

Forecast, Trend, Growth, and Instability of Internet Users in Bangladesh

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Abstract

Bangladesh's internet, like that of many other industrialized and developing countries, has grown rapidly. Despite the challenges of growing internet access and usage, the government places a high priority on the growth of the internet and information technology. This study attempts to measure the trend, growth, and instability of internet users. At the same time, an attempt has been made to forecast the number of internet users. This Secondary data has been collected from <http://www.internetlivestats.com/internet-users/bangladesh> link. Different types of statistical methodology such as t-test, correlation, simple linear regression, semi-log growth model, coefficient of variation, and Arima (0,2,1) model have been used here. The value of growth rate and CV around the trend line of internet users in each period is much higher. At the same time, the number of internet users is increasing very fast. Result also shows that in 2023, almost all people in Bangladesh may use the Internet. As a result, the growth rate of internet users at every period is considerably larger, and the number of internet users at every period is very unstable. The government and numerous NGOs must work together to make the internet available to all people of the country.

Keywords: Forecast, Trend, Growth, Internet, Instability, Bangladesh

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1 Background

1.1 Introduction of the Study: One of the most popular topics currently is the Internet of Things, which uses sensors and smart devices to make information and communication more accessible (Kiani and Seyedabbasi, 2018). The youth are a large market for smartphones and internet usage (Singh, 2021). For many people, the Internet has evolved into a primary need (Setti and Wanto, 2019). Internet users and trade have a positive and significant impact on Southeast Asia countries' economic growth (Abdul Wahab, Nayan and Cheah, 2020). The internet is presently used by over 4 billion people all over the world (Kemp, 2018). For society and businesses all around the world, online shopping has a lot of potential and advantages (Et. al., 2021). The percentage of people who use the Internet for health-related activities has risen significantly (Bujnowska-Fedak, 2015). By 2023, the number of IP-connected devices will be more than three times the world's population (Cisco Systems Inc., 2020). The Internet was used by 70.9% of people for mental health reasons (Kalckreuth, Trefflich and Rummel-Kluge, 2014).

1.2 Research Objective: This study aims to measure the growth, instability, and trend of internet users. Simultaneously, an attempt was made to forecast the number of internet users.

1.3 Statement of Problem: Any work can be done very easily using the Internet. Internet is essential in many fields like study, office, court work, etc. Therefore, it is very important to see the trend, growth, and instability of internet users in Bangladesh.

1.4 Scope of Research: The number of internet users in Bangladesh has been used here. So this study will cover the whole of Bangladesh.

1.5 The Rationale of the Study: So far, no one has worked on the forecast, trend, growth, and instability of internet users in Bangladesh. So here it has been tried.

1.6 Significance of the Study: This research will assist the government in formulating various policies. As a result, the country will benefit from it.

2 Methods

2.1 Data source: This secondary data was gathered from the website <http://www.internetlivestats.com/internet-users/bangladesh>.

2.2 Study Area: Bangladesh is a developing country. Bangladesh's telecommunications sector began to liberalize in small steps in 1989, when a private operator was granted a license to provide, among other things, cellular mobile services to compete with the Bangladesh Telegraph and Telephone Board (BTTB), the previous monopoly provider of telecommunications services in Bangladesh. And now there are many improvements in information technology in Bangladesh. Now the internet is used in almost all areas of life.

2.3 Outcome variable: Here, the number of internet users in Bangladesh has been considered as an outcome

variable.

2.4 Predictor variables: The total population of Bangladesh was used as a predictor variable in this study.

2.5 Statistical Analysis: First, the whole period has been divided into two parts. The year 2000-2008 has been identified as period-1 and the year from 2009-2016 as period-2. Then the number of internet users of the whole period, period-1, and period-2 have been compared. Then different types of statistical methodology such as t-test, correlation, simple linear regression, semi-log growth model, coefficient of variation, and Arima (0,2,1) model have been used here. SPSS 23 and R 3.6.3 are used to conduct statistical data analyses.

3 Results

3.1 Change in Total Population and Internet Users

According to the t-test, **Table-1** reveals that during period-1 and period-2, the overall population increased by 1.11 times. On the other hand, from period-1 to period-2, the number of internet users increased 11.30 times. Even though the number of internet users and the total population have both changed significantly (p -value <0.05), the number of internet users has increased more than the total population. As a result, the number of internet users in Bangladesh has remarkable change.

Table-1: Change in Total Population and Internet Users.

Field of Measurement	Mean value		t statistic	p-value
	Period -1 (2000-2008)	Period -2 (2009-2016)		
Total Population	140371510.667	156290878.125	-6.188	0.000
Internet User	1011525.889	11434218.000	-4.470	0.002

3.2 Relationship between Total Population and Internet Users

Table-2 shows that there is a high and positive correlation of internet users with the total population in each period. Since the p -value of each correlation is less than 0.05. So, each correlation is statistically significant. Therefore, it can be said that there is a high and positive correlation between the total population and internet users in each period. Of all the correlations, period-2 has the highest correlation (0.969) between the total population and Internet users.

Table-2: Relationship between Total Population and Internet Users

Criteria	Correlation (r)		p-value
Total Population vs Internet Users	Whole Period (2000-2016)	0.890	0.000
	Period-1 (2000-2008)	0.809	0.008
	Period-2 (2009-2016)	0.969	0.000

3.3 Dependency of Internet Users on Total population

According to the simple linear regression, **Table-3** shows that the value of regression coefficient in period-2 is 1.372. This value means that if the population increases by 1, the number of internet users will increase by an average of 1.372 times. Since the p -value of this regression coefficient is less than 0.05, this regression coefficient is statistically significant. Therefore, it can be said that the number of internet users is increasing at a higher rate than the total population in period-2 in Bangladesh. The value of the regression coefficient of period-1 is very low (0.182). It is also significant. So it can be said that the number of internet users has increased very slowly in period-1. On the other hand, the number of period-2 internet users has increased very fast. In the whole period, the number of internet users has increased at a moderate pace.

Table-3: Dependency of Internet Users on Total population

Period	Constant	Regression Coefficient	t statistic	p-value
Whole Period (2000-2016)	-88485353.767	0.638	7.585	0.000
Period-1 (2000-2008)	-24567460.485	0.182	3.637	0.008
Period-2 (2009-2016)	-203072915.777	1.372	9.672	0.000

3.4 Growth Rate of Internet Users and Total Population

According to the semi-log growth model, **Table-4** shows that the number of internet users has increased at a much higher rate in each period of the whole period, period-1, and period-2. The number of Internet users has increased 36.15 times in the whole period, 45.61 times in period-1, and 23.319 times in period-2. The p -value of each growth rate of internet users is less than 0.05. So these growth rates are statistically significant. On the other hand, the total population has not increased as much as the number of internet users. The total population increased by 1.299 times in the whole period, 1.524 times in period-1, and 1.195 times in period-2. Since the p -value of the growth rates of the total population is less than 0.05, these growth rates are also statistically

significant. So it can be said that the number of internet users in Bangladesh is increasing at a much higher rate than the total population.

Table-4: Growth Rate of Internet Users and Total Population

Field of Measurement	Measurement Statistics	Growth Rate (%)	p-value
Internet Users	Whole Period (2000-2016)	36.151	0.000
	Period-1 (2000-2008)	45.613	0.000
	Period-2 (2009-2016)	23.319	0.000
Total Population	Whole Period (2000-2016)	1.299	0.000
	Period-1 (2000-2008)	1.524	0.000
	Period-2 (2009-2016)	1.195	0.000

3.5 Instability of Internet User and Total Population

Table-5 shows that the CV around the trend line of internet users in the whole period, period-1, and period-2 are 49.59, 69.23, and 14.82 respectively. Because their p-values are smaller than 0.05, they are statistically significant. Here it is seen that the value of CV around the trend line of each period is much larger. So it can be said that the number of internet users in each period is unstable. However, the number of internet users of period-2 is the most unstable. On the other hand, CV around the trend line of the total population in the whole period, period-1, and period-2 are 0.37, 0.29, and 0.056 respectively. They are also statistically significant because their p-values are smaller than 0.05. Here it is seen that the value of CV around the trend line of the total population of each period is very small. As a result, the total population of each period may be stable.

Table-5: Instability of Internet User and Total Population

Field of Measurement	Measurement Statistics	Whole Period (2000-2016)	Period-1 (2000-2008)	Period-2 (2009-2016)
Internet User	CV	117.000	130.370	56.640
	R-square	0.820	0.718	0.931
	p-value	0.000	0.004	0.000
	D-W	0.229	0.553	0.751
	CV around trend line	49.590	69.230	14.820
Total Population	CV	6.500	4.160	2.920
	R-square	0.997	0.995	0.999
	p-value	0.000	0.000	0.000
	D-W	0.246	0.517	0.748
	CV around trend line	0.370	0.290	0.0562

3.6 The Trend of Internet Users

Figure-1 shows that the number of internet users in Bangladesh is gradually increasing. At first, the number of internet users increased slowly but since 2005 the number of internet users has been increasing at a much higher rate. So it can be said that the number of internet users is showing an increasing trend here.

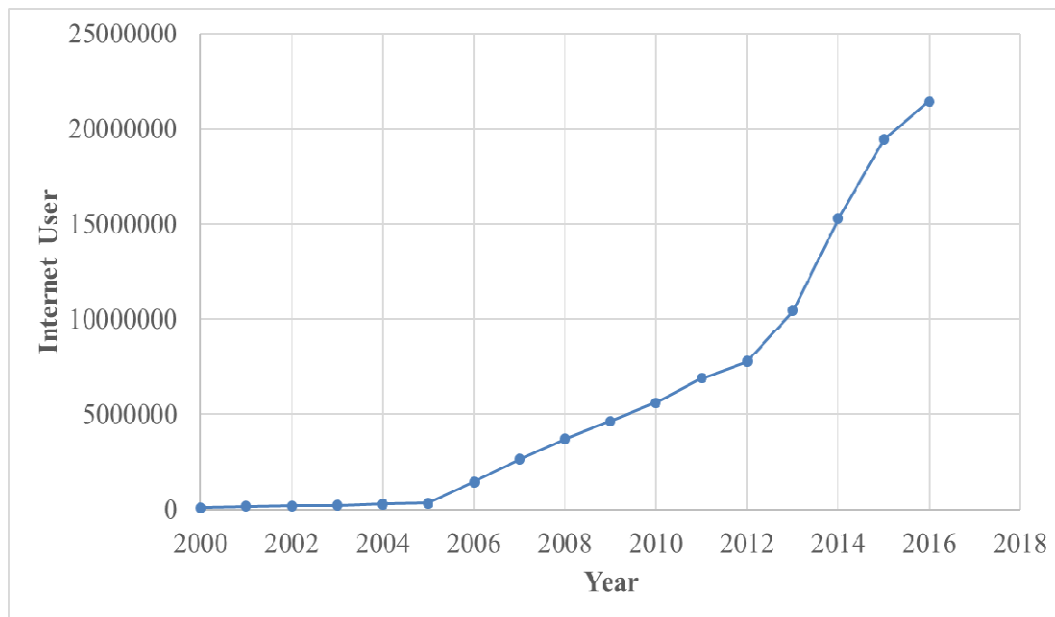


Figure-1: The Trend of Internet Users

3.7 Forecast of Internet Users

The number of internet users in Bangladesh in the next 8 years has been forecasted using the Arima (0,2,1) model, based on the number of internet users in the years 2000-2016. The number of internet users in 2017 might be 30116244, as shown in **Table-6**. **Table-6** also shows the forecasted number of internet users from 2018 to 2024.

Table-6: Forecast of Internet Users

Year	Forecasted Internet User	95% Confidence Interval
2017	30116244	15083034 - 60133004
2018	42305388	15465975 - 115721504
2019	59427923	16752811 - 210811077
2020	83480574	18625870 - 374157349
2021	117268210	21029492 - 653930823
2022	164730937	23985450 - 1131364276
2023	231403562	27553620 - 1943396505
2024	325061032	31820920 - 3320603973

4 Discussion

The people of Bangladesh are gradually becoming more aware of the internet. As a result, the growth rate of internet users is increasing in Bangladesh. For this, internet use is increasing in all workplaces. At the end of March 2021, the total number of Internet users had reached 11.614 crores (*Internet Subscribers in Bangladesh March, 2021 | BTRC, no date*). The value of internet users in 2021 is forecasted to be 11.726 crores in this study. This value is quite close to what was observed. As a result, this forecasting method is considered to be excellent.

5 Limitation

Due to the lack of available data, only the total population has been used as an independent variable in this study. If more variables were used, the result was likely to be better.

6 Conclusions

The number of Internet users is growing very fast which is showing an increasing trend. It can be said that the growth rate of internet users of each period is much higher. However, the growth rate of internet users in period-1 is the highest. On the other hand, the number of internet users is unstable in each period. Where period-1 is the most unstable.

7 Recommendation

The people of the country will be able to participate in development in all fields by using the Internet. As a result, the government and numerous NGOs must work together to make the internet available to all people of the

country.

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