

# Landlockedness, Corruption, and Economic Growth in BIMSTEC

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## Research

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# 1 Introduction

The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Co-operation, BIMSTEC, is a bridge between South East Asia and South Asia. It has also established a platform for intra-regional cooperation between SAARC and ASEAN, shares 22 percent population, 2.7 trillion GDP, 6.5 percent GDP growth rate among its seven sister countries—Nepal, Bhutan, India, Sri Lanka, Bangladesh, Thailand and Myanmar (BIMSTEC, 2019). The region is also rich in untapped natural resources, one of the world’s largest reserves of gas and other seabed minerals, and oil (Brewster, 2015; Powell, 2017; Banerjee and Dey, 2016). The nutrient input from the Ganges and Brahmaputra rivers ensures that the bay’s waters contain extraordinarily large fishing stocks (Kumar et al., 2016; Nag and De, 2007; Chaidee et al., 2007; CMFRI, 2018). This region also covers the widest range of altitude—Mount Everest to sea level— and it encompasses myriad of flora, fauna, minerals, climates, etc., which are the bases of different economic models. Among the seven sister countries, Nepal and Bhutan are landlocked mountainous countries of South Asia (Xavier, 2018).

Landlockedness denotes to geographical situation of a country without direct to the sea (Glassner, 2012). According to this description, there are 44 landlocked countries in the world. Among these, the United Nations lists 32 as landlocked developing countries (LLDCs) that are low and middle-income countries based on the World Bank country classification. Land borders are typically difficult to cross, and often represent major obstacles to trade, especially for landlocked developing economies. Long queues of trucks clogging borders are a typical image throughout the developing world; Whenever, drivers and traders are interviewed, crossing times are measured in days, even sometimes in weeks (World Bank, 2014).

Many developing countries do not generate technological progress domestically, but they import it from abroad and increases its cost, implying slower technological diffusion and progress, lower total factor productivity, and ultimately lower economic growth and income (Arvis et al., 2011; Brewer et al., 2005; Saggi et al., 2004; Hafkin and Taggart, 2001). LLDCs have the following challenges: remoteness from the major markets, dependency on transit countries, infrastructural constraints, limited regional integration,

lack of access to the sea, high trade transaction costs, institutional bottlenecks. The biggest challenge of LLDCs is trading with a third country— while bilateral trade is important. Most LLDCs can only trade with a third country after having the transit of its goods through a neighboring country to a port with additional border crossings and still experience a considerably higher cost of the trade when compared to the transit coastal countries (World Bank, 2014; Faye et al., 2004; Snow et al., 2003; Arvis et al., 2011; Huelin, 2013; Moore, 2018). When goods cross a border, there will be transaction costs having to do with customs and handling. If there is a switch in transport modes, there will be offloading and unloading costs, and perhaps storage costs as well. Therefore, landlockedness can be thought of as raising the price of imports and reducing the price of exports net of transport costs (which must be absorbed by a price-taking seller to compete internationally). Thus, LLDCs suffer deterioration in their terms of trade and a resulting reduction in real income (MacKellar et al., 2000). Therefore, facilitating land-border crossings has become a priority for governments and regional economic communities, for instance, BIMSTEC.

Likewise, Nobel laureate North (1991) reveals that institutions are the key determinant of economic growth and development. They are not only decreasing the cost of a transaction, support to division of labor and solves the human cooperation problem but also provides incentives for investment and its directions of a business environment. In the same context, increasing corruption leads to spoiling the potential economic growth in the country. It is as the abuse of public office for private gain (World Bank, 2014). In addition, Klitgaard (1997) uses the equation:  $C = M + D - A$  ; where,  $C$  =corruption,  $M$  = monopoly,  $D$  = discretion and  $A$  = accountability. This definition measures the potential corruption in practical situations. Consequently, corruption can be highly concentrated at the top of a political system and associated with the exercise of political power.

Corruption has been around for a long time and will be around in the future unless governments can figure out an effective way to combat it (Mauro, 1997). The theoretical and empirical consideration of corruption has generated a rich debate over the few decades. On one hand, researchers such as Myrdal (1989), Shleifer and Vishny (1993), Mauro (1997), Uslaner (2004), Ahmad et al. (2012) have argued that corruption is a destructive element of economic growth. Fraj and Lachhab (2015) reveal that corruption harms human cap-

ital in developing countries. [Ade et al. \(2011\)](#) establish that a low level of corruption inflows a significant amount of FDI. Also, it leads to inequality higher and hurts the poorer than the rich classes ([Gyimah-Brempong, 2002](#)).

Furthermore, governmental corruption may also discourage private investment by raising the cost of public administration since it is likely to take the form of a bribe for public service or by generating social discontent and political unrest—which may lead to economic growth ([Alesina et al., 1996](#)). On contrast, [Huntington \(1968\)](#), and [Friedrich \(1972\)](#) have suggested that it is also plausible factor for economic well-beings. They argue that if the government has produced a package of pervasive and inefficient regulations, then corruption may help circumvent these regulations at a low cost. Under this scenario, it is possible that corruption may improve the efficiency of the system and help economic growth. In the situation of weak governance and rigid bureaucratic, corruption works like grease in a squeaking wheel ([Mondiale, 2006](#)).

In the same token, [Mauro \(2004\)](#) explains that the effect of corruption depends on the different equilibria of rent-seeking activities. It is positive in case of high economic growth with the high prohibition of weak governance and bureaucratic system, however, a bad balance with high corruption and low economic growth. Also, [Méndez and Sepúlveda \(2006\)](#) express that the relationship between corruption and economic growth is non-monotonous—quadratic behavior. Regarding the BIMSTEC members, we can't gainsay that they are free from the institutional rigid bureaucratic system, weak governance, and rent-seeking behavior. It geographically intersects the two economies: the blue economy and the mountain economy. That shows a lucid picture of some kind of geographical cost too. Therefore, the paper carries a genuine issue that what is the impact of landlockedness and corruption on economic growth rate of BIMSTEC? Corruption plays dual behavior on income: none is linear and another is the quadratic or non-monotonous. Therefore, the study tries to reveal the both effects. The study is immense important regarding trust, policy, FDI inflow, international transaction, access to equal trade, bureaucratic system, macro-economic stability and so on.

The remaining parts of this paper are arranged systematically. Second section is literature survey of numerous empirical and theoretical judgments. The third section tells us about the data and strategies applied in the paper. The fourth section is the empirical result

and its economic analysis. The final section is the conclusion, it also provides a brief policy implications.

## 2 Literature Surveys

The literature review of this paper is precisely categorized into two distinct parts. The first part is an overview of landlockedness and economic growth rate. The second part is an overview of corruption and economic growth; this part is further sub-divided into three distinct approaches based on the effects of corruption.

### 2.1 Landlockedness and Economic Growth

Most of the literature have revealed the negative relationship between landlockedness and economic growth. For instance, [World Bank \(2014\)](#) estimates that the level of development in LLDCs is 20 percent lower on average than the non-landlocked. Individual country estimates show the ranges of development costs for most LLDCs that ranges from 10 to 30 percent. [Paudel \(2014\)](#) scans the determinants of economic growth in developing countries within the standard growth regression framework, with special attention being paid to the experience of landlocked developing countries (LLDCs). The results claim that the landlockedness hampers economic growth rate. [Bhattarai \(2019\)](#) examines whether landlockedness has any impact on the exporting capacity of landlocked countries among a panel data analysis of 104 countries including 30 landlocked countries. Finally, the researcher displays that landlockedness has a substantially adverse impact on the trading capability of the landlocked countries. Also, landlocked countries need foreign investments than any other geographical groupings. However, most landlocked developing countries (LLDCs) have failed to attract FDI on enough scale to offset poor local factor endowment and accelerate economic development with capital imports ([Adams, 2009](#)).

[Faye et al. \(2004\)](#) unearth that landlocked countries not only face the challenge of distance, but also the challenges that result from dependence on passage through a sovereign transit country, one through which trade from a landlocked country must pass to access international shipping markets. The study also finds that landlocked countries have a 9 percent higher ratio of export and insurance cost to the actual value of the exports

compared to its maritime neighbors. The issue of trade facilitation becomes even crucial for landlocked countries. A study by [Stone \(2001\)](#) unveils that out of 30 landlocked countries, 18 have transport costs higher than import trade value in Africa. Similarly, 7 countries out of 15 transportation cost exceeding 20 percent. Another important discovery by [Nuno and Venables \(1999\)](#) is that the median landlocked country has transport costs 58 percent higher than the median coastal economy. [Mellinger et al. \(2000\)](#) observe that the majority population who are far from the sea coast, have been bearing large transport costs for international trade. Similarly, the population of tropical regions have high disease burden are the another obstacles for the economic growth and development of those countries. Coastal economies have a high per capita income than landlocked. They have noted the huge transport cost counted for landlocked countries which is the special case of geography linking with economic progress.

## 2.2 Corruption and Economic Growth

### Approach First: Sand in the Wheel

The first approach assumes that corruption reacts like sand in the wheel. The literal meaning of it is that corruption leads to theft and fraud by public officials for private wealth accumulation. It leads to loss of net capital of the economy and decreases national output ([Alam, 1989](#)). Regarding corruption and income relation, most of the literature is skewed toward this approach. For instance, corruption impairs economic growth ([Mauro, 1995](#); [Venard, 2013](#)), total investment and foreign direct investment ([Wei, 2000](#)), and both public budgets and the productivity of a county's infrastructure ([Tanzi and Davoodi, 1997](#)). It also harms on revenue collection—in particular tax revenues—can be lower ([Aghion et al., 2016](#)). Ultimately, it hampers in budget size and investment of the economy. Similarly, in African countries, a unit increase in corruption reduces the growth rate of GDP and per capita, and increases income inequality ([Gyimah-Brempong, 2002](#)).

[Rotimi et al. \(2013\)](#) also find that corruption damages economic growth in Nigeria. [Chene \(2014\)](#) reveals that corruption is likely to adversely affect long-term economic growth through its impact on investment, taxation, public expenditures, and human development. [Gyimah-Brempong and DeGyimah-Brempong \(2006\)](#) supplement that corruption affects the equitable distribution of resources across the population, increasing income inequalities, undermining the effectiveness of social welfare programs, and ultimately re-

sulting in lower levels of human development. To add, corruption is likely to weaken the citizen trust in institutions and processes. An expanding strand of the literature shows that low trust amongst households can lead to lower financial inclusion and lower stock investment (Guiso et al., 2009). Trust is also important in the cross-country context; perceptions of low trustworthiness across countries are associated with lower trade, foreign direct investment, and portfolio investment in severe cases, corruption can undermine trust in the government, inciting civil unrest and conflict; more uncertainty can harm investment and other economic activity (Tanzi and Davoodi, 1998).

### **Approach Second: Grease in the Wheel**

Some literature have argued for sand in the wheel, however, there are numerous arguments on *greasing in the wheel* hypothesis too. The hypothesis declares that corruption can have a positive impact on economic growth rate by compensating for a bad and rigid governance. Corruption is chosen as a second-best solution to economic and structural problems that arise either due to the over regulation of a weak institutional environment (Lee and Oh, 2007; Huntington, 1968; Marquette and Peiffer, 2015). Furthermore, Heckelman and Powell (2010) opine that corruption can be growth-enhancing when economic freedom is limited, but the positive effect disappears with higher degrees of economic freedom.

### **Approach Third: Non-Linear Relationship**

Thach et al. (2017) scrutinize the impact of corruption on economic growth by using data from 19 Asian countries for 12 years, 2004 to 2015, with DGMM data processing techniques and quantile regression. The results show that corruption is a hindrance to the economic growth of those Asian countries. To add, economic growth is impacted by different levels of the corruption at different quantiles, unambiguously, at the quantile level from 0.1 and 0.5, corruption impacts positively on economic growth, or vice versa, from the level of 0.75 and 0.90, it is negative. Correspondingly, Sindzingre et al. (2010) reveal that corruption is beneficial at a low level of incidence and detrimental at high levels of incidence. Mallik and Saha (2016) reflect that corruption is not always growth-inhibitory, for some countries it is growth-enhancing which supports the *greasing the wheels* hypothesis in the sample of 146 countries but not for all. Similarly, Ahmad et al. (2012) show that a decrease in corruption raises the economic growth rate in an inverted

U-shaped way.

### 3 Data and Estimation Strategy

The issue of this study is cracked under [inferential statistics](#) using panel database. It contains seven cross-section—Nepal, India, Bhutan, Sir Lanka, Bangladesh, Myanmar, and Thailand—and seven-time series observation from 2012–2018. The raised issues are solved utilizing the principle variables—GDP growth rate, corruption, squared of corruption, and landlockedness ([categorical variable](#))—and few control variables: gross fixed capital formation, remittance, and labor force. GDP growth rate is hired as the proxy for economic growth rate, and gross fixed capital formation is for investment. Landlockedness is measured by a dummy variable ( $L_1$ ). Where,  $L_1 = 1$  refers the presence of Landlocked economies, that are Nepal and Bhutan, and 0 for other coastal economies.

Similarly, there are three indices to demonstrate the corruption size in the economy: the International Country Risk Guide (ICRG), Corruption Perception Index (CPI) by Transparency International (TI), and the World Bank’s Corruption Control Index ([Baliamoune-Lutz and Ndikumana, 2010](#)). In the paper, CPI is used to demonstrate the corruption level. Likewise, the labor force comprises people ages 15 and older who supply labor for the production of goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time job-seekers. The inflation rate is computed from the consumer price index. CPI is sourced from the Transparency International, and remaining other variables are hired from the World Bank. The variables: remittance and gross fixed capital formation are measured as a percentage of GDP, and the labor force variable is measured in 100 million. Utilizing the guidance by [Baltagi \(2008\)](#), and [Gujarati \(2009\)](#) the functional format of the model starts from equation (1) and followed by a non-linear regression as given by equation (2):

$$y_{it} = f(\text{corr}_{it}, \text{corr}_{it}^2, L_{it}, X'_{it}) \quad (1)$$

In the non-linear transformation

$$y_{it} = \xi + \eta_1 \text{Corr}_{it} + \eta_2 \text{Corr}_{it}^2 + \eta_3 L_1 + X'_{it} \Psi_i + \epsilon_{it}; i = 1, 2, \dots, 7; t = 2012, \dots, 2018 \quad (2)$$



Where,

$y_{it}$ =GDP growth rate

$Corr_{it}$ = corruption perception index,

$Corr_{it}^2$  = square of corruption perception index,

$L_1 = 1$  for the presence of landlockedness countries: Nepal and Bhutan, and 0 for other,

$X'_{it}$ = Vector of the control variables—labor force ( $LF_{it}$ ), investment as % of GDP( $GFCF/GDP$ ) $_{it}$ , remittance as % of GDP( $REM/GDP$ ) $_{it}$ , and inflation rate( $INF_{it}$ ),

$\xi$ = overall constant,

$\Psi_i$  and  $\eta_1, \eta_2, \eta_3$  = coefficients of the variables,

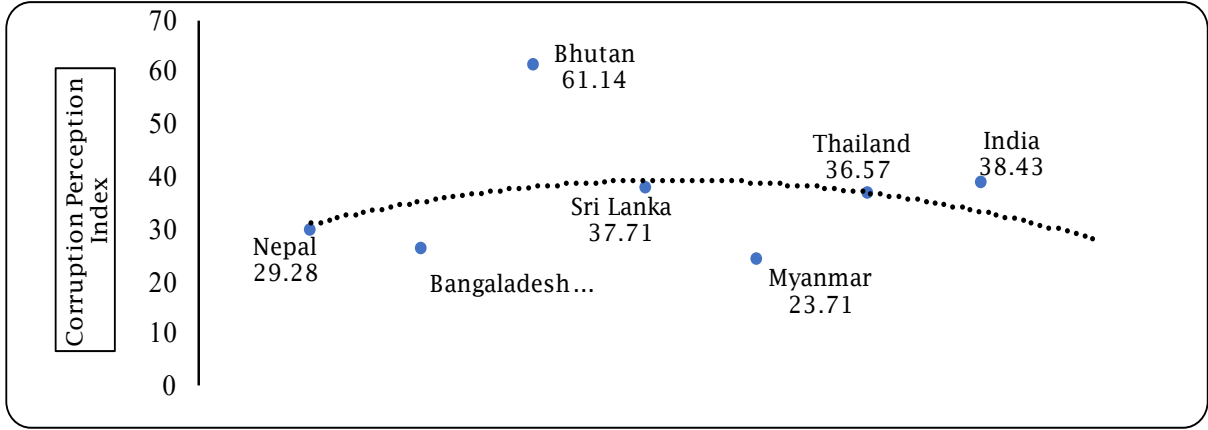
$\epsilon_{it}$  = error terms.

The variables used in this research are non negative. Furthermore, the partial derivative of equation (2) is expected the following signs:  $f'_{Corr} \geq 0, f'_{Corr^2} \geq 0, f'_{L_1} < 0, f'_{(GFCF/GDP)} > 0, f'_{INF} < 0, f'_{(REM/GDP)} > 0$ .

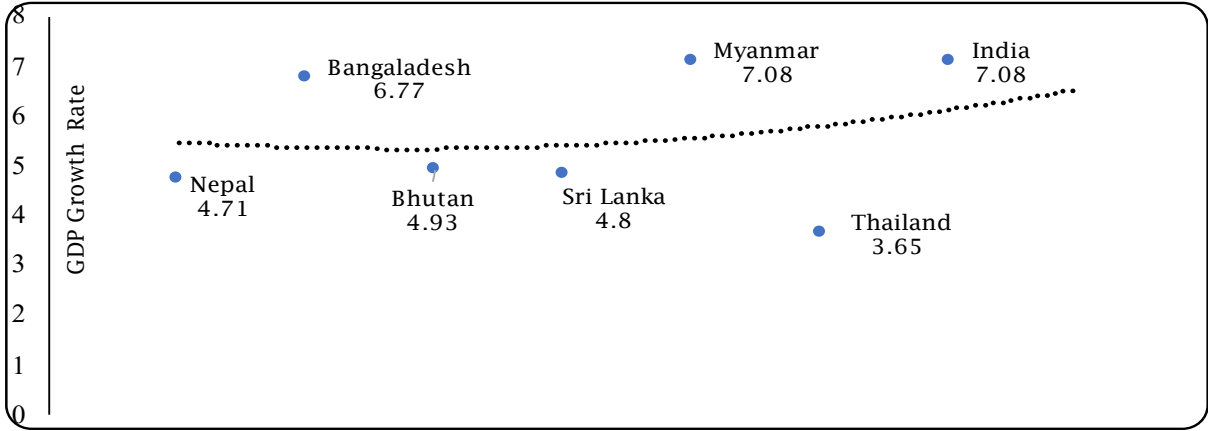
## 4 Result and Discussion

Figure 1 depicts the average performance of corruption level. It is observed that India, Sir Lank, and Thailand have modest corruption; however, Myanmar, Nepal, and Bangladesh are relatively more corrupted and score a range from 23 to 30 (among 100) CPI averagely. In this regard, Bhutan is the least corrupted country, which achieves more than 60 CPI on an average. Likewise, Figure 2 explains the average GDP growth rate at constant price over 2012–2018. It illustrates that Myanmar, Bangladesh, and India have faster growth among all members. Nonetheless, Thailand has the least, and Nepal, Sir Lanka, and Bhutan have a modest GDP growth rate. Interestingly, Myanmar and Bangladesh perform very well regarding the economic growth rate despite the presence of high level of corruption. Where, the twin landlocked countries of the BIMSETC, Nepal and Bhutan are more or less similar in term of GDP growth rate; but regarding corruption, Bhutan is the best. India secures modest performance for growth rate and corruption. The preamble analysis is very ambiguous. Thus, this paper unveils further investigations through econometric modeling.

**Figure 1:** Average Corruption Perception Index



**Figure 2:** Average GDP Growth Rate



**Table 1:** Estimated Result of Pooled Least Squares

Dependent Variable:Economic Growth (y)				
Regressors	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.1195	0.029	-4.114	0.000
Corr	-0.38115	0.277	-7.224	0.000
$Corr^2$	0.0039	0.00076	5.110	0.000
LF	0.592	0.0045	12.981	0.000
$L_1$	-3.00098	0.5583	7.938	0.000
REM/GDP	0.11158	0.0247	4.558	0.000
GFCF/GDP	0.1569	0.01720	9.114	0.000
$\xi$	8.78	1.10668	7.938	0.000

$R^2 = 0.4042$ , Adjusted  $R^2 = 0.3978$ , F-statistic=63.002 (Prob.=0.000), D-W=1.8 $\approx$  2

The estimated non-linear model, placed in Table 1, elaborates that the specified explanatory variables are statistically significant at one percent of the significance level. As

we expected in the methodology, the variables—inflation rate and landlockedness have negatives estimates. Nonetheless, remittance as a percentage of GDP, investment as percentage GDP, and labor force have positive coefficients. The coefficient of landlockedness, negative 3.00098  $\sim$  3, has unveiled that the presence of landlockedness in the county significantly impairs the GDP growth rate by 3 percent on an average. In other words, the growth rate cost of BIMSTEC due to landlockedness is 3 percent.

Furthermore, the coefficient of corruption is reported negative 0.38115. It explicates that an increase in the reversed corruption perception index by one percent leads to boost economic growth rate by 0.38115 percent annually. It depicts Grease in the Wheel situation as explained by the researchers, for instance, [Lee and Oh \(2007\)](#), [Huntington \(1968\)](#), [Lee and Oh \(2007\)](#), [Marquette and Peiffer \(2015\)](#) and so on. It occurs for compensating the bad governance, and rigid institutional and bureaucratic system that prevails in the economy. But, the squared of corruption variable unearths the positive coefficient (0.00391); which is statistically significant. The partial differentiation of the estimated growth model equals to the zero at the optimum point (Hoy et al., 2012). Therefore, the result is further extended as follows:

$$\begin{aligned}\frac{\partial f}{\partial Corr} &= 0, \\ \text{or, } 0.38115 &= 20.00391 \text{Corr} \\ \text{or, Corr} &= 48.74 \approx 49\end{aligned}$$

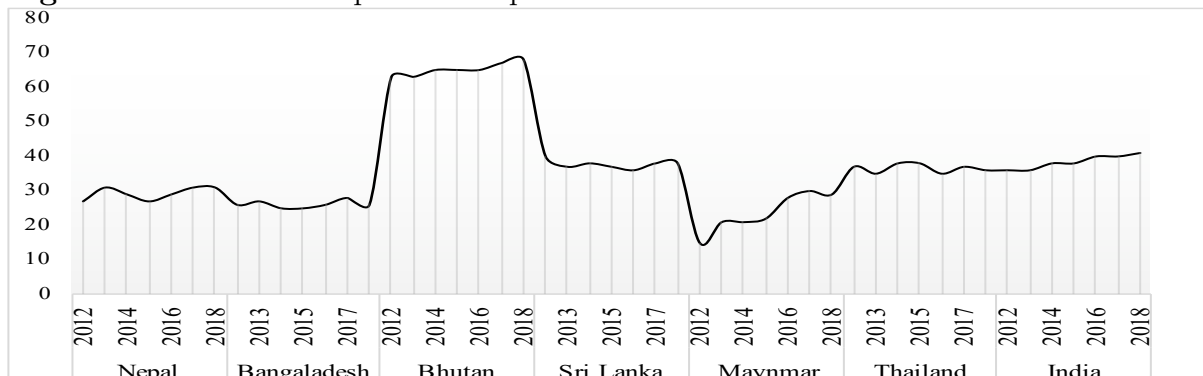
This is the optimum point of *greasing in the wheel*. It demonstrates that as well as corruption perception index goes down, it induces economic growth. On the contrary, the square of CPIs' coefficient reveals that the *greasing in the wheel* will turn into *sand in the wheel* after a threshold level, is 49 points of corruption perception index. Similarly, 0.592 percent economic growth of the BIMSTEC is responsible when it adds one million labor force to the existing labor market. The economic growth rate is positively influenced by 0.11158 and 0.1569 percent respectively for a one percent increment of remittance and investments' share to GDP. These are very obvious findings for any growth model.

## 5 Conclusion

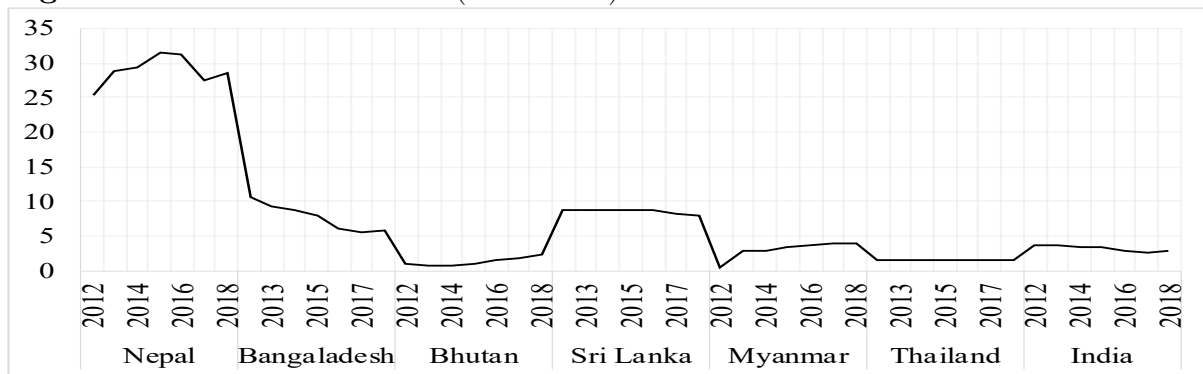
This paper presents a macroeconomic growth model to explore the impact of landlockedness and corruption on economic growth rate of BIMSTEC. The BIMSTEC bridges South East Asia to South Asia, or ASEAN to SAARC, or blue economy to mountain economy. The analysis concludes that landlockedness reduces the economic growth rate. It hints a significant augmentation in trading cost, cross border cost, and poor access to the coast in the region. Corruption plays *grease in the wheel* situation. The non-monotonous behavior reveals that it only works below 49 points of CPI. After this threshold level it will turn into *sand in the wheel*. Control variables are obvious for this model too. Hence, the study preserves myriad scope of economic trade-transaction among the members and with the globe. Each members of the county has been practicing their own economic policies for economic development, but sometimes it is not sufficient. Economic development is also induced by regional access and agreements. In the context, it strongly recommends two policies. First, the regional agenda of BIMSTEC should take liberal policies against rigid, corrupted, and weak governmental-bureaucratic system. Second, landlocked countries of the region should get easy access to the coast for lubricated economic transactions to the overseas.

# Appendix

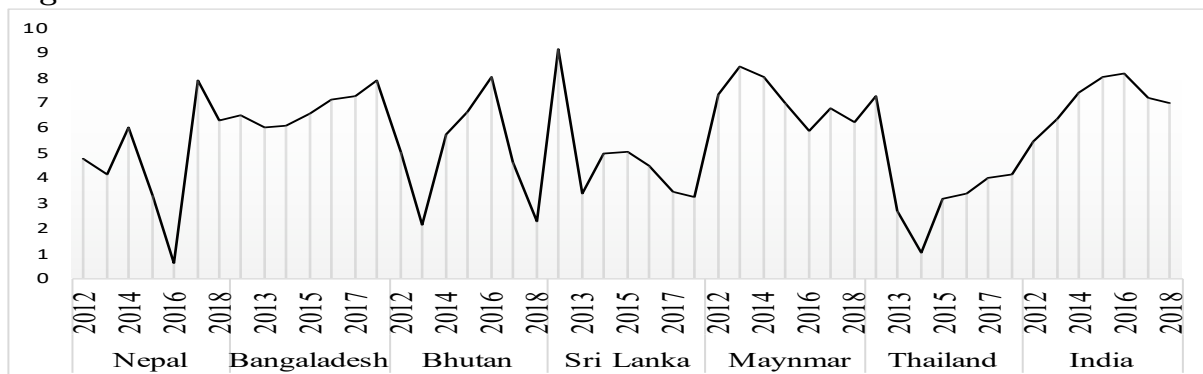
**Figure 4:** Trend of Corruption Perception Indices



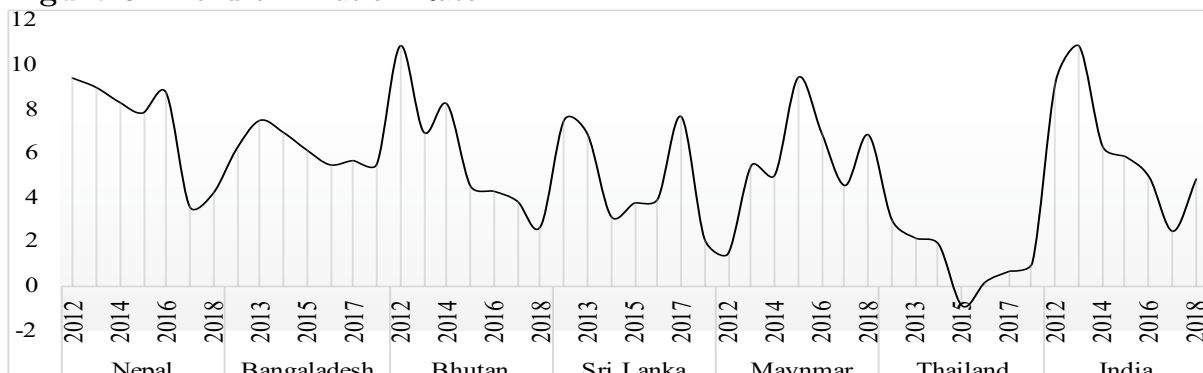
**Figure 5:** Trend of Remittance (% of GDP)



**Figure 5:** Trend of GDP Growth Rate



**Figure 6:** Trend of Inflation Rate



**Note:** All the figures and table are estimated by author.

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# Figures

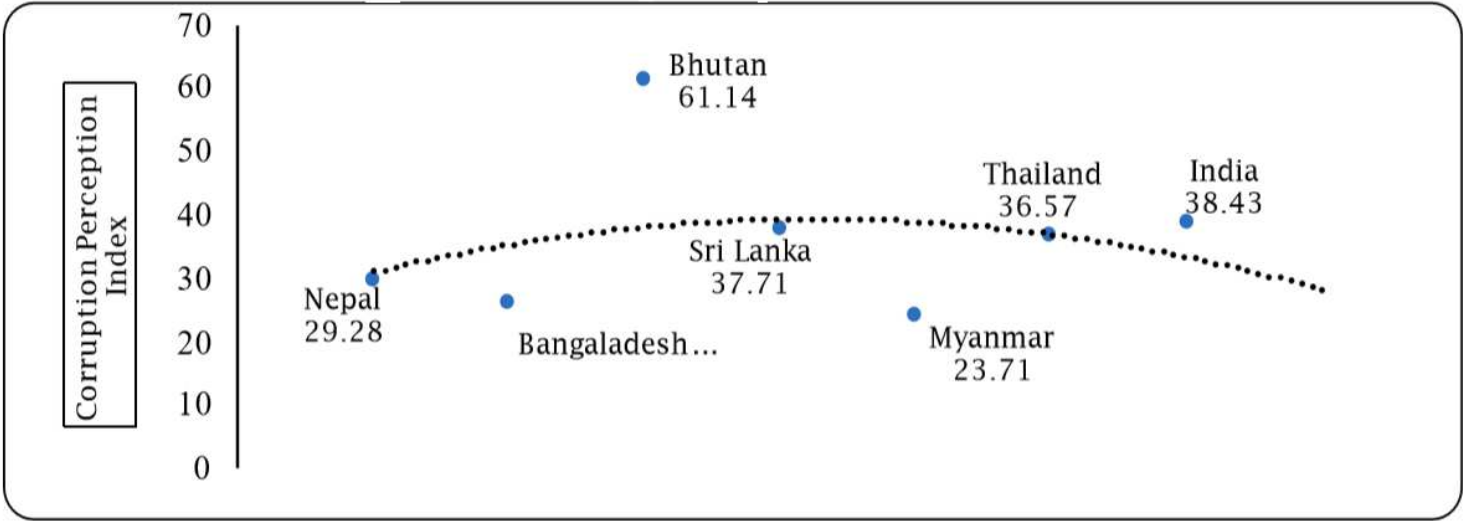


Figure 1

Average Corruption Perception Index

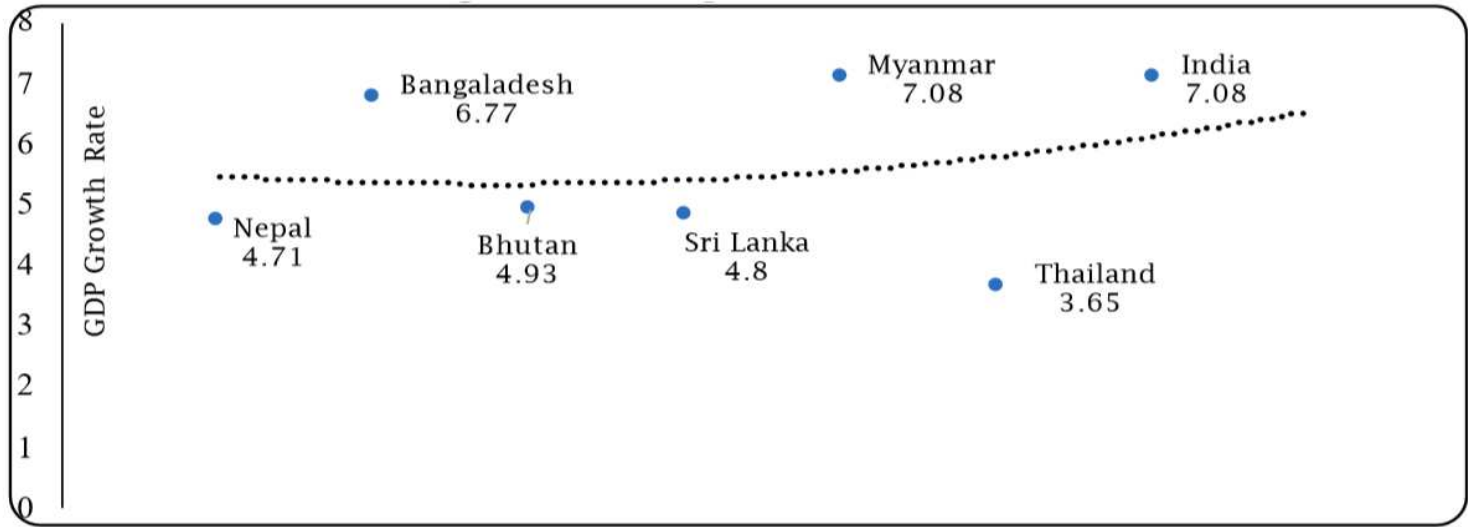


Figure 2

Average GDP Growth Rate

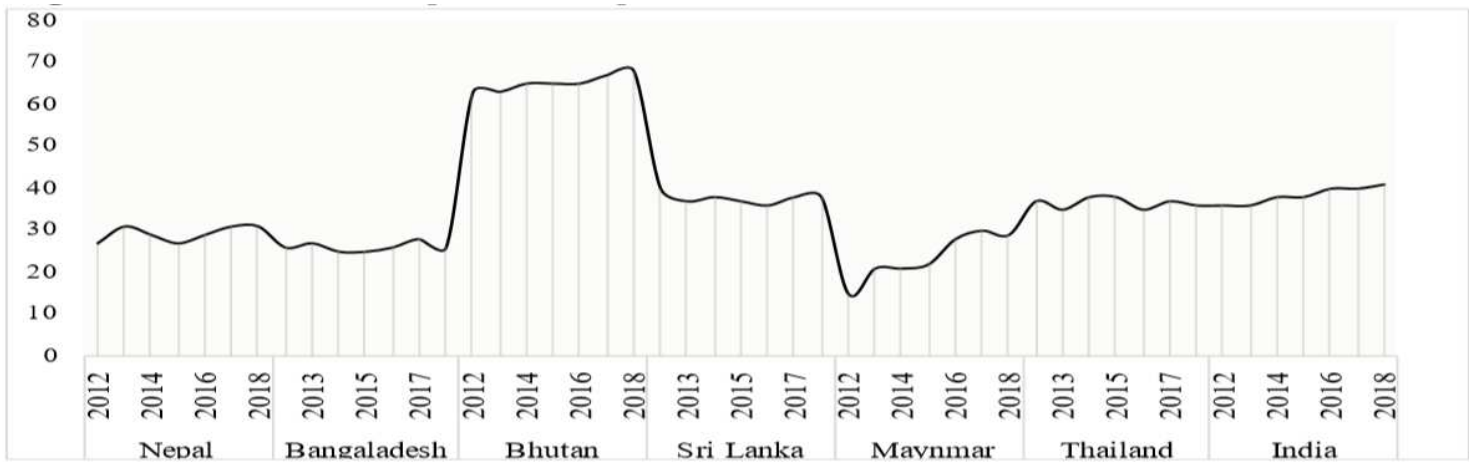


Figure 3

Trend of Corruption Perception Indices

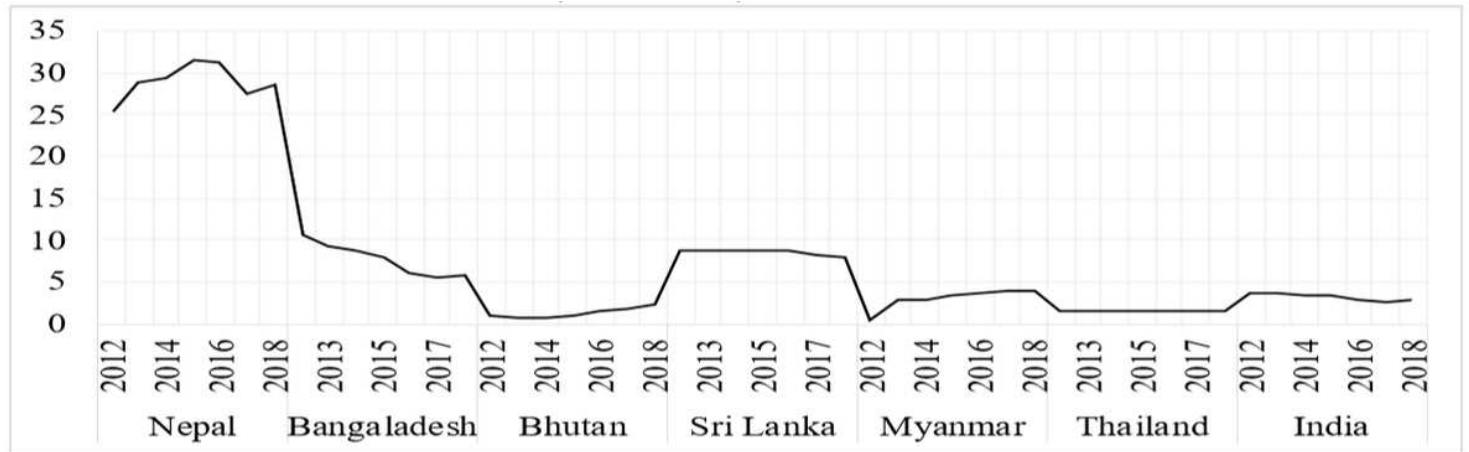


Figure 4

Trend of Remittance (% of GDP)

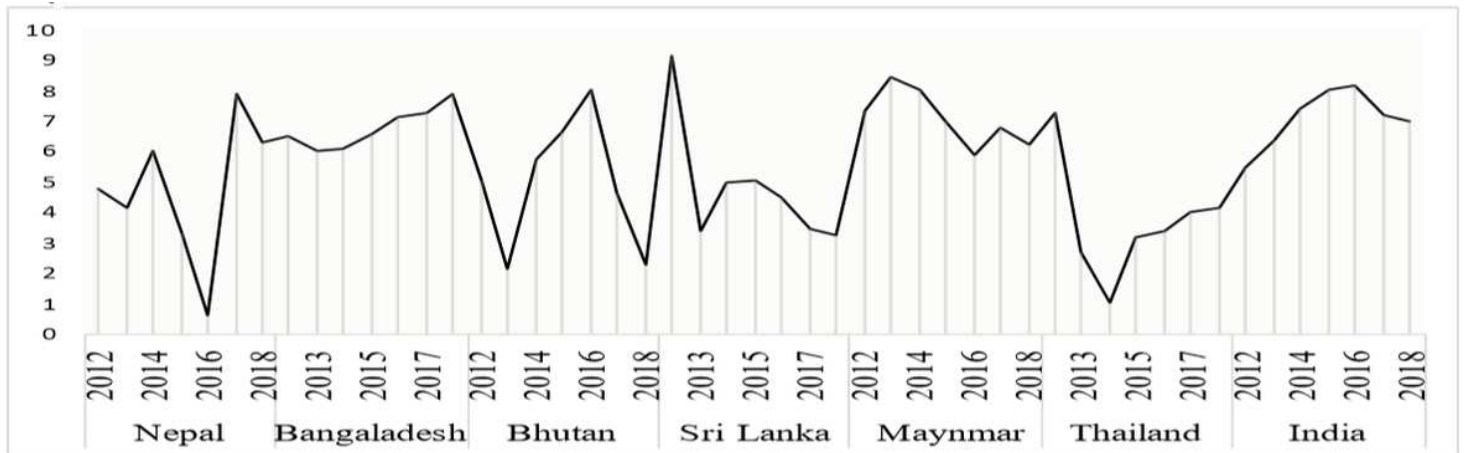


Figure 5

Trend of GDP Growth Rate

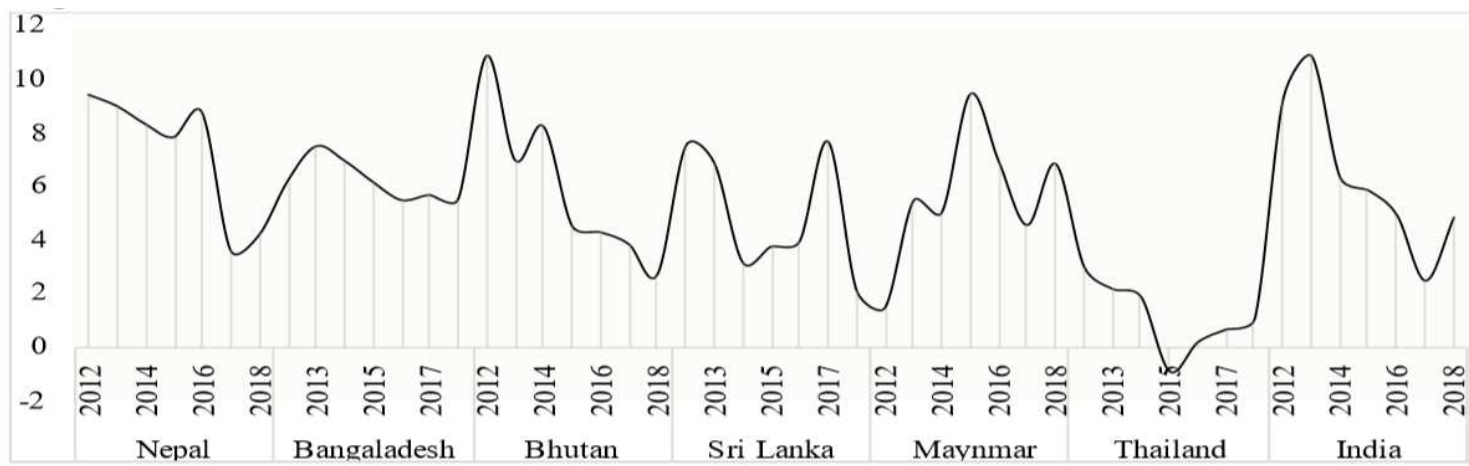


Figure 6

Trend of Inflation Rate

## Supplementary Files

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- [BIMSTEC.xlsx](#)