Research Paper

Assessing the impact of different industries on the economic trend of Dhaka region: A short-run and long-run approach

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Abstract

The economic trend of a region plays a crucial role in the overall development and growth of a nation. This paper aims to assess the impact of different industries on the economic trend of the Dhaka region in Bangladesh. Specifically, it focuses on determining the contribution of regional GDP to the national GDP through various industries. To achieve the aim, this study employs a short-run and a long-run approach of regional economic structure analysis. The short-run analysis allows for an examination of the immediate impact of industries on the Dhaka region's economic trend. On the other hand, the long-run analysis considers the sustained effects of industries over an extended period. Data for this research paper were collected from government reports, statistical databases, and are industry specific data. The analysis encompassed a wide range of sectors such as manufacturing, services, agriculture, and construction, among others to do short run and long run analysis by calculating economic base multiplier, national share, industry mix shift share and regional shift share. The results of this study provide a comprehensive understanding of the industries that have a substantial contribution to the economic trend of the Dhaka region. Furthermore, it provides insights into the extent of the region's impact on the national GDP through these industries as it determines regionally and nationally fast or slow growing industries. The findings from this research demonstrate that Dhaka Region's industries contributed 19% of the national GDP in 1999–2000, showcasing its economic importance which outpaced national average growth of industries but faced challenges in some sectors. This study sheds light on the short and long-term impacts of different industries on the economic trend of the Dhaka region in Bangladesh.

Keywords Economic trend, regional GDP, national GDP, Regional economic structure analysis, Dhaka region

1. Introduction

Economic trend denotes the comprehensive trajectory or configuration of economic operations during a specific duration. It encompasses metrics such as changes of Gross Domestic Product (GDP), employment rates, investment levels, and inflation (Zayed, 2018). Various governmental regulations, global economic circumstances, and technological progress can impact economic trends. The economic trend of a region plays a pivotal role in the overall development and growth of a nation (Phillips & Sul, 2009). In the specific context of the Dhaka region located in Bangladesh, it is crucial to evaluate the extent to which different industries are contributing to the regional and national GDP. Such an assessment is vital for effective decision-making processes that promote sustainable economic development (Sultan, 2008).

The Dhaka region, being the capital and economic hub of Bangladesh, holds significant importance in the country's overall economic landscape. It is characterized by a diverse industrial base, including manufacturing, services, agriculture, construction, and others. The region's industries have a substantial impact on the national economy, making it an

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ideal study area to investigate the dynamics of economic trends and industry contributions. While Dhaka region's industries are known to contribute significantly to the national GDP, a comprehensive assessment of their impact on the region's economic trend is lacking. To fill this gap, this research paper aims to delve into the specific industries operating in the Dhaka region and evaluate their short-run and long-run effects on economic trends.

Previous scholarly investigations have brought to the forefront the economic structure of the Dhaka region, underscoring the prevalence of the manufacturing and services sectors (Hossain & Huggins, 2021). The textile industry, specifically the ready-made garment sector, has been instrumental in propelling the region's economic advancement by facilitating job creation and augmenting export revenues (Rahman & Hossain, 2010) Nonetheless, in order to cultivate sustainable development and alleviate reliance on a singular sector, there is a pressing necessity to broaden the industrial foundation of the Dhaka region. The sustainability of the ready-made garment industry in Bangladesh necessitates the implementation of product and market diversification strategies. Furthermore, the industry confronts several obstacles, including insufficient infrastructure, ineffective port management, and mounting rivalry from foreign competitors (Rahman & Hossain, 2010).

The main purpose of this research is to evaluate how different industries affect the economic trend of the Dhaka region in Bangladesh and their contribution to the national GDP. This study also aims to investigate both the short-term and long-term impacts of industries on the economic development of the region by utilizing a short-run and long-run approach.

Data for this research were collected from BBS (2002). By collecting regional GDP and national GDP for different industries, short run and long run analysis can be done by calculating LQ, economic base multiplier, national share, industry mix shift component, regional shift component, etc. A wide range of industries, including manufacturing, services, agriculture, and construction, among others, was analysed to determine their individual and cumulative contributions to the economic trend of the Dhaka region.

Despite the importance of studying the impact of different industries on economic trend, there is a lack of research that combines both short-run and long-run approaches to assess their effects comprehensively. Previous studies have often focused on either the immediate or sustained impacts, neglecting the holistic perspective required to understand the complete dynamics of economic trends (Gori et al., 2021). This research aims to bridge this gap by employing a dual approach, providing a more comprehensive understanding of industry contributions over time. The research also investigates model fit for GDP forecasts using a variety of techniques. The results of the study are intended to improve the economic trend of the Dhaka region and promote sustainable economic growth and development.

2.   Literature Review

The process of economic trend in a given region encompasses the ongoing socioeconomic metamorphosis of the post-socialist global arena, with a particular emphasis on establishing a competitive economic framework (Marangos, 2021). The financial sector's underdevelopment does not confine a region's economic trend (Dawson, 2003). However,

the geographical distribution of economic activities within and between countries has been significantly impacted by the process of economic trends and regional integration (Zuev et al., 2021). Bangladesh has experienced diverse economic trends since its independence, commencing with a socialist economic framework, trending into a mixed economic framework, and culminating in a capitalist economic framework (Islam et al., 2020).

Dhaka region holds significant importance in the economic development of Bangladesh, as it encompasses a wide array of industries such as manufacturing, brick kilns, garment production among many others (Hassan et al., 2020). It is imperative to place emphasis on enhancing the quality of factory working conditions, addressing pertinent social concerns, fostering positive labour relations, and ensuring strict adherence to established codes of conduct (Rahman & Hossain, 2010). So, a comprehensive analysis of economic trend from both short-run and long-run perspectives can be conducted through the application of different economic models and theories.

The shift-share method offers a significant approach for analysing aggregate data to support the findings of the economic base research (Quintero, 2007). It is used by regional economists to assess changes in local employment. It helps to identify the competitive industries within a locality compared to a larger reference area, such as a nation or region. But shift-share analysis lacks a solid theoretical basis for its constant shift and share assumptions, making it unreliable for forecasting (Lahr & Ferreira, 2020). It does not incorporate critical factors like demand changes or technological advancements affecting regional employment growth. Additionally, it assumes industry composition remains unchanged over time, which may not reflect reality. It also overlooks the spatial dimension of regional employment growth, concentrating solely on industry-specific growth at the national level.

Economic base theory is a commonly used approach in regional economic analysis, emphasizing that a region's growth relies heavily on the production of goods and services those are in demand in other parts of the country, leading to exports from that specific region (McNulty, 1977). These exports serve as the primary driver of local economic growth by bringing in additional money to the area. There are several methods available to identify if an industry is directly or indirectly focused on imports or exports such as the Location Quotient (LQ), which assesses the distribution of employment across various industries and determines how diverse the economic base evolves over time, is the most often used indirect technique. This approach is simple to apply and does not require a lot of specialized knowledge (Quintero, 2007). According to Garrison (1972), economic base multipliers, typically used to assess urban economies, have limitations when applied to small rural areas. They may not accurately gauge the impact of new industries on non-basic employment in such regions. Employment multipliers, which calculate the change in total employment relative to basic employment, can be irrelevant in small rural economies.

External monetary flows can stimulate a region's economy, which can be divided into two sectors: basic and non-basic activities (Williams, 1997). 'Basic activities' export goods and services, while non-basic activities serve the local market. Basic activities originally referred to industries like agriculture, forestry, and mining that export goods beyond the local area. However, this definition has evolved to include additional income sources like earnings from commuters working outside the region, tourism, and social security payments (Cobbe, 1994). Basic GDP measures the economic output generated by a region

or country's basic industries. In contrast, "non-basic activities" are local-oriented and do not export outside the region. Examples include local retail, utilities, and school districts. Basic activities are essential for the region's economic foundation but often rely on locally produced tools and supplies. This reliance encourages the growth of non-basic activities, influencing the overall economic structure of the region (McCarty, 1942).

Short-term changes in a region can be combined with long-term theories of regional economic development to create a comprehensive regional profile (Glasson, 1978). The Stage Theory, also known as sector theory, plays a pivotal role in analysing long-term regional economic growth. It suggests that regions initially thrive in agriculture as transportation improves and trade with other areas increases. Subsequently, industrialization takes place as agricultural returns decline. Eventually, regions specialize in export production. This theory also applies to urban areas, where they evolve from a single dominant industry to a focus on region-specific services (Dawkins, 2003).

Dhaka, the capital of Bangladesh, has emerged as a rapidly expanding and densely populated urban centre in Asia, accommodating a populace exceeding 15 million. It has gained prominence as the most competitive economic centre in the nation, witnessing a surge in urbanization and industrialization in recent times (Haagsma et al., 2020). The industrial sector has contributed a large amount to the country's GDP, and generated employment and opportunities (Mohiuddin, 2014). The industrial business in Dhaka city has experienced significant growth and has made a substantial contribution to the economy of Bangladesh (Bony & Rahman, 2014).

3.   Study Area

The study area of Dhaka region is located at the center of the country. Dhaka city, the capital of Bangladesh, is located at approximately 23.8103° N latitude and 90.4125° E longitude. The Dhaka region consists of a total of 13 districts. These districts are Dhaka, Gazipur, Narayanganj, Tangail, Manikganj, Munshiganj, Narsingdi, Kishoreganj, Faridpur, Gopalganj, Madaripur, Rajbari, and Shariatpur. Each district has its unique characteristics, but they are all part of the greater Dhaka region (Figure 1).
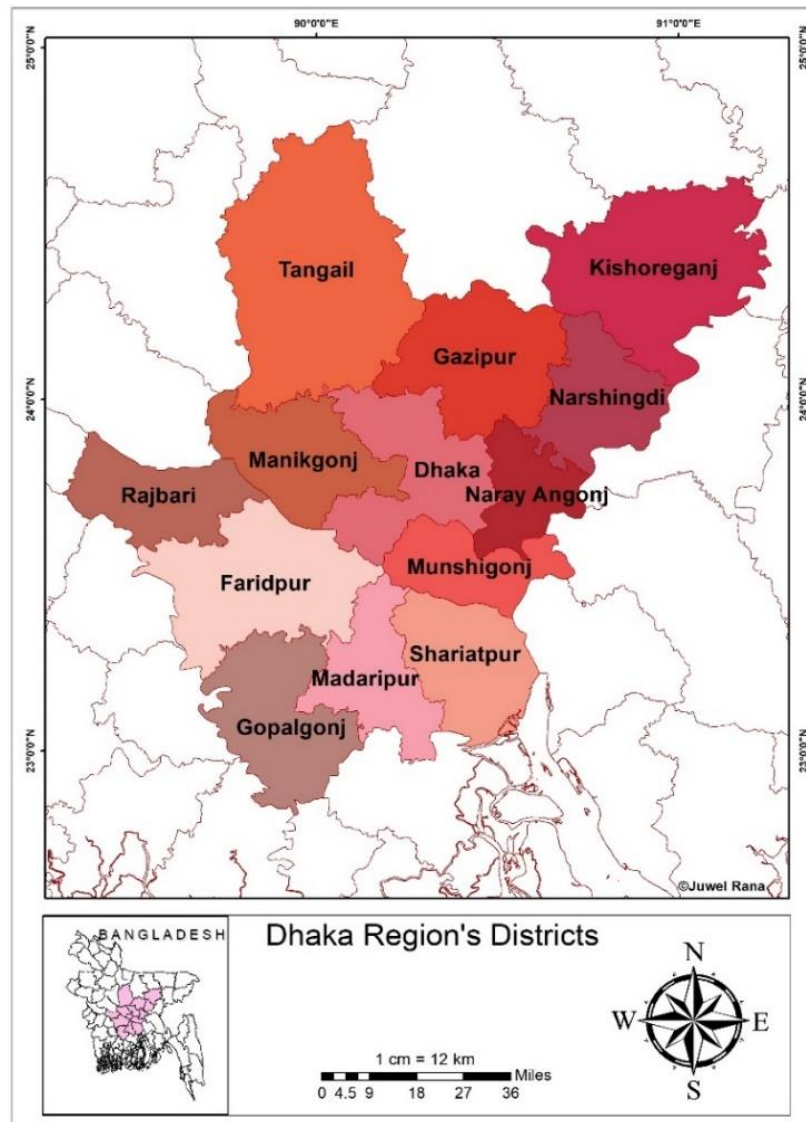
Figure 1. Dhaka region map (Source: Prepared by the authors, 2023).

4. Methodology

The study employs conventional techniques, namely location quotient (LQ) and shift-share analysis, amalgamated to form a hybrid methodology to assess the economic structure of the Dhaka region in Bangladesh. Shift-share analysis is a useful method for describing both regional and industrial economic development over a long period of time, and it has been widely used in regional economic studies (Chunyun & Yang, 2008). The investigation utilizes national and regional aggregated data of Gross Domestic Product (GDP) at

constant prices from 1995-96 to 1999-2000 as the foundation for scrutinizing the economic structure.

4.1.   Short-run regional growth calculation

The utilization of LQ as a means of assessing short-term regional expansion is a widely respected method within academic circles, and it was deemed appropriate for determining the short-term regional growth of the study area. The derivation of the LQ for each industry in a region is achieved through the utilization of the following ratio (Glasson, 1978):

$$LQ_i = \frac{Percentage\ of\ regional\ employment\ in\ industry\ i}{Percentage\ of\ national\ employment\ in\ industry\ i} \tag{1}$$

where, LQ_i is the LQ for industry i.

It is a measure used to evaluate the importance of a particular industry in a region compared to its importance in the national economy. If the LQ value is greater than 1, it indicates that employment in that industry is more concentrated in the region than in the national average. If the LQ value is less than 1, it indicates that the employment of that industry is less concentrated in the region than in the national average. If the LQ value is equal to 1, it indicates that the industry is equally important in the region and the national economy.

'Economic Base Theory' asserts that the local economy's strength relies heavily on its basic sectors, which are the primary drivers of regional economic growth, creating multiplier effects (Glasson, 1978). The formula for the calculation of basic employment is the following (McCann, 2013):

$$E_i^B = \begin{cases} \frac{LQ_i - 1}{LQ_i} \times E_i, & LQ_i \geq 0 \\ 0, & LQ_i < 0 \end{cases} \tag{2}$$

Where, E_i^B stands for basic employment in industry i, which is a measure of the concentration of a particular industry in a region compared to the national average. E_i represents the total employment in industry i. The numerator of the formula, (LQ_i-1), if positive, represents the excess concentration of industry i in the region compared to the national average. By the same equation, basic GDP can be calculated by just replacing E_i with regional GDP.

Then, an economic base multiplier is calculated from the following formula (Glasson, 1978):

$$K = \frac{E^T}{E^B} \tag{3}$$

Where K is the economic base multiplier, E^T is the total regional employment, and E^B is the total regional basic employment.

Economic base multiplier, K, is a measure used to evaluate the impact of basic industries on the overall economy of a region. A value of K greater than 1 indicates that the region has a strong economic base and is capable of generating additional employment opportunities in non-basic industries. On the other hand, a value of K less than 1 indicates that the region is heavily dependent on non-basic industries and may face economic challenges in the long run.

4.2.   Long-run regional growth calculation

Long-run regional growth calculation industrial structure analysis is a method used to determine the long-term growth of a region. This method is also known as shift-share analysis. The total regional employment growth is calculated using two separate components: 'shift' and 'share'. The 'shift' component represents any deviations in regional employment growth from the national share. The 'share' component represents the amount by which regional employment would have grown if it had grown at the national rate over the study period.

The equation for calculating the national share component is as follows (Glasson, 1978):

$$NS_j = E_{j0}\left(\frac{E_t - E_0}{E_0}\right) \tag{4}$$

where, NS_j represents the net shift of industry j in the region.

E_{j0} is the initial employment of industry j in the base year,

E_t is the total employment in the region in the target year, and

E_0 is the total employment in the region in the base year.

Shift component

There are two types of shift components: proportionality shift component and differential shift component. Proportionality shift component measures the amount of net regional shift attributable to the composition of the industrial sector in the region.

The formula for proportionality shift component is proposed by Glasson (1978):

$$PS_j = \sum\left(\frac{E_{it} - E_{i0}}{E_{i0}} - \frac{E_t - E_0}{E_0}\right) \times E_{ij0} \tag{5}$$

Here, PS_j represents the proportionately shift component for region j, E_{it} represents the total employment in industry i at time t, E_{i0} represents the total employment in industry i at the base year, E_t represents the total national employment at time t, E_0 represents the total national employment at the base year and E_{ij0} represents the total employment in industry i in region j at the base year.

The formula for differential shift component is proposed by Glasson (1978)

$$DS_j = \sum\left(\frac{E_{ijt} - E_{ij0}}{E_{ij0}} - \frac{E_{it} - E_{i0}}{E_{i0}}\right) * E_{ij0} \tag{6}$$

Here, DS_j represents the differential shift component for region j, E_{ijt} represents the total employment in industry i in region j at time t and all other variables have the same meaning as in the proportionately shift component formula.

Prediction of total regional GDP by different projection methods

The following methods have been used for predicting total regional GDP.

a. Linear regression method

$$y = mx + c \tag{7}$$

Here, y represents total regional GDP and x represents projection period in years.

b. Projected base multiplier method

$$M_{pb} = (RGDP_{ptb} - RGDP_{qtb})*K_p + RGDP_{qt} \tag{8}$$

Here, M_{pb} represents projected base multiplier, $RGDP_{ptb}$ represents predicted total basic regional GDP, $RGDP_{qtb}$ represents base year total basic regional GDP, K_p represents predicted economic base multiplier and $RGDP_{qt}$ represents base year total regional GDP.

c. Projected average base multiplier method

$$M_{pab} = (RGDP_{ptb} - RGDP_{qtb})*K_a + RGDP_{qt} \tag{9}$$

Here, M_{pab} represents projected average base multiplier, K_a represents average economic base multiplier and all other variables have the same meaning as in the projected base multiplier method.

Accuracy Assessment

To determine which of the three methods is the most appropriate, we calculate their respective accuracies using the following formula:

$$\text{Accuracy} = (1 - \frac{|actual\ value - predicted\ value|}{actual\ value}) * 100 \tag{10}$$

5. Data Analysis

5.1. Short-run analysis

By calculating LQ, we can determine the sectors as basic or non-basic activity. If LQ > 1, it indicates basic/export oriented activity. LQ = 1 indicates regional employment matching the proportion of national employment in the mentioned industry. Finally, LQ < 1 indicates non-basic/local activity.

Table 1 shows that there is a significant increase of LQ for many industries. For example, we can see that, for Real estate, renting and business activities, the industry is non-basic for initial time and it became a basic activity due to its high demand of housing, business activities in Dhaka region. And it can be said that, in the near future more industries will grow as basic activity apart from these three industries.

From Table 1, we can see that the total regional GDP was increasing year by year linearly, which is also shown in Figure 2.

**Table 1.** Calculation of LQ, basic GDP, and economic base multiplier.

Sectors	1995-1996			1996-1997			1997-1998			1998-1999			1999-2000		
	LQ	RGDP	BGDP	LQ	RGDP	BGDP	LQ	RGDP	BGDP	LQ	RGDP	BGDP	LQ	RGDP	BGDP
Agricultural & forestry	0.83	51,177		0.83	54,434		0.83	55,581		0.80	54,121		0.82	59,420	
Fishing	0.52	8,504		0.59	10,297		0.58	11,188		0.59	12,255		0.58	13,112	
Mining & quarrying	0.18	566		0.29	953		0.29	1,005		0.31	1,087		0.28	1,075	
Manufacturing	1.56	7,3577	26,541	1.56	77,016	27,563	1.55	83,298	29,491	1.57	85,922	31,286	1.57	89,835	32,574
Electricity, water & gas supply	0.78	3582		0.70	3,653		0.77	3,682		0.78	3,874		0.80	4,253	
Construction	0.97	20,385		0.97	22,148		0.97	24,245		0.98	26,407		0.98	28,648	
Wholesale & retail trade	1.19	46,887	7,541	1.19	49,473	7,935	1.19	52,545	8,416	1.17	54,238	7,990	1.17	58,083	8,423
Hotel & restaurant	0.96	1784		0.95	1,872		0.95	1,994		0.97	2,127		0.97	2,277	
Transport, storage, & communication	0.93	25,670		0.91	26,474		0.88	27,168		0.89	28,772		0.89	30,576	
Financial inter mediations	0.33	1,578		0.32	1,640		0.32	1,727		0.33	1,819		0.33	1,918	
Real estate, renting & business activities	1.00	28,833		1.00	29,850		1.00	30,980		1.01	32,161	397	1.01	33,393	386
Public administration & defense	0.51	3,895		0.51	4,110		0.51	4,354		0.52	4,604		0.51	4,876	
Education	0.87	5,463		0.86	5,709		0.86	6,153		0.87	6,591		0.86	7,012	
Health & social work	0.93	6,490		0.93	6,749		0.93	7,065		0.95	7,406		0.95	7,769	
Community, social, & personal services	0.97	26,404		0.97	27,134		0.96	27,912		0.98	28,731		0.98	29,615	
Total		30,4795	34,082		321,512	35,499		338,897	37,908		350,115	39,673		371,862	41,383
Economic base multiplier	8.94			9.06			8.94			8.82			8.99		

Source: Calculated by the authors from BBS (2002) data.
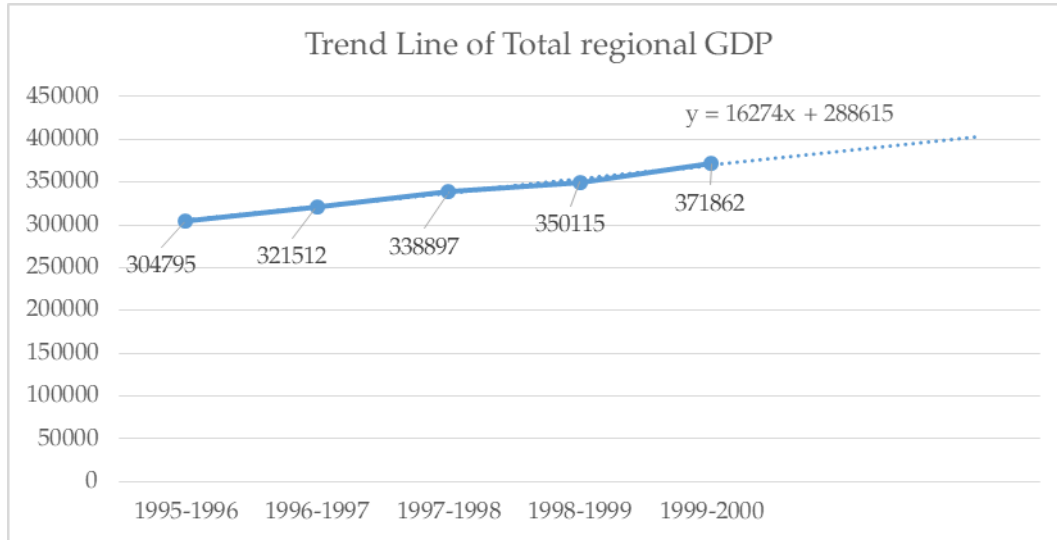
Figure 2. Trend line of total regional GDP (Source: Authors' analysis, 2023).

We also calculated economic base multiplier in Table 1 by dividing total regional GDP and total basic GDP. Analyzing the provided data, it is evident that the economic base multipliers fluctuated slightly over the given period which is shown in Figure 3.
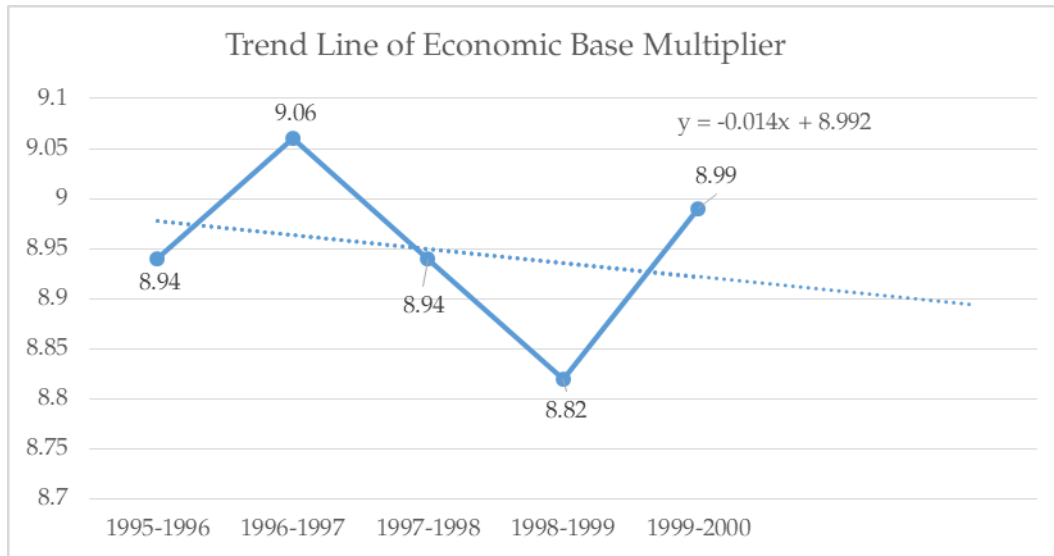
Figure 3. Trend line of economic base multiplier (Source: Authors' analysis, 2023).

From 1995–96 to 1996–97, the economic base multiplier increased from 8.94 to 9.06. According to sector theory, this increase indicates that the income elasticity of demand and labour productivity also rose during this period. Income elasticity of demand measures how sensitive the demand for goods and services is to changes in income. As income rises, people have more purchasing power, and the demand for commodities supplied by

secondary (manufacturing) and tertiary (service) sectors tend to increase faster than the demand for primary (agriculture) products. This growth in demand for secondary and tertiary sectors results in their expansion.

For the consecutive three years e.g.,1996–97, 1997–98, 1998–99, factors like the flood of 1998 and other economic conditions caused a decline in labour productivity and income elasticity of demand as economic base multipliers can fluctuate due to factors like shifts in the local economy, industry demand, or external economic conditions (Garrison, 1972). During a flood, the economic base multiplier is likely to be affected due to the disruption of economic activities and infrastructure. The multiplier may decrease as businesses and industries are unable to operate, leading to a decline in employment and income. The extent of the impact would depend on the severity and duration of the flood, as well as the resilience and recovery efforts of the affected area. This decline led to a reduction in the demand for secondary and tertiary products but boosted the demand for primary products. As a consequence, the basic industries (primary sector) experienced growth during this period according to Equation 3. But multipliers computed on the basis of historical data make them less effective in predicting unforeseen events like natural disasters (Garrison, 1972). They also overlook external factors, such as government policies and technological changes. These models primarily examine basic and non-basic sectors and may ignore other economic drivers like small businesses. This is why due to the exceptional event of the flood, the multiplier dropped from 8.94 to 8.82. Computing multipliers may not be universally appropriate, particularly in distinctive economic contexts like rural areas.

Finally, for the last year (1999–2000), the economic base multiplier increased again due to rapid urbanization and industrialization of the Dhaka region. These factors likely led to increased economic activity, which in turn led to a higher economic base multiplier.

In summary, the graph reflects changes in the economic base multiplier over the years, which can be attributed to shifts in income elasticity of demand, labour productivity, and specific economic factors like floods and urbanization. These changes influenced the demand for different sectors (primary, secondary, and tertiary) of the economy, resulting in varying rates of growth for each sector during different periods.

5.2.   Sector-wise contribution to national and regional GDP

5.2.1.   Sector-wise contribution to national GDP

During the period from 1995–1996 to 1999–2000, several sectors experienced growth in their contributions to the national GDP. According to BBS (2002), the agricultural and forestry sector witnessed an increase of 18.45%, amounting to 59,869 million BDT. Similarly, the fishing industry showed significant growth of 40.37%, with a rise of 34,519 million BDT in GDP. Mining and quarrying experienced a growth rate of 21.50%, adding 3,586 million BDT to the economy. Manufacturing saw a substantial growth of 23.23%, contributing an additional 57,228 million BDT. The electricity, water, and gas supply sector expanded by 17.69%, reflecting an increase of 4,249 million BDT. Construction experienced a remarkable growth rate of 40.54%, amounting to 44,597 million BDT. Wholesale and retail trade surged by 27.76%, adding 57,206 million BDT to the national GDP. The hotel

and restaurant industry witnessed a growth rate of 27.48%, contributing 2,691 million BDT. Transport, storage, and communication sectors experienced a growth rate of 25.27%, amounting to 36,591 million BDT. Financial intermediations showed a growth of 23.06%, adding 5,809 million BDT to the economy. Real estate, renting, and business activities expanded by 15.85%, contributing 23,954 million BDT. Public administration and defence saw growth of 25.14%, amounting to 10,097 million BDT. Education experienced substantial growth of 31.41%, contributing 10,382 million BDT. Health and social work grew by 19.10%, adding 6,958 million BDT. Lastly, community, social, and personal services grew by 12.16%, contributing an additional 17,389 million BDT to the national GDP (see Figure 4)
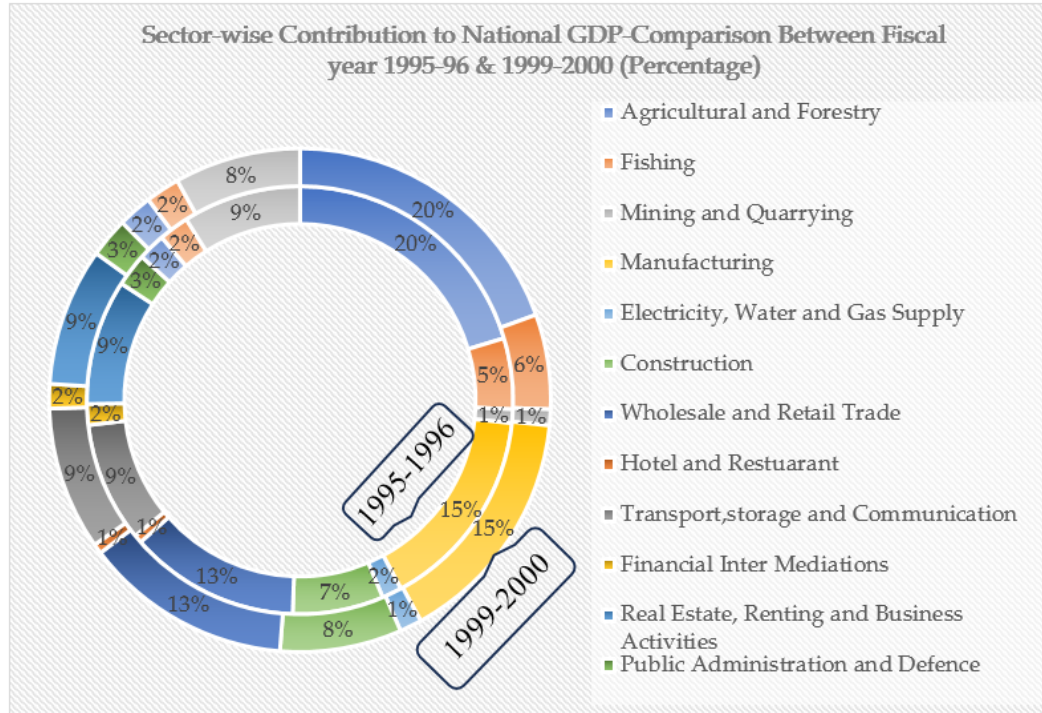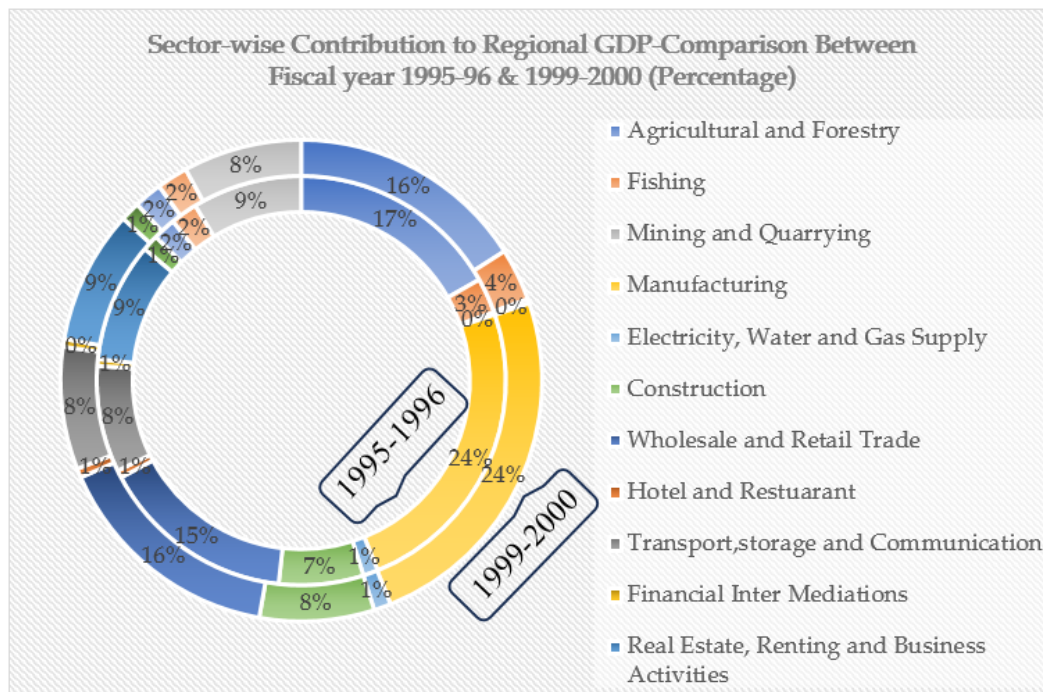

Figure 4. Sector-wise contribution to national GDP (Source: Authors' analysis, 2023).

Here we can see that the agriculture and forestry sector led in contribution to the national GDP in both 1995–1996 and 1999–2000 which is 20% for both (Figure 4). This means, there is not any significant growth of contribution to national GDP through the agriculture and forestry sector. A slight growth is shown for fishing and construction and a slight decline is shown in education, mining and quarrying. The remaining sectors were static in terms of contribution to national GDP.

5.2.2.   Sector-wise contribution to regional GDP

In the Dhaka region, the contributions of various sectors to the regional GDP exhibited varying trends from 1995–1996 to 1999–2000. According to BBS (2002), the agriculture and forestry sector experienced growth, with a rise from 51,177 million BDT to 59,420 million BDT. Fishing also saw an upward trajectory, increasing from 8,504 million BDT to 13,112

million BDT. Mining and quarrying activities expanded, with contributions rising from 566 million BDT to 1,075 million BDT. Manufacturing played a significant role, demonstrating robust growth from 73,577 million BDT to 89,835 million BDT. The sectors of electricity, water, and gas supply; construction; wholesale and retail trade; hotel and restaurant; transport, storage, and communication; financial intermediations; real estate, renting, and business activities; public administration and defence; education, health, and social work; as well as community, social, and personal services all experienced positive growth during this period (Figure 5). However, without additional data, it is not possible to determine the specific contribution of each sector to the national GDP.

Figure 5. Sector-wise contribution to regional GDP (Source: Authors' analysis, 2023).

In terms of sector-wise contribution to the national GDP, the agriculture and forestry sector holds the first position with a contribution of 20%. On the other hand, the manufacturing sector contributes 15% to the national GDP.

However, the scenario changes when we focus on the Dhaka region and its sector-wise contribution to the regional GDP. In this case, the manufacturing sector takes the lead with a contribution of 24%. This means that manufacturing activities in the Dhaka region contribute the most to the regional GDP. On the other hand, the agricultural and forestry sector, which holds the first position nationally, contributed 17% to the regional GDP in 1995–1996 and 16% in 1999–2000.

This disparity between national and regional contributions can be attributable to various factors, such as the concentration of manufacturing industries in the Dhaka region, the availability of resources, market demand, and economic policies specific to the region. The

higher contribution of the manufacturing sector to the regional GDP in Dhaka indicates its significant role in driving economic growth and development in that particular area. The reason behind the less contribution of the agriculture and forestry sector is rapid urbanization and industrialization of Dhaka region.

5.3.   Prediction of total regional GDP of 2025-2026

For forecasting the total regional GDP of 2025–2026 with 1995–1996 as the base year, we have to determine which forecasting method from the following is more suitable: (a) linear regression, (b) projected base multiplier, and (c) projected average base multiplier.

As we have total regional GDP value till 1999–2000, we will forecast the value for five years taking 1995–96 as the base year to determine which method produces results closer to the actual 1999–2000 values. The actual total regional GDP of Dhaka region for 1999–2000 is 371,862 million BDT.

a. Linear regression method

At first, we start with the linear regression method for forecasting total regional GDP of 1999–2000 assuming 1995–1996 as the base year. From equation (7), we get the following model,

$$y = 16274x + 288615$$

$$y = 16274*5 + 288615 = 369,985 \text{ million BDT.}$$

P-value <0.05, R^2 = 0.993.

b. Projected base multiplier

For the projected base multiplier method, we have to predict total basic regional GDP using linear regression. Again, for forecasting total basic regional GDP of 1999–2000 assuming 1995–1996 as base year, the linear regression equation was found to be,

$$y = 1877.8x + 32076$$

And for five years, the projected total basic regional GDP value will be 41,465 million BDT.

We also have to predict economic base multiplier for 1999–2000, where the linear regression equation was found to be,

$$y = -0.014x + 8.992$$

For five years, the predicted economic base multiplier for 1999–2000 will be 8.922. So, the projected total regional GDP was computed according to equation (8) to be 370,670.14 million BDT.

c. Projected average base multiplier

Lastly, the projected total regional GDP derived from equation (9) as 370,876.88 million BDT.

After calculating with all three methods, we calculated the accuracy for each method by equation (10) to determine which method is suitable for further forecasting.

Table 2. Accuracy assessment of three methods.

Total regional GDP in millions of BDT			Accuracy
Actual value		371,862	
Projection	Linear Regression	369,985	99.50%
	Projected Base Multiplier Method	370,670.14	99.68%
	Projected Average Base Multiplier Method	370,876.88	99.74%

Source: Authors' analysis (2023).

From Table 2, we can see that the projected average base multiplier method has the highest accuracy and the forecasting value is closer to 1999–2000 actual total regional GDP value. So, we can choose this method for further forecasting.

After 30 years, for 2025–26, total regional GDP will be 781,527.15 million BDT or 7.04 billion USD (Figure 6).
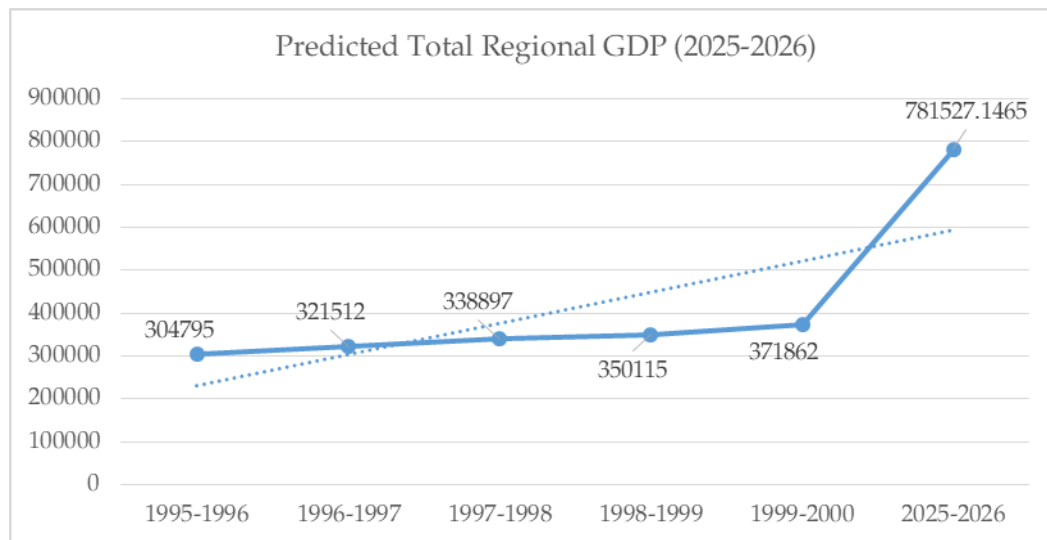
Figure 6. Predicted total regional GDP (2025–2026) (Source: Authors' analysis, 2023).

5.4.   Long-run analysis

Long-run analysis is done to examine and understand trends and patterns in economic variables over an extended period. It involves studying data over several years or even

decades to identify long-term changes, determine growth rates, and make predictions about future trends.

The national share provides insights into how industries have performed compared to the national growth rate and from Table 3, we can see that, national share for all industries is positive. This means that the industries in Dhaka region are doing well compared to national growth rate. However, within this positive trend, there are noticeable variations in proportionately shift components and differential shift components. The proportionately shift component measures the relative growth rate of industries in the Dhaka region compared to the national average. A positive value indicates that the industries in Dhaka were growing faster than the national average, while a negative value suggests slower growth. On the other hand, the differential shift component examines the difference in growth rates between the Dhaka region and the national average. A positive value indicates that the industries in Dhaka were leading the country in terms of growth, whereas a negative value suggests lagging behind.

Table 3. National share, industry mix shift component and regional shift component.

Shift component	National share	Industry mix shift component	Regional shift component
Total	71,623.08	-553.93	-4,002.15

Source: Authors' analysis (2023).

From Table 3, it is seen that, national share for the Dhaka region is positive, which means that the region's economic output is contributing positively to the overall national GDP. A negative value (-553.93) for the industry mix shift component indicates that the region's industries are growing slower than the national average. In other words, the growth rate of industries in Dhaka is lagging compared to the overall growth rate of industries in the entire country. The negative value (-4,002.15) for the regional shift component suggests that there are specific industries in the Dhaka region that are not performing as well as the average industries nationwide. These industries are considered lagging in the regional context.

The component of proportionate shift is employed as a means of gauging the quantity of net regional shift that can be ascribed to the industrial sector makeup of a given region. Nationally fast-growing and slow-growing industries pertain to the pace at which science-based companies acquire vital resources such as management teams, fundraising, and technology. These firms undergo an early growth phase that involves the consolidation of these resources, which may have indeterminate causal directions and follow different paths.

Table 4. Sector-wise shift component analysis.

Serial no	Sectors	N_j	P_j	D_j	Findings
I	Agricultural and forestry	+	-	-	Nationally and regionally cannot meet up the demands.
II	Fishing	+	+	+	Both nationally and regionally, this sector has contribution.
III	Mining and quarrying	+	-	+	This cannot serve nationally but regionally leading industry.
IV	Manufacturing	+	-	-	Same as I.
V	Electricity, water, and gas supply	+	-	+	Same as III.
VI	Construction	+	+	-	Nationally fast-growing industry and regionally lagging industry.
VII	Wholesale and retail trade	+	+	-	Same as VI.
VIII	Hotel and restaurant	+	+	+	Same as II.
IX	Transport, storage, and communication	+	+	-	Same as VI.
X	Financial intermediations	+	-	-	Same as I.
XI	Real estate, renting, and business activities	+	-	-	Same as I.
XII	Public administration and defense	+	+	+	Same as II.
XIII	Education	+	+	-	Same as VI.
XIV	Health and social work	+	-	+	Same as III.
XV	Community, social and personal services	+	-	-	Same as I.

Source: Authors' analysis (2023).

Table 5. Fast-growing and slow-growing industries at the national level.

Fast-growing industries	Slow-growing industries
Fishing	Agricultural and forestry

Construction	Mining and quarrying
Wholesale and retail trade	Manufacturing
Hotel and restaurant	Electricity, water, and gas supply
Transport, storage, and communication	Financial intermediations
Public administration and defence	Real estate, renting, and business activities
Education	Health and social work
	Community, social and personal services

Source: Authors' analysis (2023).

From Table 4 and 5, it can be seen that out of the fifteen industries present, seven are experiencing national-level fast growth, whereas the remaining industries, including basic ones such as manufacturing and real estate, are progressing at a slower pace. This leads to the inference that not all the basic industries present within the Dhaka Region are expanding at a rate equivalent to that of the entire nation of Bangladesh. The slow expansion of industries in the Dhaka region of Bangladesh can be explained by multiple factors. One of the reasons is the overreliance on a single sector, such as the ready-made garment (RMG) industry, which renders the economy vulnerable to shocks due to the lack of diversification. Furthermore, the unpredictable political climate, the frailty of institutions, the lack of business confidence, and the significant outflow of capital impede the growth of job-creating productive capacities and the shift to formal sectors. In comparison to other nations in the region, manufacturing industry in Bangladesh has also experienced sluggish growth, indicating a slow pace of industrial development (Khanom, 2020). Moreover, the division of land holdings and low wages in the RMG industry restrict productivity and income levels, underscoring the urgency of increasing educational attainment in rural areas to enhance productivity.

Table 6. Regionally leading and lagging industries.

Regionally leading industries	Regionally lagging industries
Fishing	Agricultural and forestry
Mining and quarrying	Manufacturing
Electricity, water, and gas supply	Construction
Hotel and restaurant	Wholesale and retail trade
Public administration and defence	Transport, storage, and communication
Health and social work	Financial intermediations
	Real estate, renting, and business activities
	Education
	Community, social, and personal services

Source: Authors' analysis (2023).

From Table 6 we can see that, The Dhaka region boasts several leading industries, including fishing, mining and quarrying; electricity, water and gas supply; hotel and restaurant; public administration and defence; and health and social work. These industries play a crucial role in enhancing the quality of life in the region by providing essential services and adequate infrastructure (Hossain, 2012). However, the informal supply of water and electricity in the informal settlements of Dhaka, where a significant portion of the population resides, operates under informal regulation, contributing to a complex hybrid institutional sphere (Hossain & Huggins, 2021). The growth of these industries is also attributed to the unplanned rapid urbanization in suburban areas resulting from rapid industrialization without proper regulatory controls (Jamal & Rahman, 2012). Furthermore, the hospitality sector, consisting of hotels and restaurants, is currently experiencing a period of growth due to an increase in both tourism and business travel. The rapid and unplanned urbanization of Dhaka has resulted in the conversion of agricultural land, water bodies, and forests, which has ultimately led to a decline in the value of ecosystem services. While the service sector, comprising wholesale and retail trade; and transport, storage, and communication, has witnessed unprecedented growth. It has also given rise to several challenges such as traffic congestion and logistics management. Moreover, the encroachment on agricultural land and wetlands by real estate projects beyond Dhaka's planned areas has been fuelled by the proximity to the central business district and transportation connectivity.

5.5.   Relationship between short- and long-run regional growth

From Figure 3 and Table 3, we can see that the correlation between long-term and short-term analyses is crucial for obtaining a thorough comprehension of economic dynamics. Short-term analysis centres on scrutinizing economic variables during a comparatively restricted interval, pinpointing fluctuations, commercial cycles, and immediate reactions to modifications in economic circumstances. The analysis of the short-term fluctuations in the economic base multipliers illustrates the varying impacts of basic activities on the non-basic sector. In certain years, such as 1996–1997, there was a more pronounced spillover effect of basic activities on the overall economy, resulting in an increase in growth in the non-basic sector. Conversely, during the period of 1998–1999, the multiplier decreased, possibly due to the adverse effects of a flood, which reduced the capacity of the basic sector to promote growth and generate economic benefits. In the long term, though there may be short-term fluctuations, the industries in the Dhaka region have presented positive national shares, thereby exhibiting consistent and commendable performance in comparison to the national growth rate. These industries, including fishing, mining, and quarrying; electricity, water, and gas supply, and hotels and restaurants, have contributed significantly to the region's economic progression and standard of living. The rapid and unregulated urbanization in the area has also brought about challenges such as infrastructural issues and environmental impacts.

6.   Findings

Dhaka region's industries contributed approximately 19% to the national GDP in 1999-2000 economy, highlighting the region's economic importance and substantial role in the

country's economic growth. This high percentage of GDP attributed to Dhaka signifies a thriving business environment and a strong industrial presence. Moreover, our analysis reveals that Dhaka region's industries have been performing relatively well compared to the national growth rate, indicating faster growth than the average industries across the country. This positive trend showcases the region's potential for further development and reinforces its status as an economic powerhouse. However, we observed a major concern regarding the predicted total regional GDP of the Dhaka region. From Figure 6, the predicted total regional GDP of Dhaka region (2025–26) is only 781,527.15 million BDT ($7.04 billion), but according to ("Dhaka (North & South) - C40 Cities," 2023), as of 2022, Dhaka's economy contributed $213.3 billion to the nominal gross state product and $740 billion in purchasing power parity, which contributes 40% of Bangladesh's gross domestic product. One of the main reasons for this difference is inflation as the average inflation rate of Bangladesh from 1995 to 2022 is 6.06% per year (Macrotrends, 2014). Another reason is the emergence of new sectors such as information technology (IT) and the lack of available data on various sectors (tourism, banking, etc). Bangladesh's consumer expenditure has increased as a result of the digital economy's explosive rise. 180 million people have mobile subscriptions, 90% of people have access to the internet, and $200 million worth of digital financial transactions take place every day (Munir et al., 2023). Around 90% of the population will have more access to financial services and cashless transactions thanks to the government-backed platform *Binimoy*. According to the Bangladesh Department of Information Technology, freelancers earn 100 million dollars a year (Amin, 2022). Over the last ten years, Bangladesh's tourism industry has grown significantly, contributing a total of 693.21 billion BDT in 2018, compared to an average of 377.46 billion BDT from 2007 to 2018. According to the Bangladesh Investment Development Authority (2021), over the last ten years, Bangladesh has seen a sharp increase in tourism, which accounted for 3% of GDP in 2019. Over the past 20 years, Bangladesh's banking sector has undergone extraordinary growth and development (Ahamed, 2012). The contribution of these sectors remained unidentified due to unavailability of these data in BBS database at that time. And current data is also not available to compare the projection value with the existing scenario. Another concern is slower growth of some of the industries in the Dhaka region, as indicated by the industry mix shift component. Identifying the reasons behind this slower growth and implementing appropriate strategies to address it- will be crucial to sustain the region's economic momentum. Additionally, there are lagging industries within the region, as suggested by the Regional shift component, which could hinder the overall economic growth. Supporting these lagging industries or exploring opportunities for diversification could help uplift their performance and, in turn, boost the region's economic potential. An interesting finding from our analysis is the connection between basic industries and the demand for service products. As basic industries grow, there is a corresponding rise in demand for services, leading to the growth of non-basic industries. Understanding this relationship can aid policymakers in fostering a conducive environment for both basic and non-basic industries to flourish. Furthermore, our research identifies specific industries, such as the hotel and restaurant sector, and construction industry, among others, that exhibit promising potential to become basic industries in the

near future. Promoting and nurturing these sectors can further enhance the region's economic diversification and overall stability.

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7. Conclusion

In conclusion, the economic performance of the Dhaka region has been analysed from both long-run and short-run perspectives, which provide valuable and complementary insights into its development. The research indicates that the industries in the Dhaka region have continuously surpassed the pace of national growth, demonstrating their robustness and beneficial impact on the country's economy. The short-run analysis demonstrates fluctuations in economic base multipliers, indicating varying impacts of basic activities on the non-basic sector over time. Short-term disruptions, such as the flood in 1998–1999, could have affected the relationship between basic and non-basic activities, leading to fluctuations in economic performance. However, despite these short-term fluctuations, the long-run analysis reveals that the region's industries have exhibited an overall positive performance, as indicated by their positive national shares in comparison to the national growth rate. The study also identifies a significant disparity between the reported economic contributions as of 2022 and the projected total regional GDP for 2025–2026. It could be attributable to discrepancy of variables like inflation, the emergence of new sectors, and the lack of data for various industries. However, by following our methodological process and adding the data of new sectors and unavailable sectors, we will be able to show the results maintaining the highest accuracy which we have shown in Table 2 where the error between the projected value and the actual value was only 0.0007%. Dhaka region's dominant industries, including fishing; mining and quarrying; electricity, water, and gas supply; hotel and restaurant; public administration and defence; and health and social work, are instrumental in driving economic growth and enhancing the quality of life in the region. These industries have made substantial contributions to the national GDP, underscoring their significance in the wider economy and their potential for long-term development.

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