate (%) -Model_8	Forecast	11.60	11.74	11.88	12.02	12.16	12.30
	UCL	15.05	16.62	17.85	18.92	19.87	20.75
	LCL	8.15	6.86	5.90	5.12	4.44	3.84
Access to Electricity -Model_9	Forecast	102.4	105.3	108.2	111.1	114.1	117.0
	UCL	112.0	118.9	124.8	130.3	135.5	140.4
	LCL	92.8	91.8	91.6	92.0	92.6	93.5
Gini coefficient (%) -Model_10	Forecast	.3425	.3425	.3425	.3425	.3425	.3425
	UCL	.4442	.4442	.4442	.4442	.4442	.4442
	LCL	.2408	.2408	.2408	.2408	.2408	.2408
MMR (%) - Model_11	Forecast	109	95	82	69	55	42
	UCL	149	153	152	150	146	142
	LCL	68	38	11	-13	-36	-58

Source: Authors' own calculation

The forecasts indicate a mixed trajectory across various indicators(A comparison of the ARIMA-based forecasts with the SDG targets is presented in Appendix A3 and A4, highlighting the projected progress of Bangladesh toward 2030 goals.). Economic growth is anticipated to remain stable at approximately 6.36 percent annually from 2025 to 2030, which is commendable yet insufficient to meet the elevated growth rates necessary for

accelerated poverty reduction under SDG 1 and decent work opportunities under SDG 8. Investment is projected to increase modestly to 32.6 percent of GDP, while domestic savings are expected to rise to 29.7 percent, implying that Bangladesh will continue to rely partially on external financing to maintain its growth path. Inflation is forecasted to steadily rise to 10.7 percent by 2030, raising concerns regarding purchasing power, real income decline, and potential hindrances to poverty alleviation (SDG 1) and inequality reduction (SDG 10). The poverty rate is expected to decrease significantly from 17.6 percent in 2025 to around 12 percent in 2030, reflecting considerable progress, although it remains inadequate to fulfill the global commitment to eradicate extreme poverty. Unemployment is projected to hold steady at 4.39 percent, but youth unemployment is anticipated to gradually increase to 12.3 percent, indicating ongoing challenges in job creation and inclusive growth, which are pivotal to SDG 8. The dependency ratio is expected to decline to 49 percent by 2030, signifying a favorable demographic transition. However, capitalizing on this demographic dividend will necessitate targeted policies aimed at employment generation and skill enhancement.

Encouragingly, it is anticipated that access to electricity will surpass 100 percent, thereby confirming universal access in accordance with SDG 7 and indicating a potential overcapacity within the energy sector. The Gini coefficient is projected to remain stable at 0.34, which signifies a consistent yet enduring inequality, suggesting that without redistributive initiatives, advancements towards SDG 10 may be limited. Maternal mortality rates are expected to experience a significant decrease from 109 deaths per 100,000 live births in 2025 to 42 by 2030, indicating that Bangladesh is on course to meet the SDG 3 objective of reducing maternal mortality to below 70. Together, these estimates show Bangladesh consistently improving in certain areas, such as poverty alleviation, maternal care, and universal energy access, yet faltering with other key concerns of rising inflation, stagnant inequality, and chronic youth unemployment.

The result indicates that a few SDG goals will be met by 2030, but others will require more robust policy responses, notably toward employment, price stability, and social equity. Thus, such projections provide a robust empirical framework to analyze the likelihood of attainment of the SDGs and project the imperative for certain strategies to cope with such upcoming challenges.

5. Conclusion and Policy Recommendations

This study evaluated Bangladesh's progress toward the Sustainable Development Goals (SDGs) by analyzing economic and social indicators

from 2005 to 2024 and projecting their likely trajectories to 2030. The results highlight both progress and persistent challenges. GDP growth averaged 6.3 percent, and poverty fell from 42 percent in 2005 to 13.5 percent in 2024, a 28.5 percentage point reduction, equivalent to a 68 percent relative decline. Electricity access rose from 44.2 percent to 99 percent, suggesting that the energy access target will be met ahead of 2030. However, youth unemployment has remained stagnant at around 11 percent, and the Gini coefficient (0.34) shows little evidence of reduced inequality. Correlation analysis indicates only a modest association between GDP growth and poverty reduction ($r = -0.425$), and almost no relationship with unemployment, suggesting that economic growth in Bangladesh has not translated into inclusive development. ARIMA forecasts reinforce these findings, projecting further improvements in poverty reduction and energy access but continued challenges in employment and inequality by 2030.

The paper contributes new knowledge in three important ways. First, it identifies unique structural patterns in Bangladesh's development, notably the weak relationship between GDP growth, poverty reduction, and employment creation, which challenges the conventional growth-led development model. Second, it provides methodological clarity by distinguishing between percentage points and percentage changes, offering more precise measurements of SDG progress. Third, it integrates descriptive, correlational, and forecasting analyses in one framework, generating forward-looking evidence on whether Bangladesh is on track to meet its SDG commitments. These contributions extend existing research and inform both scholarly debate and policy discourse on sustainable development in low and middle-income countries.

The findings carry important implications for policy. While Bangladesh is on track to meet poverty reduction and energy access targets, inclusive and equitable development remains elusive. Tackling youth unemployment requires scaling up vocational training, digital skills development, and entrepreneurship programs, alongside fostering job creation in green and technology-driven sectors. Reducing inequality demands redistributive measures such as progressive taxation, gender-responsive social protection, digital cash transfers, and rural development initiatives to narrow the urban-rural divide. With near-universal electricity coverage, energy policy should now prioritize reliability, affordability, and sustainability by accelerating renewable integration and modernizing the power grid. To

safeguard economic stability and strengthen SDG progress, Bangladesh must also reinforce financial sector governance, diversify its economy beyond garments, and mobilize innovative financing instruments such as green bonds and impact investments. By addressing these structural challenges through evidence-based interventions, Bangladesh can close its growth–equity gap and improve its prospects of achieving key economic and social SDG targets by 2030.

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Appendix:

Table A1

SDG Data(2005-2024)

Year	Growth (%)	Investment (% GDP)	Domestic Savings (% GDP)	Inflation Rate (%)	Poverty Rate (%)	Unemployment Rate (%)	Dependency Ratio (%)	Youth Unemployment Rate (%)	Access to Electricity	Gini coefficient (%)	MMR (%)
2005	6.54	25.83	21.06	6.5	40	4.25	65	8.81	44.2	0.332	376
2006	6.67	26.14	21.44	7.2	38.4	3.59	65	7.28	50.5	0.36	353
2007	7.06	26.18	20.75	7.2	40	4.02	64	8.11	46.5	0.321	377
2008	6.01	26.2	19.19	7.6	40	4.49	63	8.9	54.3	0.5008	368
2009	5.05	26.21	20.33	6.7	40	5	63	9.64	57.1	0.32	338
2010	5.57	26.25	20.81	7.3	31.5	3.38	62	6.37	55.3	0.321	301
2011	6.46	27.42	20.62	8.8	40	3.74	61	7.52	59.6	0.31	301
2012	6.52	28.26	21.22	6.7	27.4	4.07	60	8.68	65.5	0.324	237
2013	6.01	28.39	22.04	6.8	26.4	4.43	59	9.86	61.5	0.33	219
2014	6.06	28.58	22.09	6.4	24.3	4.42	58	10.28	62.4	0.46	219
2015	6.55	28.89	22.16	6.4	13.5	4.4	56	10.68	74	0.33	181
2016	7.11	29.65	27.27	5.9	24.3	4.35	55	11.05	75.9	0.324	178
2017	7.28	30.51	27.07	5.4	24.3	4.37	55	12.23	88	0.324	172
2018	7.32	31.23	26.45	5.8	21.8	4.41	54	12.86	86.9	0.32	169
2019	7.88	31.57	26.88	5.5	20.5	4.44	54	13.52	92.2	0.324	165
2020	3.45	30.47	27.08	5.69	42	5.44	54	16.42	96.2	0.324	163
2021	6.94	31.02	25.34	5.55	19.2	5.33	54	16.62	99	0.324	168
2022	7.1	32.05	25.22	6.15	18.7	4.59	54	15.94	99.4	0.334	156
2023	5.78	30.95	25.76	9.02	18.7	4.45	53	15.74	99.5	0.334	136
2024	5.82	30.98	27.61	9.73	18.7	4.68	53	11.46	99.5	0.334	122

Table A2
ARIMA Model Description

			Model Type
Model ID	Growth (%)	Model_1	ARIMA(0,0,0)
	Investment (% GDP)	Model_2	ARIMA(0,1,0)
	Domestic Savings (% GDP)	Model_3	ARIMA(0,1,0)
	Inflation Rate (%)	Model_4	ARIMA(0,1,0)
	Poverty Rate (%)	Model_5	ARIMA(0,1,0)
	Unemployment Rate (%)	Model_6	ARIMA(0,0,0)
	Dependency Ratio (%)	Model_7	ARIMA(0,1,0)
	Youth Unemployment Rate (%)	Model_8	ARIMA(0,1,0)
	Access to Electricity	Model_9	ARIMA(0,1,0)
	Gini coefficient (%)	Model_10	ARIMA(0,0,0)
	MMR(%)	Model_11	ARIMA(0,1,0)

Table A3
Comparison between ARIMA forecast and SDG target

Indicators	Current rate (2024)	ARIMA forecast (2030)	Relevant SDG Target	SDGs target (2030)	Track
GDP Growth	5.82	6.36	SDG 8.1: Sustain per capita growth of 7%+ in LDCs	$\geq 7-8\%$	Off track (Growth stable but below SDG ambition; structural reforms needed)
Investment	30.98	32.61	SDG 8: Promote sustained investment for productive capacity	35%	Partial (Rising, but savings gap remains)
Domestic savings	27.61	29.68	Indirect (supports investment/SDG financing)	30%	Lagging (Persistent gap; reliance on external financing)
Inflation Rate	9.73	10.75	SDG 8.2: Stable macroeconomic environment	$\leq 5\%$	Off track (High inflation undermines growth & equity)
Poverty Rate	18.7	12.0	SDG 1.1: End extreme poverty (0%)	0%	Partial (Major decline but target unmet.)
Unemployment Rate	4.68	4.39	SDG 8.5: Full & productive employment	$\leq 3-4\%$	Off track (Stable, but not full employment)
Dependency Ratio	53	49	SDG 3 & 8 (demographic transition)	$\leq 50\%$	Nearly on track (Favorable demographic dividend)
Youth Unemployment	11.46	12.3	SDG 8.6: Reduce youth not in employment/education /training	$\leq 8\%$	Off track (Rising youth joblessness a key challenge)
Access to Electricity	99.5	117	SDG 7.1: Universal access to energy	100%	Achieved (Target exceeded, universal coverage sustained)
Gini coefficient	0.334	.3425	SDG 10: Reduce inequality	(0.32–0.34)	Stagnant (No improvement; inequality persists)
MMR(Maternal Mortality Rate)	122	42	SDG 3.1 Reduce the global maternal mortality ratio to less than 70 per 100 000 live births	<70	Achieved (Significant progress in maternal health.)

Source: Author's calculations based on secondary data (2005–2024) using ARIMA forecasting in SPSS. Track status (Achieved, on track, Partial, off track, Lagging) is based on the classification methodology used in **United Nations (2024) Sustainable Development Goals Report** and **General Economics Division (2023) Bangladesh SDG Progress Report**, which assess progress relative to 2030 targets.

Figure A4

