

Contribution of VAT to the Total Revenue in Bangladesh

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Abstract

Research Purpose: The study mainly focused on how Value Added Tax (VAT) contributes to the country's total revenue based on the secondary time series annual data.

Data and Methodology: The empirical study covered 31 years data from the F/Y of 1991-1992 to 2021-2022. OLS multiple regression model has employed to fulfill the objective. In the Model, the dependent variable is total revenue and the independent variables are VAT, Import-Export duty, Excise duty, Supplementary duty, total direct tax, Tax beyond NBR, and non tax revenue. To achieve more precise and genuine results, the data is processed and transformed into the current purchasing power of money by using the GDP Deflator.

Research findings: Descriptive analysis showed that VAT was not only the first position but also it was more consistent than any other revenue sources. Moreover, the inferential statistics discovered that VAT has a statistically significant positive impact on the country's TR. Regression result indicates that a 1% increase in VAT will result in a 0.31% increase in the country's overall revenue.

Research implication: The policymakers would make the proper decision based on the study's findings which come from conversion values of the variables.

Originality: The study has showed that how VAT contributes to the total revenue in Bangladesh considering the current purchasing power of money.

Scope of future research:

Extensive studies on the VAT gap and VAT evasion and their effects on the country's TR may be undertaken.

Keywords: Value Added Tax, Total Revenue, GDP Deflator, Bangladesh.

1. Introduction

Taxes are an important aspect of a country's economic development and expansion for any government, as they provide the government with considerable money (Basirat et al. 2014). It is the world's most powerful and effective fiscal

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policy tool. Designing a tax ideally requires an understanding of its intrinsic revenue capacity, or its "automatic" revenue responsiveness to changes in the economic cycle (Sanz-Sanz et al., 2016). The government uses tax revenue to handle externalities and provide public goods and social services (Nerbø, 2015).

Direct and indirect taxes make up tax systems. Since taxes are the government's main source of funding and currently account for about 85% of total revenue in Bangladesh, they ought to be increased to address the government's excessive spending (Shil, Masud, & Alam, 2019). The governments of wealthy nations sought additional revenue after World War II to fund increased public spending. They addressed these through imposing new value-added taxes (VAT) in the latter half of the 20th century (Tanzi, 2017). Their tax revenue was largely derived from income tax and VAT. Additionally, Tanzi (2017) demonstrated that the average tax rates of industrialized nations rose steadily during the 20th century. After the 20th century, it contributed to over 10% of GDP; at the end of the century, it had risen to over 30%. In a few European nations, it even surpassed 40% of GDP. The IMF promotes the benefits of VAT-adopted countries' revenues for emerging nations. To balance Pakistan's government budgets, VAT is an important source of revenue (Hassan, 2015).

Using its rate, base, and geographic coverage across both developed and developing nations, Luitel (2005) demonstrated that the VAT has emerged as the most crucial component of the tax system and has contributed significantly to government revenue over the past 50 years. According to Feltenstein et al. (2021), a significant portion of tax revenue in emerging nations comes from VAT. Important indirect taxes include excise duty, supplementary duty, and VAT. In Bangladesh's Fiscal Year 2019-2020, approximately 38.82 percent of tax revenues and 32.30 percent of government revenues come from VAT, making it an important instrument for government revenue mobilization (NBR, 2021).

In Bangladesh, taxes generate 84% of government revenue, and VAT accounts for the largest share (approximately 35%) (Alam et al., 2017). Since VAT has a significant effect on economic growth as a fiscal policy tool (Simionescu & Albu, 2016), it is one of the primary sources of public revenue in Bangladesh for resource mobilization (Shil et al., 2019). In recent years, Bangladesh has ranked second in terms of government revenue from income tax, and VAT has ranked first (GOB, 2019). In the 2019–2020 fiscal year, a total of Tk. VAT of 860.97 billion was collected, representing 59% of Bangladesh's total indirect tax revenue (GOB, 2021). The goal of implementing VAT was to increase government revenue and free up funds for investments in economic growth. VAT has helped the country's economic development since its introduction. This study examined the potential impact of VAT on Bangladesh's overall revenue.

A country's tax system is vital for promoting equality and enhancing an economy's social and economic well-being (Ahmad & Sial, 2016), which has been a major issue of discussion in public finance in recent decades (Adkisson & Mohammed, 2014). A nation's Tax system is a crucial tool for policymaking that

can either encourage or discourage investment (Clark, 2007). Different taxes are fiscal policy tools, and several authors have examined their functions and impacts on the economy (Alesina et al., 2012). Economic security depends on a stable fiscal policy; thus, policymakers must manage its volatility. Numerous studies have highlighted the importance of volatility in fiscal policy (Fatas & Mihov, 2006). Spending restrictions and properly balanced budgets are examples of fiscal rules that lower fiscal policy volatility (Fatas & Mihov, 2006). Taxes primarily finance government spending (Bernardi et al., 2005). Mankiw et al. (2009) highlighted the widely accepted standard theory of optimal taxation, the tax system in which social welfare is maximized. An appropriate tax rate and structure would not hamper economic growth and output (Mitra & Stern, 2003).

According to Jelena et al. (2018), taxes are the economic manifestation of a state's existence and indicate its economic core. Social and political activities, as well as economic factors, affect the total amount of tax revenue and its structure, as taxes involve the exchange of commodities and services between citizens and the government (Castañeda Rodríguez, 2018). Raising taxes, changing the composition of spending, or increasing the national debt are the three ways that government spending is supposed to be financed (İYidoğan et al., 2017).

Although some studies have found the VAT-Total tax revenue related issue in Bangladesh, according to the researcher's best knowledge, there is no study on the extent to which VAT revenue contributes to the total revenue of the government with the current purchasing power of money in Bangladesh.

1.1 Objective of the Study

To find out the contribution of VAT to the total revenue of the government in Bangladesh.

1.2 Research Question

How much has VAT revenue contributed to the government's total revenue in Bangladesh?

1.3 Rationale of the Study

The revenue collected for infrastructure provision in a given country influences its political, economic, and social development (Edame & Okoi, 2014). Taxes impact economic growth by influencing the investment in individuals and physical resources (Shafi & Asghar, 2015). Therefore, policymakers should be concerned with the factors that determine tax revenue collection, which drives economic development in all circumstances. In the world, VAT affects over 4 billion people and accounts for around 20% of total tax revenue (Keen & Lockwood, 2007). In OECD countries, VAT accounts for about 20% of total tax revenues (OECD, 2016). The VAT has proven to be an effective tool for raising revenue; as a result, its effectiveness directly affects fiscal mobilization, macroeconomic stability, and development (Le, 2003). To accomplish the aforementioned objective, it is necessary to know how much VAT contributes to the country's overall revenue, so that policymakers can make proper decisions when collecting VAT.

2. Literature Review

Alavuotunki et al. (2019) used macro data to investigate how the VAT affects disparities and government revenue growth. The study found that VAT negatively affected revenue. The study also showed that implementing VAT increased wealth inequality while leaving the consumption gap unchanged. Ebeke and Ehrhart (2011) examined whether the best way to increase revenue in developed nations is to implement a value-added tax (VAT). Using a representative sample of 103 developed countries observed between 1980 and 2005, they found compelling evidence that VAT reduces tax revenue volatility. As a result, countries with VAT have tax receipts that are 40% to 50% less volatile than those without VAT.

Emmanuel (2013) used a simple linear regression model based on secondary time-series data from 1994 to 2010 to examine the effects of VAT on economic growth, as measured by GDP and total tax revenue, in Nigeria. The researcher discovered that VAT significantly affects these metrics. The effect of VAT on economic growth in the Republic of Serbia between 2005 and 2014 was examined by Kalas and Milenkovic (2017). The study found that despite a high and positive correlation between the variables, there was no statistically significant effect on observed variables.

Ofishe (2015) used Ordinary Least Squares techniques based on secondary time series data from 1994 to 2012 to investigate the impact of VAT on GDP in Nigeria. During the study period, the researcher discovered a substantial, significant positive association between VAT and economic growth, as indicated by GDP and TTR. The report suggested that the government make efficient use of the VAT money, which it collects for economic and infrastructure development.

Okoye and Gbegi (2013) studied the influence of VAT revenue on wealth creation in Nigeria. Ten years of secondary data out of eighteen years were selected using purposive sampling techniques. The study's hypotheses were tested using the Student's T-test and the Pearson product-moment correlation coefficient. They discovered that VAT revenue significantly affects both the production of wealth and Nigeria's overall tax revenue.

Onaolapo et al. (2013) investigated the effect of VAT on revenue creation in Nigeria using a stepwise regression analysis based on secondary data from 2001 to 2010. The results showed that VAT has a statistically significant effect on the country's revenue. Onwuchekwa and Aruwa (2014) examined how VAT affected Nigeria's economic expansion by using ordinary least squares. The outcome demonstrates that VAT significantly increases the government's overall tax revenue and the country's economic growth.

Oraka et al. (2017) used a simple regression analysis to investigate the effects of VAT on the Nigerian economy from 2003 to 2015. Analysis revealed a negative relationship between VAT and per capita income, but a positive relationship between VAT and total government revenue. Rahman and Sarkar (2021) empirically analyzed VAT's role on a country's total revenue using Ordinary

Least Squares (Simple) regression techniques and descriptive statistics. They found that VAT has a statistically significant positive influence on the country's total revenue.

2.1 The Concept of the Variables

There are two main variables that must be met to achieve the objective: VAT is the independent variable, and total revenue is the dependent variable. The following is an overview of these variables:

2.1.1 VAT Revenue

According to the American Heritage Dictionary, a Value-Added Tax is "a tax on the estimated market value added to a product or material at each stage of its manufacture or distribution, ultimately passed on to the consumer."

According to Khadka (1997), when a business or manufacturing organization buys input materials from other businesses, the businesses or organizations that buy the materials then combine the input resources with output elements like labour, capital, and land to create a production or sales process. Value addition refers to the added value of purchased input components.

According to Bannock and Peacock (1989), in the VAT system, a registered concern can get a rebate on the VAT payment of the purchase price against the received VAT on the sales price, and in this regard, the difference amount which is between the received VAT on Sales and Payment VAT on purchase deposited to the government treasury, when input tax credit system is operated in all the stages of supplied then VAT paid in every stage on added value and such VAT amount transferred to the next stage. At the end, the consumer consumes the product, so s/he is unable to transfer this VAT to others and, consequently, finally bears the burden of it. The amount of VAT paid by the consumer equals the sum of VAT paid at all stages.

2.1.2 Total Revenue

All monies received by a country's government through various channels, including taxes, tariffs, fines, and other sources, are combined to form the total revenue of the public finance sector. This money is necessary to fund public services and initiatives essential to society's health, such as infrastructure development, national defence, and healthcare and education. It shows a government's financial standing and capacity to pay for both present commitments and upcoming investments. Insights into economic activity, fiscal policies, and a nation's overall financial stability can be gained through analysis of total revenue trends, which helps decision-makers assess sustainable development and the fair allocation of funds.

In Bangladesh, total direct and indirect tax revenue is aggregated into total tax revenue. In this study, NBR collected tax revenue; tax revenue collected beyond NBR is called total tax revenue, although both direct and indirect taxes are included. On the other hand, non-tax revenue and total tax revenue, collected by both NBR and non-NBR, are consolidated into total revenue.

JUJBR**2.2 Research Gap**

As a result, the literature indicates that while a number of studies have examined the contribution of VAT to GDP and total tax revenue across nations, there is a dearth of studies on the relationship between VAT and total revenue. The results of some studies indicate that VAT significantly increases total revenue, whereas other studies find negligible effects. However, a small number of studies have concluded that VAT negatively affects overall revenue in Bangladesh. Therefore, it is crucial to understand the precise role that VAT revenue plays in contributing to Bangladesh's total revenue, using the current purchasing power of money.

2.3 Hypothesis of the Study

Total revenue is considered another important characteristic, and including TTR and nontax revenue in the economy can influence the country's GDP. Many theoretical and empirical studies have investigated the relationship between VAT and total revenue. Studies on the relationship between VAT and a country's overall revenue have identified both positive and negative effects. In this context, earlier empirical research on the relationship between VAT and total revenue often indicates a strong positive association between VAT and total consolidated revenue (Ofishe, 2015). The results of OLS revealed that increases in total revenue and VAT raised economic growth in Adamawa state (Haruna et al., 2015), but they didn't significantly affect GDP, total tax revenue, or total revenue (Kalas & Milenkovic, 2017). In this respect, it is plausible to anticipate a positive association between VAT and total revenue, which will ultimately boost the nation's GDP. Consequently, this is the way the hypothesis has been presented:

H₁: There is a significant positive relationship between VAT and the country's total revenue.

3. Methodology of the Study

The nature of this study is empirical, based on time-series secondary data from the fiscal years 1991–1992 to 2021–2022. As a result, the sample includes 31 years of the full TR and VAT data. The GDP Deflator is used to convert original data to the current purchasing power of money.

3.1 Variables and Model Specification of the Study

In previous research, several econometric models have been developed to identify problems associated with these variables. TR is the dependent variable in this study, whereas VAT is the independent variable. The study's factors are similar to those found in a number of other studies (Ofishe, 2015). Total government revenue, or total revenue, is calculated by adding tax and non-tax revenue. Secondary time-series data have been used to develop the regression model. To exhibit the relationship between VAT and total revenue, the data on import and export duty (IED), excise duty (ED), supplementary duty (SD), total direct tax (TDT), tax beyond NBR, and non-tax revenue (NTR) were used as additional predictor variables.

3.2 Multivariate Model

The researcher selected the study's variables after reviewing several papers. Several earlier studies used the ordinary least squares (OLS) simple regression model with VAT as an independent variable and TR as a dependent variable. Furthermore, in multiple regression models, VAT is displayed as an independent variable alongside other variables. Ofishe (2015) used one of the three simple regression models to demonstrate the relationship between VAT (independent variable) and TR (dependent variable). Likewise, Kalas and Milenkovic (2017) employed one of the three models, taking into account (1) VAT as the independent variable and TR as the dependent variable. The same model was also used by Adegbe et al. (2016) and Onwuchekwa and Aruwa (2014).

This study has produced a significant model for determining the contribution of VAT to total revenue. Thus, the following shows the significant model:

3.3 Model

A connection is constructed based on the realized working relationship among the variables of TR, VAT, SD, IED, ED, and Tax beyond NBR, TDT, and NTR. The researcher developed the following multiple regression model from the above working relationship to infer the extent to which VAT contributes to the country's TR. Thus, the model is as specified below:

$$TR_t = F(VAT_t + IED_t + ED_t + SD_t + \text{Tax beyond NBR}_t + TDT_t + NTR_t + \varepsilon_t)$$

A linear or stochastic model is specified below:

$$TR_t = \alpha_0 + \beta_1 VAT_t + \beta_2 IED_t + \beta_3 ED_t + \beta_4 SD_t + \beta_5 \text{Tax beyond NBR}_t + \beta_6 TDT_t + \beta_7 NTR_t + \varepsilon_t$$

Represented in the natural logarithm form is as follows:

$$\ln TR_t = \alpha_0 + \beta_1 \ln VAT_t + \beta_2 \ln IED_t + \beta_3 \ln ED_t + \beta_4 \ln SD_t + \beta_5 \ln \text{Tax beyond NBR}_t + \beta_6 \ln TDT_t + \beta_7 \ln NTR_t + \varepsilon_t$$

3.4 Data Processing and Presentation

For data series consistency, all monetary values of the variables have been converted to current prices at a constant price, using the Index factor for the base year 1985-1986 = 100 (general). The index factor was calculated by:

$$If = \text{GDP Deflator}_{cy} / \text{GDP Deflator}_{by}$$

Here, If indicates the Index factor, GDP Deflator_{cy} indicates the current year's GDP Deflator, and GDP Deflator_{by} indicates the base year's GDP Deflator. Again, the GDP Deflator was calculated by:

$$\text{GDP Deflator} = \text{GDP}_{crv} / \text{GDP}_{cnv}$$

Here, GDP_{crv} indicates GDP at current value, and GDP_{cnv} indicates GDP at a constant value.

Although the GDP data at current value were available for the fiscal year 1972-1973, GDP at constant value was available for 1995-1996. To enhance the sample size, the inflation rate has been used to convert GDP from its current

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value to a constant value. GDP at constant value is calculated from 1986-1987 to 1994-1995. Since the GDP Deflator for the base year 1985-1986 is 1, the GDP Deflator for each year is used as an index factor to convert the monetary values of all variables. The following way was used to calculate the GDP Deflator of the next consecutive base years:

$\text{GDP Deflator}_{1995-1996} = \text{GDP Deflator}_{1994-1995} * (1 + \text{inflation rate of 1995-1996})$

$\text{GDP Deflator}_{2005-2006} = \text{GDP Deflator}_{2004-2005} * (1 + \text{inflation rate of 2005-2006})$

$\text{GDP Deflator}_{2015-2016} = \text{GDP Deflator}_{2014-2015} * (1 + \text{inflation rate of 2015-2016})$

After getting the GDP Deflator for every year, the monetary value of all variables is converted into a constant monetary value at a constant price in the following way:

Conversion monetary value at constant price = Each year Monetary value / GDP Deflator of the respective year.

Although the conversion data of all variables are consistent and linear, they are not normally distributed. To achieve a normal distribution, it is necessary to transform the data to its natural logarithm.

4. Data Analysis and Findings

4.1 Results of Descriptive Statistics

Table-1: Normality Test of Original Variables (Figure in Crore Taka)

Variables	N	Mean	Std. Deviation	Shapiro-Wilk Test		
	Statistic	Statistic	Statistic	Statistic	df	Sig.
Conv_VAT	31	10262.78	7355.56	.895	31	.005
Conv_ Imp & Exp D	31	4532.22	1286.13	.923	31	.024
Conv_Exc D	31	303.81	261.06	.728	31	.000
Conv_ SD	31	4637.16	2802.59	.917	31	.020
Conv_TDT	31	8028.72	6767.69	.847	31	.000
Conv_Tax_Beyond_NBR	31	1081.44	388.75	.911	31	.014
Conv_ NTR	31	5231.08	2958.98	.867	31	.001
Conv_ TR	31	33916.31	21147.08	.896	31	.006

Source: Analysis of Data using SPSS.

Table-2: Normality Test of Ln Variables

Variables	N	Mean	Std. Deviation	Shapiro-Wilk Test		
	Statistic	Statistic	Statistic	Statistic	df	Sig.
Lnconv_VAT	31	8.96	.79	.953	31	.188
Lnconv_ Imp_Exp_D	31	8.38	.28	.978	31	.743
Lncon_Exc_D	31	5.47	.69	.943	31	.100

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Variables	N	Mean	Std. Deviation	Shapiro-Wilk Test		
	Statistic	Statistic	Statistic	Statistic	df	Sig.
Lncon_SD	31	8.19	.71	.945	31	.116
Lnconv_TDT	31	8.57	.97	.993	31	.060
Lncon_Tax_beyond_NBR	31	6.92	.36	.931	31	.054
Lnconv_NTR	31	8.42	.53	.967	31	.449
Lnconv_TR	31	10.23	.65	.940	31	.081

Source: Analysis of Data using SPSS

Table 1 shows that the original data are not normally distributed, as indicated by the Shapiro-Wilk p-value < 0.05 . On the other hand, Table 2 shows that Ln data are normally distributed, as the p-value of the Shapiro-Wilk test is > 0.05 .

4.2 Stationarity Test for Unit Roots

- H_{01} : LnCon_VAT has a unit root or non-stationary
 H_{02} : LnCon_Imp_Exp_D has a unit root or non-stationary
 H_{03} : LnCon_Exc_D has a unit root or non-stationary
 H_{04} : LnCon_Supp_D has a unit root or non-stationary
 H_{05} : LnCon_TDT has a unit root or non-stationary
 H_{06} : LnCon_TR has a unit root or non-stationary
 H_{07} : LnCon_Tax beyond NBR has a unit root or non-stationary
 H_{08} : LnCon_NTR has a unit root or non-stationary

Table-3: Unit Root test at level:

Name of Variables: Lnconv_Variables

Exogenous: Constant

Lag Length: 1 (Automatic - based on AIC, maxlag=2)

Variable	ADF test statistic	1% Critical Value	5% Critical Value	10% Critical Value	Probability *	Remarks
LnConv_VAT	-1.6852	-3.6702	-2.9640	-2.6210	0.4283	Non-stationary
LnConv_Imp_Exp_D	-0.5145				0.8748	Non-stationary
LnConv_Exc_D	-2.3791				0.1558	Non-stationary
LnConv_SD	-1.0599				0.7182	Non-stationary
LnConv_TDT	-0.0543				0.9458	Non-stationary
LnConv_Tax_beyond_NBR	-1.5912				0.4746	Non-stationary
LnConv_NTR	-1.4534				0.5429	Non-stationary
LnConv_TR	-0.1265				0.9624	Non-stationary

*MacKinnon (1996) one-sided p-values.

Source: Computed with Eviews 12

JUJBR**Table-4: Unit Root test at 1st difference:**

Name of Variables : D(Lncon_Variables)

Exogenous: Constant

Lag Length: 0 (Automatic - based on AIC, maxlag=2)

Variables	ADF test statistic	1% Critical Value	5% Critical Value	10% Critical Value	Probability *	Remarks
D(LnConv_VAT)	-8.8462	-3.6793	-2.9678	-2.6230	0.0000	Stationary
D(LnConv_Imp_Exp_D)	-5.8712				0.0000	Stationary
D(LnCon_Exc_D)	-5.7068				0.0001	Stationary
D(LnCon_SD)	-5.7465				0.0001	Stationary
D(LnConv_TDT)	-4.1464				0.0032	Stationary
D(LnCon_Tax_beyond_NBR)	-5.3447				0.0001	Stationary
D(LnConv_NTR)	-6.3104				0.0000	Stationary
D(LnConv_TR)	-7.1399				0.0000	Stationary

*MacKinnon (1996) one-sided p-values.

Source: Computed with Eviews 12

Table 3 (when data is at level) shows that all p-values are greater than 0.05 by applying the Augmented Dickey-Fuller (ADF) test, and we conclude that all LnConv_variables are therefore non-stationary at the level since we are unable to reject the null hypothesis. However, Table 4 (when data is at first difference) shows that the p-value of each D (LnConv_variables) is less than 0.05, which means that we can reject the null hypothesis. Since data is stationary at the first difference, any further investigation will be obtained from each of the values of D(LnConv_variables).

4.3 Test of Long-Run Relationship

Based on Lndata, the following hypothesis is developed:

H₀: There is no long-run relationship among the variables.H₁: There is a long-run relationship among the variables.

Table 5 demonstrates the null hypothesis of no cointegration ($r = 0$) is rejected because the trace statistic is greater than its critical value (indicating at least one cointegrating relation); the hypothesis of no more than one cointegrating relation ($r \leq 1$) is also rejected (indicating at least two cointegrating relations); the hypothesis of not more than two relationships ($r \leq 2$) is rejected (indicating at least three cointegrating relationships); the hypothesis of not more than three relationships ($r \leq 3$) is rejected. Therefore, there are four cointegrating equations and also a long-run relationship among the model's variables.

Table- 5: Johansen Cointegration Test Unrestricted Cointegration Rank Test (Trace)**JUJBR**

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value @ 0.05	Prob
None*	0.970290	314.9377	159.5297	0.0000
At most 1 *	0.943124	212.9661	125.6154	0.0000
At most 2 *	0.839696	129.8266	95.75366	0.0000
At most 3*	0.654223	76.73676	69.81889	0.0126
At most 4	0.525268	45.93990	47.85613	0.0749
At most 5	0.401362	24.33478	29.79707	0.1867
At most 6	0.262291	9.454957	15.49471	0.3250
At most 7	0.021590	0.632969	3.841465	0.4263

Computed with Eviews 12.

4.4 Test of Multicollinearity

Table 6 shows that the model's centered Variance Inflation Factors (VIFs) are less than 10. Hair et al. (1995) stated that VIF values < 10 indicate unreasonable collinearity among the independent variables. Therefore, multicollinearity is not present, so it is appropriate to perform a multiple regression analysis using the explanatory variables concurrently.

Table-6: Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Lncon_VAT 1	0.001210	4.748567	1.978876
Lncon_Exp_Imp_D 1	0.000762	1.932021	1.657056
Lncon_Exc_D 1	4.41E-05	1.505945	1.500216
Lncon_SD 1	0.000598	2.278219	1.484008
Lncon_TDT 1	0.000641	2.729462	1.262565
Lncon_Tax beyond NBR 1	0.000535	1.451141	1.300885
Lncon_NTR 1	9.01E-05	1.337693	1.266243
C	1.45E-05	3.893678	NA

Source: Computed with Eviews 12.

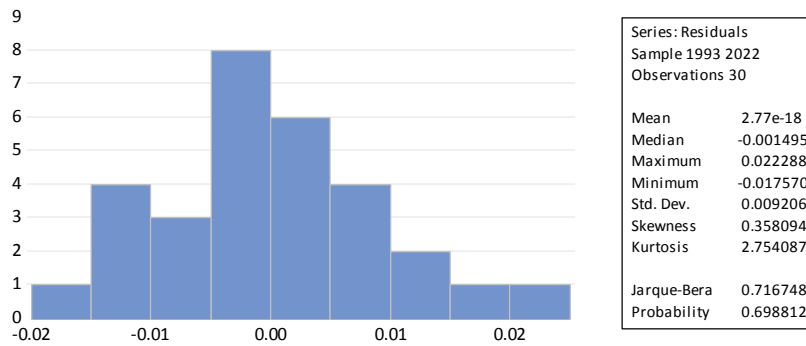
4.5 Tests of Residual Diagnostic**4.5.1 Jarque- Bera Test for Normality**

H_0 = There is a normality in the residual.

H_1 = There is no normality in the residual.

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Table 7 shows that the Jarque-Bera test probability is higher than 0.05. Therefore, it is determined that the model's residuals are normally distributed, as we are unable to reject the null hypothesis.

Table-7: Result of Normality Test for Residuals

Computed with Eviews 12.

4.5.2 Breusch-Godfrey LM Test for Serial Correlation

Table 8 found that the model's Obs*R-squared is 1.3225 and its Prob. Chi-Square is 0.5162, indicating that the Chi-square value is higher than 0.05. Therefore, it was unable to reject the null hypothesis and concluded that there is no serial correlation in the model.

Breusch-Godfrey serial correlation LM test

H_0 : No serial correlation at up to 2 lags

Table-8: Result of LM Test for Serial Correlation

	Model		Model
F Statistic	0.4612	Prob. F (2,20)	0.6371
Obs*R-squared	1.3225	Prob.Chi-Square (2)	0.5162

Source: Data taken with eviews-12 and compiled by the researcher

4.5.3 Breusch-pagan-Godfrey Test for Heteroskedasticity

Heteroskedasticity: Breusch-Pagan-godfrey

H_0 : Homoskedasticity

Table-9: Result of heteroskedasticity test

	Model		Model
F Statistic	0.3765	Prob. F (7,22)	0.9062
Obs*R-squared	3.2096	Prob.Chi Square (7)	0.8650
Scaled explained SS	1.5138	Prob.Chi-Square (7)	0.9818

Source: Data taken with eviews-12 and compiled by the researcher

According to Table 9, the model's Obs* R-squared is 3.2096 and its Prob. Chi-Square value is 0.8650. The model's null hypothesis cannot be rejected because the chi-square probability value is greater than 0.05, indicating that there is no heteroskedasticity in the data series. All the diagnostic tests indicate that the preconditions for running multiple regression analysis are satisfied.

5. Regression Results

H₁: The regression Model cannot predict the LnCon_ TR1 by LnCon_VAT1

H₂: The regression Model can predict the LnCon_ TR1 by LnCon_VAT1

Table 10 displays the results of the variability testing of TR, accounting for the seven independent variables. The results indicate that the regression model has a 97.10% goodness-of-fit, with an R² (Coefficient of Determination) of 0.9710. Again, the adjusted R- Squared is 0.9618, which means that 96.18% of the variability in the dependent variable TR is explained by the seven independent variables. On the other hand, the F statistic is 105.3194, and the p-value is 0.0000, which indicates that we reject the null hypothesis and that the model is statistically significant for forecasting using the outcome variables. However, the Durbin-Watson statistic value of 1.98 indicates that there is no autocorrelation issue in the data series. The regression model is constructed as follows.

$$TR = 0.0021 + 0.3124VAT + 0.1853Imp_Exp_D + 0.0207Exc_D + 0.1412SD + 0.2141TDT + 0.1699NTR + \epsilon_t$$

It is observed that the p-value of D (Lncon_Tax beyond NBR) is 0.6577, which is greater than 5% level of significance, meaning that this variable is unable to predict the dependent variable Total Revenue. Therefore, this variable is excluded from the regression model.

From the regression results, it is also observed that the intercept coefficient is 0.0021. The coefficient of VAT is 0.3124, and the p-value is 0.0000, which is less than a 5% significance level. Therefore, the null hypothesis is rejected, i.e., VAT has a significantly positive effect on Total Revenue. The regression model showed that a 1% increase in the VAT will lead to a 0.31% increase in the TR. These findings are similar to those reported by Onaolapo, et al. (2013) and Onwuchekwa & Aruwa (2014). On the other hand, this study's findings differ from those of Kalas & Milenkovic (2017).

Table-10: Regression Result
Dependent Variable: Lncon_TR1

Variable	Coefficient	Std. Error	t-Stat.	p-value
LnCon_VAT 1	0.3124	0.0348	8.9819	0.0000
LnCon_Exp_Imp_D 1	0.1853	0.0276	6.7152	0.0000
LnCon_Exc_D 1	0.0207	0.0066	3.1190	0.0050
LnCon_SD 1	0.1412	0.0245	5.7728	0.0000

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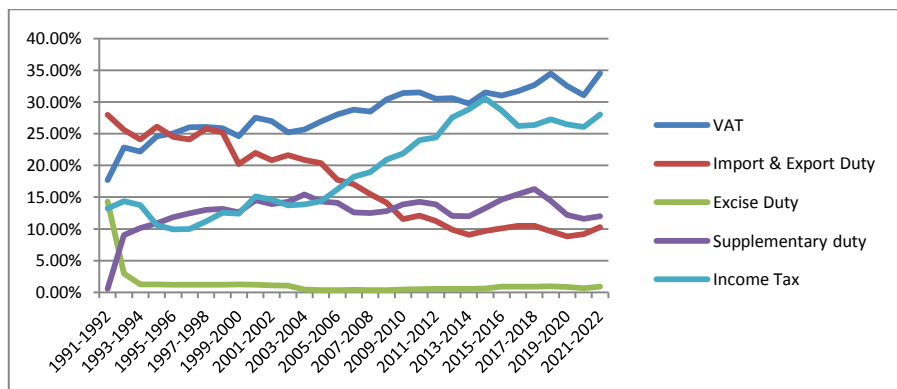
Variable	Coefficient	Std. Error	t-Stat.	p-value
LnCon_Tax beyond NBR	-0.0104	0.0231	-0.4491	0.6577
LnCon_TDT 1	0.2141	0.0253	8.4585	0.0000
LnCon_NTR 1	0.1699	0.0095	17.9002	0.0000
Intercept	0.0021	0.0038	-0.5546	0.5847
R-Squared	0.9710			
Adjusted R-Squared	0.9618			
F-statistic	105.3194			
p-value of F-Statistic	0.0000			
Durbin-Watson stat.	1.9822			

Source: Analysis of Data using SPSS-26.

6. Discussion

6.1 Descriptive Analysis

Appendix table 1 and Figure 1 show the total revenue distribution from 1991-1992 to 2021-2022. Although there were slight fluctuations across sources in revenue collection, VAT revenue was increasing faster than any other source of government revenue. The minimum VAT contribution to total revenue was 17.68% in 1991-1992, and the maximum was 34.55% in 2021-2022. According to the mean value, VAT was the 1st, Income tax was the 2nd, Import and export duty was the 3rd, Supplementary duty was the 4th, and Excise duty was the fifth position during the study period. On the other hand, the coefficient of variation for VAT, Supplementary duty, Income tax, Import-Export duty, and excise duty was 13.60%, 21.69%, 35.32%, 38.80%, and 187.22%, respectively. According to the coefficient of variation, VAT was the lesser percentage among the revenue sources, indicating that it was more consistent than other sources in its revenue collection.



Source: Analysis of data from the F/Y of 1991-1992 to 2021-2022 in Appendix Table-1

Figure 1: The percentage share of revenue to the total revenue

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6.2 Policy Implications

Policymakers should emphasise improving tax administration. A tax-related online database or library is required to make tax-related information available to interested users. Additionally, data from all variables were converted to current purchasing power to avoid inflation. Thus, policymakers would use the study's findings, through GDP conversion values, to make informed decisions.

6.3 Limitations of the study

The study period is only the fiscal years from 1991-1992 to 2021-2022 due to the absence of the government's most recent tax-related database/website/library. On the other hand, scholarly articles on VAT in Bangladesh are scarce, and the researcher considers the current purchasing power of money using the GDP conversion factor. It may not suitable extracted data due to the determination of base year for ten years interval.

6.4 Scope of Further Study

A research field may involve a comparative analysis of South Asian or contemporary countries in relation to VAT issues. Extensive studies on the VAT gap and VAT evasion and their effects on the country's TR may be undertaken. A VAT collection or budgeted forecast may be also good field of research using the ARIMA, ARMA, VAR or VECM model.

7. Conclusion

VAT is the core revenue source for governments in every developed and developing country except the United States of America. It is a much-discussed topic worldwide because governments worldwide collect a lion's share of total revenue from VAT. This study investigates how VAT contributes to the total revenue. The descriptive statistics showed that in terms of revenue collection, VAT was also the largest contributor to the country's total revenue during the study period. The multiple regression analysis shows that TR in the country is statistically positive and significantly affected by VAT. It also shows that a 1% VAT increase leads to a 0.31% increase in the country's total revenue. Schlotterbeck (2017) identified that the implementation of VAT in the Caribbean countries significantly boosted domestic revenue mobilization and consequently lessened the budget deficit. The idea that a VAT is favourable to improving domestic revenue mobilization is also supported by evidence from Africa (Onwuchekwa & Aruwa, 2014).

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APPENDIX

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Table-1: The Percentage share of Revenue to the Total Revenue

Fiscal Year	VAT	Imp_Exp.D	Excise D	Supp. duty	In. Tax
1991-1992	17.68%	27.97%	14.30%	0.53%	13.18%
1992-1993	22.85%	25.63%	2.95%	9.02%	14.37%
1993-1994	22.17%	24.08%	1.28%	10.11%	13.76%
1994-1995	24.58%	26.10%	1.26%	10.87%	10.59%
1995-1996	25.06%	24.48%	1.19%	11.83%	9.95%
1996-1997	26.04%	24.08%	1.22%	12.43%	9.99%
1997-1998	26.08%	25.81%	1.22%	12.98%	11.20%
1998-1999	25.84%	25.20%	1.19%	13.17%	12.56%
1999-2000	24.61%	20.23%	1.24%	12.62%	12.39%
2000-2001	27.52%	22.00%	1.19%	14.54%	15.10%
2001-2002	26.97%	20.83%	1.12%	13.90%	14.63%
2002-2003	25.20%	21.63%	1.03%	14.28%	13.72%
2003-2004	25.67%	20.88%	0.47%	15.41%	13.87%
2004-2005	26.92%	20.36%	0.37%	14.30%	14.35%
2005-2006	28.02%	17.73%	0.37%	14.12%	16.23%
2006-2007	28.78%	17.02%	0.38%	12.61%	18.20%
2007-2008	28.51%	15.48%	0.35%	12.51%	18.94%
2008-2009	30.39%	14.13%	0.36%	12.81%	20.90%
2009-2010	31.39%	11.54%	0.45%	13.85%	21.86%
2010-2011	31.49%	12.11%	0.51%	14.29%	24.00%
2011-2012	30.49%	11.24%	0.56%	13.88%	24.42%
2012-2013	30.59%	9.87%	0.57%	12.02%	27.57%
2013-2014	29.75%	9.09%	0.55%	12.01%	28.86%
2014-2015	31.49%	9.70%	0.61%	13.24%	30.57%
2015-2016	30.99%	10.09%	0.88%	14.64%	28.69%
2016-2017	31.73%	10.48%	0.89%	15.46%	26.22%
2017-2018	32.67%	10.50%	0.89%	16.29%	26.36%
2018-2019	34.50%	9.60%	0.94%	14.40%	27.27%
2019-2020	32.54%	8.84%	0.86%	12.17%	26.45%
2020-2021	31.08%	9.16%	0.67%	11.57%	26.08%
2021-2022	34.55%	10.29%	0.91%	11.98%	28.04%
Mean	28.26%	16.97%	1.31%	12.70%	19.36%

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Fiscal Year	VAT	Imp- Exp.D	Excise D	Supp. duty	In. Tax
Median	28.51%	17.02%	0.89%	12.98%	18.20%
Std. Deviation	3.84%	6.59%	2.46%	2.76%	6.84%
Minimum	17.68%	8.84%	0.35%	0.53%	9.95%
Maximum	34.55%	27.97%	14.30%	16.29%	30.57%
Coff. of Variation	13.60%	38.80%	187.22%	21.69%	35.32%
Count	31	31	31	31	31

Source: NBR Annual Report Statistics - National Saroni (2021-2022) - Saroni-5, 5(a) & 5(b).

*Turnover Tax included in the VAT since 2004-05