

VAT Role in the Development of Bangladesh: Any Association with GDP Growth Rate, Government Revenues, and Annual Budget

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ABSTRACT: This paper represents an outline of the contribution of Value Added Tax (VAT) in Bangladesh in association with the GDP growth rate, the annual budget amount, and total government revenues from the beginning of vat introduction in Bangladesh. We constructed a correlation matrix using the Pearson and Spearman correlation methods, which was then visualized using a Heatmap to visualize the relationship between the variables. To evaluate the association among the variables, three hypotheses have been set and tested using ANOVA, Pearson correlation, and Spearman correlation. The data set have been developed from secondary sources combing the data of VAT revenues, GDP growth rate, the annual budget amount, and total government revenues from the very beginning of VAT's introduction in Bangladesh (1991-2020) to complete the study and test statistical models. According to our findings, VAT makes a significant contribution to government income generation, resulting in the coverage of budgeted revenues and contributing to consistent GDP growth. VAT, as an indirect tax, is now seen as a powerful fiscal weapon to meet the government's ever-increasing demand for revenues to support all development programs for countries transitioning from least developed to developing. VAT has a strong significant correlation with the annual budget amount, but no positive association with GDP growth rate or total governmental revenues, according to Pearson, Spearman, and ANOVA model findings. VAT can play a vital role in sustaining government internal revenue sources by bordering the basic tax base.

KEYWORDS: VAT, GDP growth, annual budget, government revenues, and Bangladesh.

1 INTRODUCTION

Value Added Tax (VAT) is a type of consumption tax [1] and an indirect tax invented in France [2] that must be paid whenever value is added from production to ultimate sale. VAT is a type of utilization charge [3], although it is borne by end users. VAT is different from a deal charge in that it is collected at the end of the process and only sent to the government once [4]. Bangladesh's sales tax was replaced by VAT in 1991, thanks to continued prodding from development agencies such as the IMF [2]. VAT was enacted in Bangladesh [5] to increase revenue, mobilize resources, introduce broader flat-rate taxation, and improve financial openness and accountability. In revenues generation of the government of Bangladesh, the role of VAT is increasing over the years leading to support for government expenditures [2]. The increase in national income is the after effect of the expansion in the per capita income of a country. In Bangladesh, different plans and projects are carried out by the public authority for the financial improvement of the country, and the introduction of VAT by replacing sales tax is one successful example [2]. Tax, particularly VAT, provides the majority of the funds required to carry out those plans and programs. As a developing country, Bangladesh relies heavily on tax income, particularly VAT [6]. VAT is a consumption tax imposed on the value-added prices of all stages of production and sales in Bangladesh, and it is one of the most prominent and productive

vehicles of public income [7]. With the beginning of Bangladesh's socioeconomic and infrastructure development, the importance of increasing internal revenues is growing. Taxes account for almost 80% of entire government revenue, necessitating legislative reorganization. And the implementation of VAT is seen as a bold move [4]. Bangladesh is significantly reliant on taxes. There are two perspectives on the impact of VAT on economic growth: one contends that VAT is growth-enhancing, stimulating capital accumulation and economic growth, while the other contends that VAT is regressive, impacting consumption, which in turn has an impact on investment, employment, and, ultimately, economic growth. While some studies show a beneficial association between value-added tax and economic growth, others argue that because of its regressive nature, VAT is anti-growth. As a result, the topic of whether there is any relationship between the amount of VAT, the yearly budget, total government income, and GDP growth rate has previously been raised. Therefore, we are proposing the objectives of the study are:

- To evaluate the contribution of VAT in association with the annual budget of Bangladesh towards ever-growing developments from the very inception of VAT introduction in Bangladesh.
- To assess the association of VAT with GDP growth rate, annual budget amount, and total government revenues.

2 LITERATURE REVIEW

2.1 VAT AND BANGLADESH

Bangladesh has faced several sorts of consumption taxes over the years. In Bangladesh, a value-added tax (VAT) has been adopted to replace the sales tax in order to broaden the government's income base and mobilize resources to drive economic growth. The role of VAT in the relationship between GDP growth rate and VAT has yet to be revealed. The value added tax (VAT) has a strong positive relationship with Bangladesh's gross domestic product (GDP) and economic advancement [2]. Bangladesh is having difficulty collecting government tax collections in order to meet funding for growing economic and social development. The implementation of the Value Added Tax (VAT) in 1991 was one of the most visible and focused tax reforms programs to address the issue of increasing government tax collections. The same study also noted certain issues with current VAT performance, such as a small number of VAT taxpayers, a lack of public awareness, and ineffective monitoring mechanisms [8]. There is a positive substantial relationship between VAT and Bangladesh's economic growth, which is followed by GDP. VAT has a significant positive connotation with total revenues, and overall tax revenues contribute to Bangladesh's economic success [7]. Tax evasion in the SME sector is a result of the complexity of tax laws and ineffective tax administration, resulting in lower VAT collection in Bangladesh. Furthermore, tax evasion in VAT is high in the majority of rising countries [9]. Bangladesh has graduated into a middle-income country and to finance own internal funds to finance development projects for public utilities. The same study also suggested that increasing the capacity of tax administration and politically unbiased reforming the tax systems can help in this regard [5].

2.2 VAT AND GLOBAL PERSPECTIVE

VAT, or consumption tax, is paid by the end user of the goods or service, and it is extremely simple to collect, administer, and evade. Furthermore, VAT consumes a significant portion of total government tax income and hinders Nigeria's economic progress [10]. In Kenya, VAT rates have a negative relationship with GDP and a negative relationship with CPI. Unemployment has a favorable relationship with VAT rates [11]. VAT is the government of Kosovo's principal source of revenue, and it has had a progressive impact on GDP [12]. VAT systems can be enhanced by the quality of democracy and legislative strength of the government [13], just as VAT systems can be enhanced by the quality of democracy and legislative strength of the government. VAT has a significant impact on investment development in Nigeria [14]. Developing and transitional economies (DTE) are more capable of proper functioning of VAT than the sales tax and the application of VAT depends on "self-assessment", which remains a problem for many DTE [15]. The adoption and adaptation of VAT in SAARC countries has the potential to raise the government's revenue ratio and hence the tax ratio. According to our findings, a flourishing VAT adaption is a critical proven weapon for collecting tax and increasing revenue ratios. The SARCC countries' GDP-to-revenue ratio has been improved by adjusting VAT [16]. Growing countries use VAT as an effective tool to stabilize tax revenues, and it has been established that VAT reduces tax revenue instability significantly [17]. In comparison to countries without a VAT system, foreign locations with VAT have 40-50 percent less tax revenue unpredictability. The VAT's revenue impact and implementation are linked to a long-run increase in the overall revenue-to-GDP magnitude relationship [18].

2.3 TAX ADMINISTRATION AND AUTHORITIES INFLUENCES OF VAT INTRODUCTION

Countries should develop their economic and social infrastructures, which can only be done by improving tax efforts to determine the required amount of public spending in order to reach the global goal of achieving the Millennium Development Goals (MDGs) [19]. VAT may be a good approach to raise funds and update the whole tax structure, but it must be effectively conceived and implemented [20].

Internal sources of finances are regarded an essential component of development projects and programs in developing countries, as they enable the country to continue constant progress and development. Bangladesh was recently promoted from least developed to developing country status, owing to significant socioeconomic improvement that has resulted in the preparation of a big deficit budget. In this case, VAT can be a powerful and effective weapon in combating the government's ever-increasing demands for internal finances. Bangladesh implemented VAT in 1991, and income generated from VAT has been steadily increasing each fiscal year. However, no comprehensive research has been undertaken on these topics, such as the participation of VAT in government revenue generation in relation to GDP growth rate and annual budget. As a result, this research is being carried out to assess the contribution of VAT in Bangladesh from 1991 to 2020 in relation to GDP growth, yearly budget, and total government revenues.

3 METHODOLOGY

We are proposing three hypotheses to measure the relationship among the variables. Different techniques are used to experiment the hypothesis whether they are accepted or rejected. Data needs to preprocess and methods are applied to find different values to test the hypothesis. Overall methodology is given below.

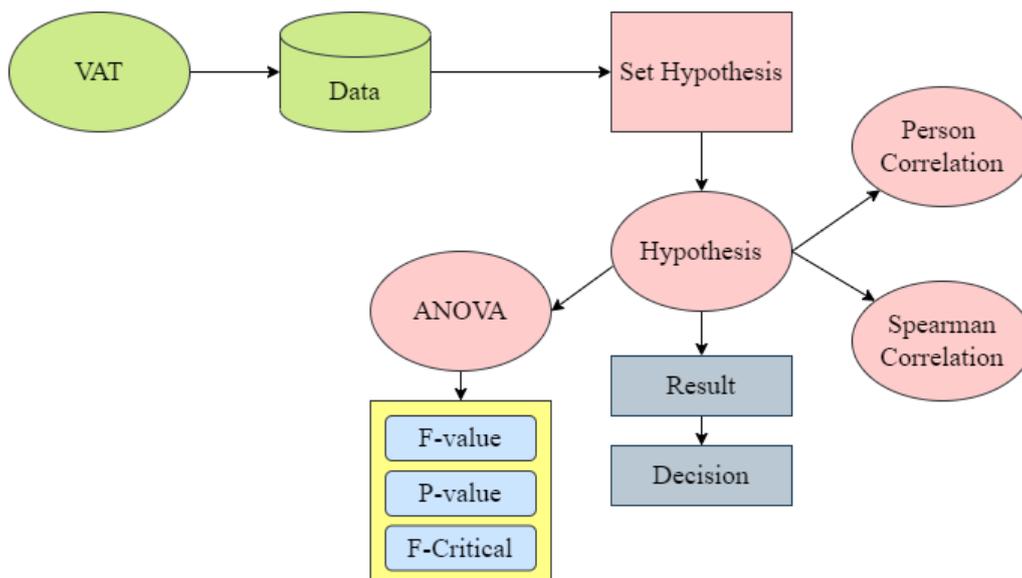


Fig. 1. Block diagram of proposed methodology

3.1 ANOVA

In 1918, Ronald Fisher first proposed the idea of Analysis of Variance. Analysis of Variance is known as ANOVA. To determine the norms of multiple significant groups' difference from each other, ANOVA is used as a statistical method. It uses the features taken from each group to measure the degrees of variance within them. Hypothesis testing can be accomplished with the help of these types of groups. There are several types of ANOVA. They are :

- i. One-way ANOVA.
- ii. Two-way ANOVA.
- iii. Multivariate ANOVA.

For this analysis, we used one-way ANOVA. To compare two means from two different groups, one-way ANOVA is utilized which is based on F-statistics. Few of the functional units of One-way ANOVA measurements:

3.2 F

It's a test statistic that is being used to see how well the group means are equal and the comparative importance of the different groups of variables. The F is expressed by the following formula:

$$F = \frac{\text{Variance in sample norms}}{\text{Variance within sample}}$$

3.3 P

The P value is the probability of having a result that is at least as significant as the one observed if the null hypothesis is true.

3.4 F-CRITICAL

The F critical indicates how much risk you're prepared to accept when rejecting a hypothesis when it is true. It demonstrates the relevance of the numerous groups of variables. The null hypothesis is accepted when the estimated F-critical value is larger than the F value else it is rejected.

3.5 PEARSON CORRELATION

Karl Pearson presented it after Francis Galton proposed a similar concept. This is a technique used to determine the association concerning two or more continuous variables. It depicts the significance of the relationship or correlation as well as the link's path. From this correlation, we can establish three possible hypotheses: a positive linear relationship, a negative linear relationship, or no linear relationship. It ranges from -1 to 1, with 0 indicating no connection, 1 indicating total positive correlation, and -1 indicating a total negative correlation.

The correlation among two factors x and y is calculated by using the equation below:

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$$

Here,

r = which represents correlation coefficient.

x_i = which represents the value of the x variable in the sample.

\bar{x} = which represents the mean of the x variable in the sample.

y_i = which represents the value of the y variable in the sample.

\bar{y} = which represents the mean of the y variable in the sample.

3.6 SPEARMAN CORRELATION

Spearman correlation is developed by Charles Edward Spearman. Spearman's correlation coefficient is a statistical measure of the strength and orientation of the monotonic association between paired data. It varies from -1 to 1. If the value is -1 or +1, the correlation between the two variables can be described using precisely monotone functions. The raw data X and Y will be first converted to prioritized data before being used in the calculation. It uses rank data rather than raw data values in the calculation; it is less susceptible to outliers than the Pearson correlation coefficient. It is symbolized by the Greek letter ρ . Spearman's correlation formula is as follows when there is no tied rank:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

Here,

d_i = which represents the difference of paired data.

n = which represents the amount of data.

The Spearman’s correlation formula is as follows when there is a tie rank:

$$\rho = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$$

3.7 TEST OF HYPOTHESES

VAT has a substantial positive association with gross domestic product and positively contributes to the economic development of Bangladesh [2]. VAT has a strong Pearson’s Product Moment Correlation to the GDP of the Nigerian Economy [21]. Recently, VAT considered a major instrument that boosts the economic development of the country. Furthermore, in comparison with sales tax, VAT increases the economic progress of Ethiopia [22]. With the change in the VAT rate, the aggregate consumption and economic growth rate also change [23]. Therefore, this study suggests a positive association between the VAT and GDP growth rate in the following hypothesis:

H₁: There is a positive association between the VAT and GDP growth rate

An increase in the VAT rate didn’t increase the total tax revenue of the state budgets, despite the gradual increase of tax revenues [24]. VAT has great potential to generate sufficient government revenues and VAT has been considered a viable tool of taxation [25]. For developing countries like Bangladesh, to meet the ever-increasing expenditure of government development projects, the government needs to raise their internal sources of fund in annual budget preparation [26]. VAT is one kind of indirect tax that can be used as a base for long-term financing plans for the general EU budget leads to the welfare standards and developments in the member states [27]. Furthermore, this study suggests a positive association between the VAT and Annual Budget Amount in the following hypothesis:

H₂: There is a positive association between the inflation rate and the unemployment rate.

VAT is the second long-term source of total government revenues in Nigeria [28]. VAT is considered a major basis of revenue for the government around the world and the contribution of VAT increasing rapidly [29]. In a developing country, as for representative and politically noncontroversial leads to produce a very thin tax base and encouraged to rely on VAT [30]. VAT is a secondary tax paid on the value addition in each stage from production to distribution considered a significant source of government revenues [31]. Accordingly, this study suggests a positive association between VAT and the Total Government Revenues in the following hypothesis:

H₃: There is a positive association between VAT and Total Government Revenues.

3.8 THEORETICAL FRAMEWORK

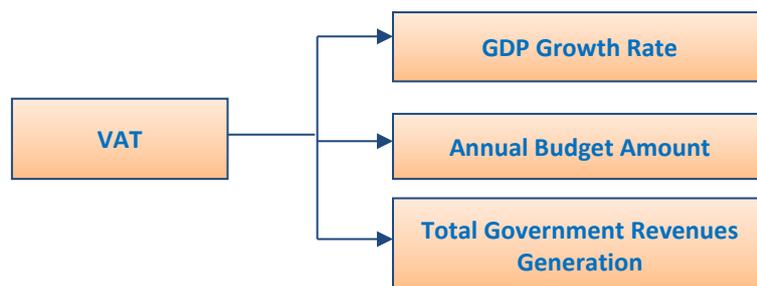


Fig. 2. Theoretical Framework

4 RESULTS AND DISCUSSION

We assessed the correlation value among the variables using Pearson's correlation and Spearman correlation measure approaches to see if the hypothesis is rejected or accepted. Three hypotheses were tested using analysis of variance (ANOVA), correlation results approach, and another statistical method. When the F value is greater than the F-critical value, two of the hypotheses are rejected by the procedures. Figures 3 and 4 show a Heatmap that is used to suggest the hypothesis and shows the link between the variables. A strong positive correlation is shown by dark blue, while a strong negative correlation is shown

by white. The correlation matrix is also shown in the Heatmap by the values and the diagonal elements are shown the 100% correlation because the correlation between a variable with itself is always 100%.

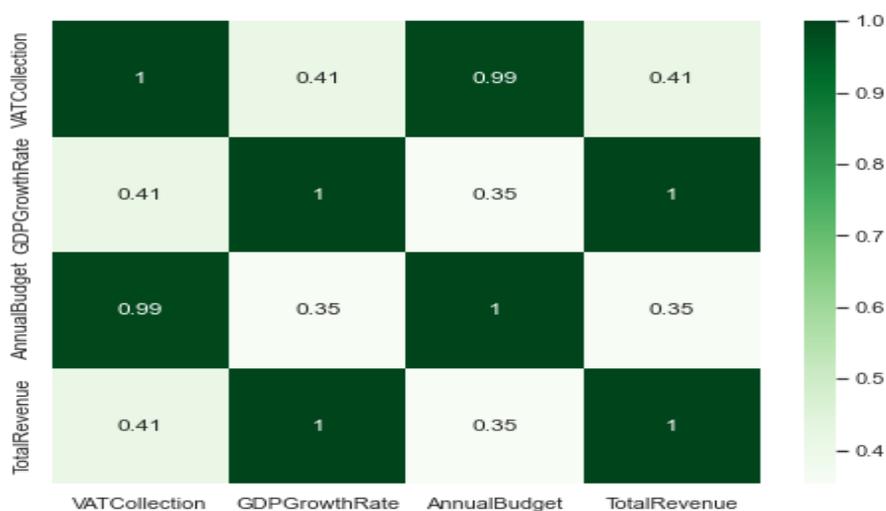


Fig. 3. Heatmap of correlation matrix (Pearson Correlation)

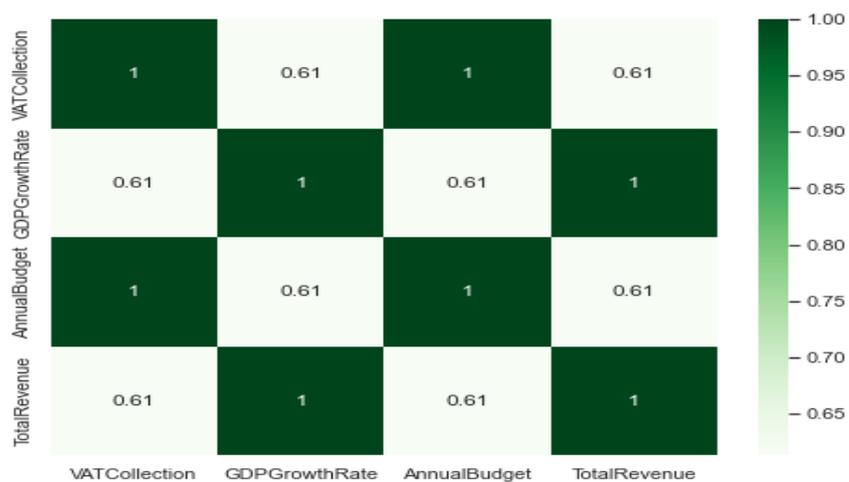


Fig. 4. Heatmap of correlation matrix (Spearman Correlation)

The testing result is tabulated in table:

Table 1. Hypothesis testing result

Hypothesis	Pearson (Parametric)	Spearman (Nonparametric)	ANOVA Single Factor
H ₁	Rejected	Rejected	Rejected
H ₂	Accepted	Accepted	Accepted
H ₃	Rejected	Rejected	Rejected

The above table shows the acceptance result of the hypothesis using different methods. Detailed descriptions of each result are discussed.

Table 2. Score for hypothesis testing parameters of ANOVA

ANOVA			
Hypothesis	F	P	F-Crit
H ₁	16.25	0.000176	4.02
H ₂	1.57	0.000211	4.02
H ₃	13.22	0.000618	4.02

Hypothesis 1 stated that VAT has a positive association with GDP growth rate. In Pearson, Spearman and ANOVA model reject hypothesis 1 where the F value is 16.25 and F critical value is 4.02 in ANOVA, and 0.000176 is calculated by the proposed correlation finding methods. So VAT has no significant positive association with the GDP growth rate.

Hypothesis 2 stated that there is a positive association between the VAT and the Annual budget amount. In Pearson, Spearman, and ANOVA model accept hypothesis 2 where the F value is 1.57 and F critical value is 4.02 in ANOVA, and 0.000211 is calculated by the proposed correlation finding methods. So, VAT has a positive association with the annual budget amount.

Hypothesis 3 stated that there is a positive association between the VAT and the total government revenues. In Pearson, Spearman, and ANOVA model rejected hypothesis 3, where the F value is 13.22 and F critical value is 4.02 in ANOVA, and 0.000618 is calculated by the proposed correlation finding methods. So, VAT has no positive association with the total government revenues.

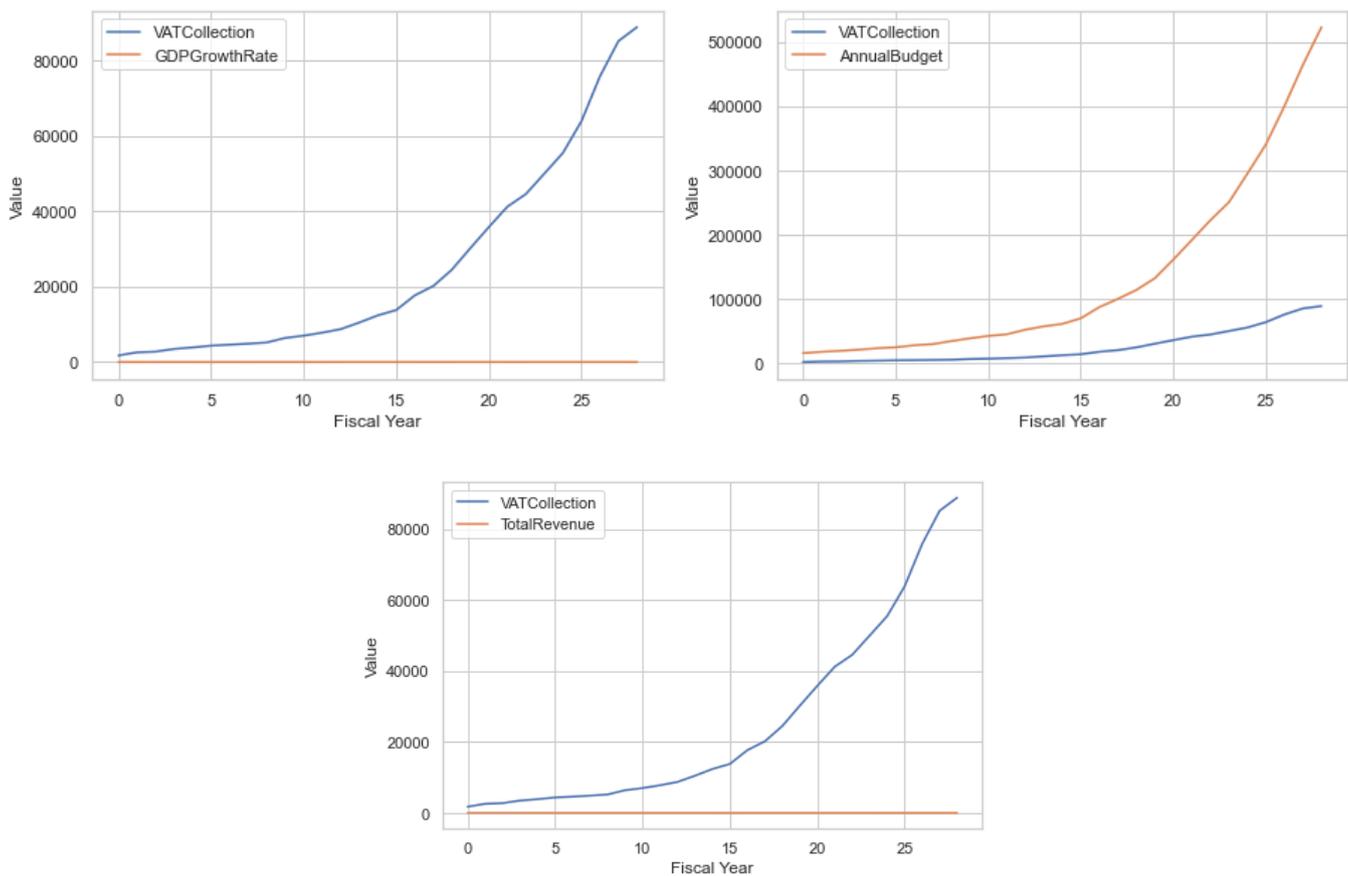


Fig. 5. Relationship among variables of hypothesis H₁, H₂, and H₃

COMPARATIVE SCENARIO OF VAT TOWARDS GDP GROWTH RATE, TOTAL BUDGET AMOUNT AND TOTAL GOVERNMENT REVENUES

The Government of the People’s Republic of Bangladesh introduced VAT to replace the outdated general sales taxes in the fiscal year 1991-1992 to increase the government's revenue and make funds available for developmental purposes in the country, it has been seen that the VAT collection of Bangladesh every fiscal year is increasing as well the size of the annual budget is also increasing. In the line of increasing VAT revenues, it is now contributing to the total revenues generation of the government significantly that leading to a smooth run of government-sponsored development projects, and as a result GDP growth rate of the country is upward sloping. The overall contribution of VAT in total government revenues generation, contributing to annual budget size and GDP growth rate has been illustrated in the following graph.

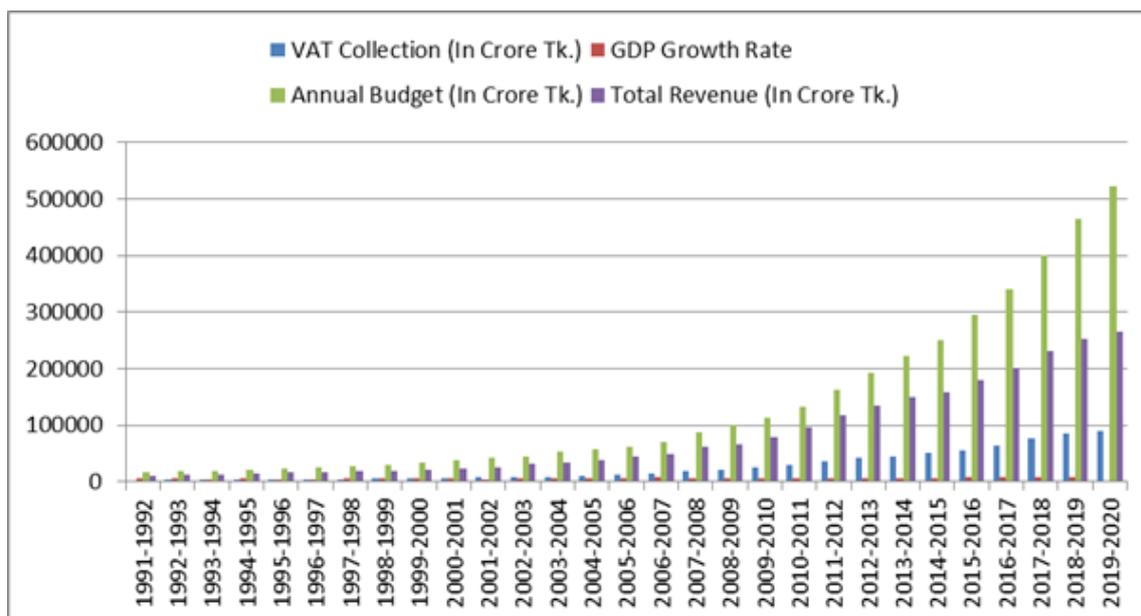


Fig. 6. VAT collection in association with GDP growth rate, annual budget amount and total government revenues

5 CONCLUSION

VAT has been discovered to be a very effective tool for raising government revenue in Bangladesh. VAT was introduced in Bangladesh in 1991 as a consequence of international pressure to replace sales tax as a modern, progressive indirect tax. Bangladesh was just promoted from the list of least developed countries to the list of developing countries. Bangladesh has made significant progress in the areas of education, communication, energy, health, agriculture, power, and social safety networks, thanks to massive funding and the implementation of a big yearly budget with deficit financing. In this context, VAT can be used as a feasible alternative for greater indirect tax charging to create internal government finances, which helps to reduce reliance on deficit financing and maintain a stable GDP growth rate. The Bangladesh government has raised a large amount of income from VAT over the last three decades (1991 to 2020). VAT accounts for a significant chunk of the annual budget and overall government revenue.

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