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Are Saving and Investment Cointegrated? Evidence from Bangladesh Using DOLS Model

Mohammad Safiqul Islam*

Abstract: Achieving and maintaining a smooth and excellent economic growth rate is the core macroeconomic objective in the present world, and definitely, the domestic savings rate can play the exigent role in this regard. Analyzing the annual data of real gross domestic product, saving and investment in Bangladesh from 1993 to 2018, this study tried to explore the association among these variables by using cointegration analysis and the estimated result confirms that one cointegrating vector exits among them. Causality analysis has also employed in this study and the result reveals only a unidirectional causality from savings to real gross domestic product at 10% significance level. This study goes further to estimate the elasticity by employing the dynamic OLS technique (considering 1 "leads" and 1 "lag" of the first difference of integrated variables) and the result predicts that if savings increases (one) 1 percent then the real GDP increases about1.016 percent and it is statistically significant. So, the policy implication of this study is that domestic saving can lead to accelerate economic growth in Bangladesh.

Introduction

Achieving and maintaining a smooth and excellent economic growth rate is the core macroeconomic objective in the present world, and definitely, the domestic savings rate can play the exigent role in this regard. The savings-growth literature was gained a momentum with the development of the Harrod-Domar (H-D) model, a model which suggested that "for stability and full employment, the ratio of saving rate to capital output must always equal the natural growth rate of the economy which is given by the growth rate of labor force of the economy" (Yeldan, 2009). For overcoming the drawbacks of the H-D model, Robert Solow developed a neoclassical model that predicted temporary growth effect (Solow, 1957). Although Solow's model found no effect on the steady state growth rate, it confirmed that savings rate can enhance the standards of living by increasing the per capita capital stock. This model also concluded that technological advancement, which was considered as exogenous factor, can accelerate long-run output growth permanently, and higher savings rate can determine the growth rate only in the transitional period when the economy moves to the new equilibrium from old steady-state situation. However, new findings was found from the study of Singh (2009) where it was claimed that the new growth theory, widely known as "Endogenous growth theory", can explain the positive permanent impacts of savings rate on output growth through the accumulation of physical capital that leads to permanent progress in technological advancements (Lucas, 1988; Romer, 1986, 1887).

Recently, the economy of Bangladesh has become capable of maintaining a good growth rate, on average 6%+ over the last decade. The growth rate increased to 7.11% in 2015-16, while it was 6.55% in 2014-15 (Bangladesh Bureau of Statistics (BBS)). Moreover, in 2016-17 it was 7.28% and becomes 7.86% in 2017-18 (BBS). Although economic

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growth rate increases, both domestic and national saving decreased slightly. Domestic saving decreased from 25.33% in 2016-17 to 22.83 % in 2017-18, and national saving decreased from 29.64% in 2016-17 to 27.42% in 2017-18. Gross investment (% of GDP) and both public and private investment increased in this time frame. Gross investment increased to 31.23% in 2017-18 from 30.51% in 2016-17, while public and private investment increased from 7.41% and 23.10% in 2016-17 to 7.97% and 23.26% in 2017-18, respectively. Overall, the total investment increased approximately 16.61% in 2017-18 compared to the previous fiscal year.

The government of Bangladesh undertook some good policies to promote investment and economic growth. To ensure investment friendly environment throughout the country, "Board of Investment (BOI)" and "Privatization Commission" were merged together into "Bangladesh Investment Development Authority (BIDA)". "Bangladesh Economic Zone Authority (BEZA)", which is directly monitored by Prime-Minister office of Bangladesh, has taken an initiative that aims to create employment opportunities for more than 10 million within the next 15 years by establishing 100s economic zones all over the country.

In this backdrop, about 79 economic zones has approved already, where 56 are public and 23 are private. Various development projects, under the annual development plan, are taken and implemented to promote economic growth. Unemployment problem is reduced as a consequence, many small and medium business firms are operating successfully, and domestic investment are increasing that further leads to accelerate economic growth.

Literature Review

It is an important economic issue to analyze the relationship between saving and investment, since it provides a key approach to the sustainable economic growth process. Various works have been conducted to analyze this relationship throughout the world. The existing theoretical position can be categorized into two approaches; one stands on the basis of classical foundations, and the other one stands on the base of Keynesian and Post-Keynesian doctrines. The classicalists argued that increased savings rate caused to deteriorate interest rate. As interest rate declines, demand for loanable funds increase. As a consequence, domestic investment increases that lead to accelerate economic growth. Therefore, here the dominant player is the saving rate. Increased savings rate raises investment through reducing interest rate. Counter viewers of this classicalist position argued that it's not saving rate but investment which is the dominant player in the economy. The more domestic investment is consistent with better economic growth that will consistent with higher income per capita and purchasing power of the people, and when people earn more they get the opportunity to save more. Therefore, increasing rate of investment accelerate economic growth that leads to increasing savings rate (Solow, 1970; Ang, 2007).

There exists a puzzle over the years, commonly known as "Feldstein–Horioka (F–H)" puzzle, was claimed cointegration between savings and investment. Feldstein and Horioka (1980) conducted a study over 16 OECD countries from 1960 to 1974 and revealed a high correlation between these two variables. Their finding was consistent with low capital mobility, instead of high capital mobility around the open economies.

After that various studies (divided into two positions) were conducted by focusing this puzzle and newly developed cointegration techniques had been employed.

One group examined the cointegration status by considering various assumptions about exchange rate and capital mobility. Miller (1988) was the pioneer of this position who used the technique of Engle and Granger (1987) to examine the data of USA from 1946 to 1987. His investigation revealed a cointegration between saving and investment rate under the fixed exchange rate regime during world war two, but no cointegration was observed with the flexible exchange rate period. These findings were expressed as an indication that increasing capital mobility triggered the long-run association between saving and investment.

Miller's work was highly criticized by Gulley (1992). Guller (1992) criticized the cointegration technique used by Miller, and also questioned about the execution of the intercept term in the regression. According to Guller, intercept term is important in the saving-investment model so that it should be include to express the nonzero means. Guller found that both saving and investment are stationary at their level form and no long-run association exist between these two whether we set the fixed or flexible exchange rate assumptions. Moreover, the study of Sarno and Taylor (1998) also found no cointegration among these two in UK, while it was examined by including before and after data of the abolition of UK exchange rate controls.

The second strand criticized the F-H puzzle by arguing that the saving-investment correlation arise because of two alternative macroeconomic factors, nothing else. From the findings of Summers (1998) for the long-run current account targeting (Summers, 1988) which, as noted by Hussein (1998), "if successful, would produce a strong saving–investment relationship, even with high capital mobility" and, "most notably, the intertemporal budget constraint which, being expected to be always operative" (Jansen, 2000), implies a "cointegration relationship between saving and investment regardless of the degree of financial integration with the global economy" (Coakley and Kulasi, 1997; Jansen, 1997, 1998).

Some of the studies found positive impact of growth on saving rate (Kuijs, 2006; World Bank, 1993; Sepehri and Akram-Lodhi, 2005; Rodrik, 1998). Besides, some studies have found the causality between saving rate and income growth is bi-directional (Attanasio et al., 2000; Singh, 2009; Carol and Weil, 1993). Moreover, according to Gorner (2006), "it is worth noting the possibility of an adverse effect of an increase in saving rate on output growth in the short run which operates through its contractionary effects on growth of consumer spending".

In particular, we concentrate on examining for Bangladesh whether the domestic saving has noteworthy effect on the growth rate of real GDP over the sample period able to collect.

Methodology

Data Description and Sources

Annual data of Bangladesh, covering the period 1993 to 2018, has been used in this study, while data on the variables of Real Gross Domestic Product (RGDP), Saving (S),

and Investment (I) in this study is in billion taka. These data are taken from BBS, Economic Review of Bangladesh and Statistical Bulletin. We have transformed the data set into a logarithm form. Data of log of RGDP, S and I, both in level form and 1st difference form, are illustrated in Figure 1.

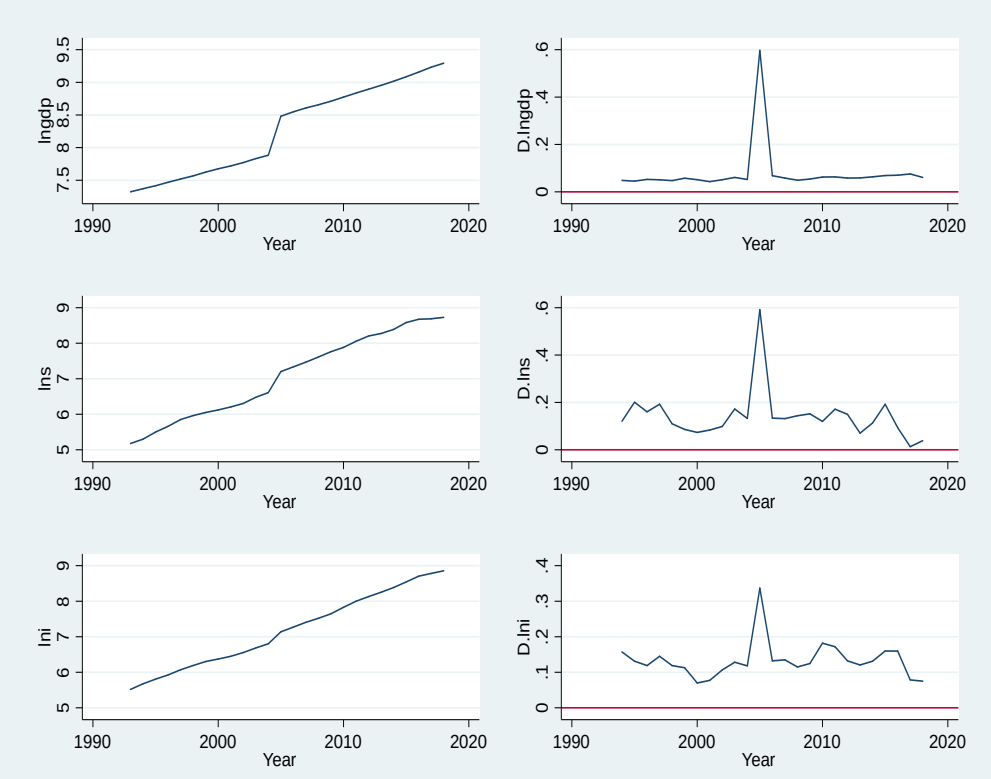

Figure 1: Left-side graphs are the Level form and the right-side graphs are the 1st difference form for the selected variables.

From the graph we observe that there is an association among the variables of real gross domestic product, savings and investment for the specified time period in Bangladesh.

Model Specification

This study has employed the method of "Granger causality", and "Vector Autoregressive Model (VAR)" to explore the impacts of public borrowing on economic growth in Bangladesh. In order to test the causal relationships, the following model is specified:

$$Y = f(S, I) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where Y = Real gross domestic product; S = Saving; and I= Investment.

According to the objective of this paper, equation (1) shows for public debt-growth nexus in a VAR model as:

$$Y_t = a_{10} + \sum_{j=1}^{k} a_{1j} Y_{t-j} + \sum_{j=1}^{k} b_{1j} S_{t-j} + \sum_{j=1}^{k} c_{1j} I_{t-j} + u_{1t} \dots\dots\dots\dots (2)$$

$$S_t = a_{20} + \sum_{j=1}^{k} a_{2j} S_{t-j} + \sum_{j=1}^{k} b_{2j} Y_{t-j} + \sum_{j=1}^{k} c_{2j} I_{t-j} + u_{2t} \dots\dots\dots\dots (3)$$

$$I_t = a_{30} + \sum_{j=1}^{k} a_{3j} I_{t-j} + \sum_{j=1}^{k} b_{3j} Y_{t-j} + \sum_{j=1}^{k} c_{3j} S_{t-j} + u_{3t} \dots\dots\dots\dots (4)$$

Where: Y_t= Real GDP for economic growth

S_t = Saving

I_t = Investment

u_t = A zero mean white noise error term

Testing for Unit Root: The ADF test

"Specious regression" can be found from the use of conventional "OLS" method (Granger, 1988), as unit root problem is a common scenario of the time series data. So, tracking the unit problem is the primary task for time series estimation and owing to detect this problem this study has relied on the widely used the "Augmented Dickey Fuller (ADF)", which can be expressed as shown in equation 5 below:

$$\Delta h = a_1 + b h_{t-1} + c_i \sum_{i=1}^{n} \Delta h_{t-i} + v_i \dots\dots\dots\dots (5)$$

The symbol "*h*" stands here to represent the variables under investigation in this study, RGDP, S and I, while the symbol "Δh" stands for representing the 1st difference form of the variables. Moreover, u stands for indicating the error term, which is white noise, and n stands for representing the length of lag. This test assumes non-stationarity as the null hypothesis, which can be rejected if the estimated value of the λ becomes significantly different from zero, otherwise not.

Table 2: ADF and Phillips-Perron tests

Variable	ADF		Phillips-Perron	
	Level	First Difference	Level	First Difference
Lnrgdp	-0.262	-4.831*	-0.204	-24.278*
lns	-1.013	-4.273*	-0.477	-22.636*
Lni	-0.090	-4.052*	-0.028	-21.112

Note: * denotes 1% critical values of rejection of the null hypothesis.

Table 2 shows that the time series are non-stationary i.e. *I(0)* at their levels, while first difference turns these stationary. That is each of the series lnrgdp, lns and lni are integrated of order 1, *I(1)*.

Cointegration Tests

Maximum likelihood procedure (Johansen-Juselius; 1990) is used to find the existence of a long run association among savings, investment and economic growth. For these three variables, the first order Vector Auto Regressive (VAR) models are used.

$$\sum_{j=1}^{2} a_{ji} Y_{jt} = v_{it} ; \qquad i = 1, \ldots\ldots, r (6)$$

The v_{it} are *I(0)* series, although the Y_{jt} are *I(1)*. Under *I(0)* of v_{it} the long run relationship of Y_{jt} (j= 1, 2, 3) is determined by 3-r common trends.

The trace, and max eigenvalue stat is used to the Johansen-Juselius (1990) procedure; the trace stat is developed by follow the null hypothesis, where there are at most *r* distinct cointegrating vectors:

$$\lambda_{trace} = T \sum_{i=r+1}^{N} \ln(1 - \lambda_i) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

here λ_i's are the N-*r* least squared acknowledged associations between Y_{t-k} and ΔY_t (where $Y_t = (GDP_t, S_t, I_t)^{/}$ and all the variables in Y_t are supposed I(1)), corrected for the belongings of the lagged differences of the X_t process.

The max eigenvalue stat is developed by follow the null hypothesis of at most *r* cointegrating vectors in contradiction of the alternative hypothesis of *r* + 1 cointegrating vectors:

$$\lambda_{\max} = -T \ln(1 - \lambda_{r+1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Table 3 contains the related co-integration testing information. It is observed here (in Table 3) that Johansen and Juselius's (1991) trace-statistic and max-statistic tests indicate that GDP, S, and I are co-integrated. This indicates that the long-term relationship between savings, investment and GDP growth in Bangladesh is stable. In other words, the savings and investment strategy would have an effect on the long-term economic development of Bangladesh's economy.

Table 3: Results of multivariate cointegration tests

Maximum rank	Eigenvalue	Trace statistic	Critical value	Max Statistic	Critical value
None*	-	30.1425	29.68	21.9527	20.97
At most 1	0.3547	9.1898	15.41	7.1066	14.07
At most 2	0.2474	2.0832	3.76	2.0832	3.76

Note: * denotes the rejection of the null hypothesis at 5% critical value.

Testing for Causality

In order to find out the direction of causality this study relies on the "Granger causality" (Granger, 1969) test. Although it is difficult to reveal the true causality among a set of variables, predictive causality can be found and used in this regard (Diebold, 2001).

Table 4: Causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP does not Granger Cause LNS	25	0.67576	0.4199
LNS does not Granger Cause LNGDP		3.17991	0.0884
LNI does not Granger Cause LNS	25	0.10040	0.7543
LNS does not Granger Cause LNI		0.70880	0.4089
LNI does not Granger Cause LNGDP	25	2.02993	0.1683
LNGDP does not Granger Cause LNI		0.00053	0.9818

In table 4, we observe that there is only one causality found among these variables at 10% level of significance is savings causes GDP. But practically we know that there is an association among these variables, as for any economy if the savings increase then there is a possibility to increase the investment too, in this case there a possibility to increases the GDP of a country. May be due the inconsistency or error for this data set we don't find any causal relationship among these selected variables.

Dynamic Ordinary Least Square (DOLS) Model

To estimate the elasticity, we will use the Stock Watson Dynamic OLS (DOLS) method (proposed) by Stock & Watson (1993)). This econometric technique is an improvement over OLS that corrects the dynamic sources of bias. It is also desirable for a small sample. This method will generate a unique equation that eliminates the endogeneity problem of the explanatory variables too. Table 5 tabulates the estimated result of DOLS for this study.

Table 5: Estimated Results of DOLS

Dependent Variable: LNGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNS	1.016359	0.119121	8.532172	0.0000
LNI	-0.195696	0.218778	-0.894495	0.3873
C	3.052404	0.776180	3.932596	0.0017
@TREND	-0.036013	0.019439	-1.852581	0.0868
R-squared	0.996672	Mean dependent var		8.323618
Adjusted R-squared	0.994368	S.D. dependent var		0.638729
S.E. of regression	0.047932	Sum squared resid		0.029868

In table 5, we observe that if savings increases (one) 1 percent then the real GDP increases about1.016 percent and it is statistically significant, the other variable investment is negatively related with real GDP, but which is not statistically significant. Adjusted R-square implies that, both these two variables (savings and investment) have very a high influence (about 99.43%) on real GDP.

Recommendations and Conclusion

The omitted variable bias problem is the most serious problem in causality analysis that can provide serious misleading result to the policymakers. To avoid omitted variable bias problem we included three important variables into our model and formed a tri-variate framework for the real GDP (RGDP), savings (S) and Investment (I) by using annual data of Bangladesh from 1993 to 2018. The estimated result confirms that one cointegrating vector exits among these variables. Causality analysis has also employed in this study and the result reveals only a unidirectional causality from savings to real gross domestic product at 10% significance level. This study goes further to estimate the elasticity by employing the dynamic OLS technique (considering 1 "leads" and 1 "lag" of the first difference of integrated variables) and the result predicts that if savings increases (one) 1 percent then the real GDP increases about1.016 percent and it is statistically significant. So, the policy implication of this study is that domestic saving can lead to accelerate economic growth in Bangladesh.

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Environmental Kuznets Curve for Particulate Matter 2.5 Emissions: New Evidence from the Top Nine Polluted Countries

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Abstract: The Particulate Matter 2.5 (PM2.5) pollution is a very harmful and disastrous environmental pollution that can bring serious health hazards by causing some dangerous diseases; like, Lung Cancer, Pneumonia, Asthma, and Cardiovascular diseases. The present study has attempted to examine the Environmental Kuznets curve (EKC) for PM2.5 pollution in the top nine polluted countries (based on PM2.5). The EKC for PM2.5 assumes that although the concentration increases with the per capita income at the initial level, it will decline in the future with higher per capita income. After performing some necessary tests, the study has found the panel fixed effect model as appropriate and applied it. The results revealed a U-shaped quadratic relationship between PM2.5 and income per capita of the selected nine top polluted countries from 2010 to 2017. Moreover, the study has also found that the non-renewable energy positively and trade openness negatively affect the PM2.5 pollutions. Therefore, the study recommends renewable energy transition and trade openness as mitigation policies for these highly polluted countries.

Keywords: Particulate Matter 2.5, Environmental Kuznets Curve, Panel fixed effect model, Top polluted Countries.

1. Introduction

Kuznets Curve is a very familiar and influential concept in economics (developed by Kuznets(1955)) that asserted an inverse nonlinear relationship between income inequality and growth. According to this theory, when an economy begets accelerating economic growth, it may experience an increasing trend of income inequality, but this will not be a monotonically increasing phenomenon. After a certain period, when the economic development of the country will achieve momentum with a higher level of per capita income, income inequality will start to decline. The study of Grossman & Kruger (1991) blended the concept of Kuznets and predicted a similar nonlinear inverse relationship between environmental pollutions and income per capita, which is widely known as Environmental Kuznets Curve (EKC) now. So, according to EKC, a lower level of economic development causes environmental degradation, but a higher level will reduce it. Various studies have used different indicators to represent the degradation of the environment. For example, some used greenhouse gas emissions (Ansuategi & Escapa, 2002; Kolstad, 2006; Marrero, 2010; Bölük & Mert, 2014), some used CO2 (Gill et al., 2018a;Ru et al., 2018;Isik et al., 2019; Rafindadi & Usman, 2019), some used SO2 (Merlevede et al., 2006; Al-Rawashdeh et al., 2014;Sinha & Bhattacharya, 2017;Ulucak & Bilgili, 2018; Ru et al., 2018), some used NO2 (Danesh Miah et al., 2010; Sinha & Bhattacharya, 2016), some used ecological footprint (Ulucak & Bilgili, 2018; Al-mulali

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et al., 2015; Caviglia-Harris et al., 2009), some used deforestation (Culas, 2007; Chiu, 2012; Zambrano-Monserrate et al., 2018; Murshed, 2020), and some used Particulate Matter pollution (S. Wang et al., 2017; Dong et al., 2018; Luo et al., 2018; Ji et al., 2018; Y. Wang & Komonpipat, 2020) as the representative of environmental degradation. Although all these indicators are very harmful to the environment, the CO2 and the PM2.5 emissions are the most detrimental for the present world. CO2 is the main contributor to global warming (the global threat), while PM2.5 pollution is responsible for various deadly diseases like Lung Cancer, Pneumonia, Asthma, and Cardiovascular diseases. In the global research platform, more than hundreds of works have published focusing the CO2 emissions, but comparatively few studies have focused on PM2.5 pollution. The main underlying reason for this difference is the unavailability of data, as time-series data of the PM2.5 is available for a short period. In this background, the present study has attempted to explore the real shape of EKC for PM2.5 pollution, and included the top nine PM2.5 polluted countries of the world as the study area. According to the PM2.5 pollution, ten mostly polluted countries in the world in 2018 are "Bangladesh, Pakistan, India, Afghanistan, Bahrain, Mongolia, Kuwait, Nepal, UAE, and Nigeria respectively" (*World-Air-Quality-Report-2018*). These countries are suffering a huge from their air pollution, and their citizens are at a high health risk. Therefore, the study attempted to investigate the validity of EKC for PM2.5 pollution in these countries, as the existence of EKC means that the PM2.5 concentration of these countries will gradually decline with a higher per capita income after reaching a turning point. So, the specific objective of the study is to explore the validity of EKC for PM2.5 pollution in the most polluted countries.

PM2.5 pollution indicates the increasing concentration of various little particles (less than 2.5 microns) in the atmosphere. The PM 2.5 method is extensively used to measure air pollution, as these poisonous particles are extremely harmful for human body. Now the question is how these poisonous particles come into the air? Although some of these particles are naturally created, man-made activities are mostly responsible for spreading these particles into the air. Weburn coal and timber regularly as a main source of energy that are highly responsible for emitting these toxic particles into the air. These particles are also generated from the engine of the vehicles, and from the various factories that are devoted to production process. Various economic activities and heavy ongoing construction works to accelerate economic growth contribute a lot to increase the PM2.5 concentration in the air also. The study has included nine out of the top ten polluted countries and dropped Afghanistan because of data unavailability. The PM2.5 pollution, measured in mean annual exposure (micrograms per cubic meter), of these nine countries from 2010 to 2017 are tabulated in Table-1.

Table 1: PM2.5 air pollution, mean annual exposure (micrograms per cubic meter)

Year	Bangladesh	Pakistan	India	Bahrain	Mongolia	Kuwait	Nepal	UAE	Nigeria
2010	70.76	68.01	95.76	65.63	43.30	62.74	100.78	38.98	52.61
2011	70.21	68.54	97.60	63.73	45.36	62.83	100.77	39.19	50.97
2012	70.79	62.38	88.17	70.29	42.65	64.07	96.96	39.28	56.13
2013	65.65	61.02	91.80	67.79	42.32	62.61	95.31	39.61	49.74
2014	68.40	59.52	89.62	62.76	39.30	55.62	98.12	37.98	48.63
2015	66.97	60.09	89.30	72.60	42.51	65.41	96.25	42.33	75.40
2016	60.13	58.63	89.67	69.86	38.22	60.84	98.05	40.52	71.37
2017	60.85	58.28	90.87	70.82	40.11	60.75	99.73	40.92	71.80
2018	97.1	74.3	72.5	59.8	58.5	56.0	54.2	49.9	44.8

Sources: World Bank Database 2020, World-Air-Quality-Report-2018

A zigzag trend can visualize from the data of the PM2.5 concentration for these highly polluted countries within this time frame. Overall, Bangladesh experienced a 97.22 percent increase, Pakistan a 9.24 percent increase, India a 24.29 percent decrease, Bahrain an 8.88 percent decrease, Mongolia a 35.10 percent increase, Kuwait a 10.74 percent decrease, Nepal a 46.22 percent decrease, The UAE a 28.01 percent increase, and Nigeria experienced a 14.85 percent decrease in PM2.5 concentration in the air in 2017 compared to 2010.

2. Literature Review

The validity of EKC implies an inverted U-shaped curve for environmental pollutants and economic growth, where economic growth acts as both the cause and mitigating solution of degradation. Various studies found the validity of EKC (Islam et al., 2013; Tiwari et al., 2013; Al-mulali et al., 2015; Ling et al., 2015;Rayhan& Islam, 2018,Usman et al., 2019). Again, many studies did not find the existence of EKC(Ansuategi & Escapa, 2002; He & Richard, 2010;Pao et al., 2011; Bölük & Mert, 2014; Dogan & Turkekul, 2016; Gill et al., 2018b; Erdogan et al., 2020).So, the validity of EKC depends on study country, method, control variables, and study period. Few studies have found that examine the validity of EKC for PM2.5 pollution, and study of Ma et al.(2016), Dong et al.(2018), and Y. Wang & Komonpipat (2020) found the validity of the EKC for PM2.5 pollution.

Besides, various studies have found a positive impact on energy or non-renewable energy consumption on environmental degradation, and conclude that energy consumption is the most influential factor that can directly degrade the quality of our environment (Rayhan, 2020). For example, studies of Soytas & Sari(2003), Soytas et al.(2007), Pao et al.(2011), Alam et al. (2012), Jafari et al.(2012), Islam et al. (2013), Al-mulali et al. (2015), Dogan & Turkekul (2016), Rayhan et al. (2018), and Usman et al. (2020) found the adverse effect of energy consumption of environmental pollution.

Many EKC related empirical works were conducted for an open economy by including trade openness as an explanatory variable. Some of them have found a detrimental impact (Al-mulali et al., 2015; Azam & Khan, 2016; Tachie et al., 2020); and some of them have found a mitigating effect of trade on environmental quality (Ling et al., 2015; Friedl & Getzner, 2003; Antweiler et al., 2001; Moutinho et al., 2020). Increasing economic openness means more industrialization, more domestic and foreign investment, increasing production of durable goods and services, and increasing economic activities than before. Therefore, these increasing economic activities and industrialization can impede environmental quality by increasing pollution. From this view, we can say that trade has a detrimental impact on the environment.

Contrary, trade can improve environmental quality by increasing the demand for a good environment with an increasing per capita income. If increasing economic activities and industrialization maintain the implementation of strict environmental laws, the environmental quality will not deteriorate with trade. Moreover, technology transfer and import of environmentally friendly technology with increasing economic openness can improve environmental quality. Therefore, whether trade can improve or impede the environmental quality of a country depends on: (1) the proper implementation of environmental laws, (2) the internal policy of the country to maintain the environment clean and green, and (3) the addition of environmentally friendly technologies in the production process.

Although mixed results exist in the literature of EKC, to our best knowledge, no previous work validate the EKC for the PM2.5 pollution in these top polluted countries. This gap in the literature provided us the opportunity and ground for conducting this study.

3. Methodology

3.1 Sources and Expected Sign of the Variables

Data of PM2.5 emissions (micrograms per cubic meter), economic growth (real GDP per capita, in constant dollars 2010), urbanization (number of urban population % of total), and economic openness (trade % of GDP) were collected from World Development Indicator (WDI, 2020), and the data of energy (per capita nonrenewable energy supply which is calculated by dividing the total population of a country from the total primary supply of Coal, Oil, Natural Gas, Biofuel and Waste expressed in thousands of tonnes of oil equivalent (ktoe) of that country) was collected from World Energy Statistical Yearbook, 2019. Data are taken over the period of 2010-2017. The study has incorporated the natural logarithm of all variables to estimate the elasticities, and expect that the real GDP per capita (denoted as LNPRGDP) will be positively related with PM2.5 concentration, where the square of the real GDP per capita (denoted as LNPRGDP2) will be negatively related (which will give us the required shape of the EKC). Moreover, the study expects that the per capita energy supply (denoted as LNENPC) will be positively related with the PM2.5 pollution, and the impact of economic openness (denoted as LNEO) can be either positive or negative. Statistical Software Eviews 9 is used for statistical analysis of the study.

3.2 Estimation Method

Selecting appropriate model is very important for Panel data estimation. We use static panel data estimation in this study. To select the appropriate model between the Fixed Effect Model (FEM hereafter) and Random Effect Model (REM hereafter) the study has employed the Hausman test, which assumes the FEM in the null. A respective less than 0.05 p-value can reject the null with the conclusion that REM will be the appropriate. But, a high p-value compare to 0.05 is incapable of rejecting the null, therefore FEM will be the suggested model in that case. The study has performed Jarque-Bera (JB) test to check the normality of the data, and also performed Bias-corrected scaled LM, Breusch-Pagan LM, Pesaran CD, and Pesaran scaled LM to find out cross-section correlation. Checking of cross-section dependence is very important to avoid biased results.

4. Results and Discussions

Descriptive statistics of the variables are tabulated in Table-2. The mean PM2.5 concentration in Bangladesh is 66.7184 ($\pm$4.26) micrograms per cubic meter, in Pakistan 62.0586 ($\pm$4.05), in India 91.6004 ($\pm$3.35), in Bahrain 67.9362 ($\pm$3.57), in Mongolia 41.7233 ($\pm$2.34), in Kuwait 61.8588 ($\pm$2.95), in Nepal 98.2482 ($\pm$2.05), in UAE 39.8521 ($\pm$1.3536), and in Nigeria is 59.5816 ($\pm$11.27) micrograms per cubic meter. In this time frame, the average PM2.5 concentration in very high in Nepal and India compare to other countries, while average concentration is low in UAE. The mean real GDP per capita within 2010 to 2017 in Bangladesh is \$939.92 ($\pm$119.32), in Pakistan \$1052.9 ($\pm$1161.14), in India \$1629.4 ($\pm$226.09), in Bahrain \$21657.87 ($\pm$807.73), in Mongolia \$3543.656 ($\pm$486.93), in Kuwait \$37484.76 ($\pm$2345.96), in Nepal \$683.745 ($\pm$65.09), in UAE \$37676.19 ($\pm$2851.397), and in Nigeria \$2437.541 ($\pm$96.88). The

average per capita income of Bahrain, Kuwait, and UAE belong to the high income group, while Mongolia, and Nigeria belong to lower middle income group, and other countries belong to low income group. The average degree of economic openness in Bangladesh is 42.44 (±4.91), in Pakistan 30.21 (±3.40), in India 48.29 (±6.61), in Bahrain 160.50 (±25.23), in Mongolia 106.59 (±11.85), in Kuwait 98.44 (±1.60), in Nepal 48.13 (±4.09), in UAE 165.52 (±12.32), and in Nigeria 33.95 (±11.83).

Table 2: Descriptive Analysis of the Variables

Bangladesh					
Variable	Mean	Std. Dev.	Min	Max	Observations
PM 2.5	66.71848	4.261927	60.1263	70.7939	N = 8
PRGDP	939.9205	119.3322	781.154	1127.27	N = 8
EO	42.43616	4.910833	35.304	48.1109	N = 8
ENPC	223.9783	22.12778	195.104	253.134	N = 8
Pakistan					
PM 2.5	62.05855	4.052325	58.2824	68.5449	N = 8
PRGDP	1052.9	61.13742	987.41	1155.36	N = 8
EO	30.20785	3.402842	25.3062	33.3336	N = 8
ENPC	452.1097	12.17126	439.939	477.117	N = 8
India					
PM 2.5	91.60036	3.349303	88.1694	97.5994	N = 8
PRGDP	1629.4	226.094	1357.56	1987.34	N = 8
EO	48.28595	6.606551	40.1589	55.7937	N = 8
ENPC	598.3436	29.38809	551.519	636.771	N = 8
Bahrain					
PM 2.5	67.93615	3.568697	62.7585	72.6047	N = 8
PRGDP	21657.87	807.7261	20516.6	22435.7	N = 8
EO	160.4975	25.22611	120.472	191.872	N = 8
ENPC	10040.07	399.7765	9385.08	10573.5	N = 8
Mongolia					
PM 2.5	41.72325	2.339768	38.2228	45.3602	N = 8
PRGDP	3543.656	486.9338	2643.29	3997.49	N = 8
EO	106.5867	11.84588	90.287	126.999	N = 8
ENPC	1592.935	108.0311	1441.6	1754.36	N = 8
Kuwait					
PM 2.5	61.85884	2.949696	55.6239	65.4061	N = 8
PRGDP	37484.76	2345.955	33359.4	40287.4	N = 8
EO	98.43721	1.600808	96.1586	101.011	N = 8
ENPC	9451.686	798.456	8389.1	10725.3	N = 8
Nepal					
PM 2.5	98.24815	2.045042	95.314	100.784	N = 8
PRGDP	683.745	65.09451	592.401	779.204	N = 8
EO	48.13534	4.085206	41.8283	53.0953	N = 8
ENPC	407.2355	38.11752	360.654	465.738	N = 8
UAE					
PM 2.5	39.8521	1.353577	37.9834	42.335	N = 8
PRGDP	37676.19	2851.397	33893.3	41045.1	N = 8
EO	165.5246	12.32789	143.878	178.667	N = 8
ENPC	7512.162	660.1441	6741.09	8402.77	N = 8
Nigeria					
PM 2.5	59.58159	11.2741	48.6334	75.399	N = 8
PRGDP	2437.541	96.87786	2292.45	2563.9	N = 8
EO	33.94779	11.83379	20.7225	53.278	N = 8
ENPC	820.3487	18.97062	797.753	849.992	N = 8

The average economic openness of Bahrain, and UAE are more than 3 times higher than the South Asian countries, and almost 5 times higher than Nigeria, while the average economic openness of Mongolia and Kuwait are almost 2 times higher than the South Asian countries, and almost 3 times higher than Nigeria. Finally, the average per capita energy supply in Bangladesh is 223.98 (±22.13)ktoe, in Pakistan 452.11 (±12.17), in India 598.34 (±29.39), in Bahrain 10040.07 (±399.78), in Mongolia 1592.94 (±108.03), in Kuwait 9451.67 (±798.46),in Nepal 407.24 (±38.12), in UAE 7512.16 (±660.14), and in Nigeria is 820.35 (±18.97)ktoe.

Table-3 captures the Hausman test results, from where it is observed that the respective p-value is 0.9415 (very much higher than 0.05), making us unable to reject the null hypothesis, therefore, suggests the FEM. Besides Hausman test, the study also performs the Redundant Fixed effects tests (results are tabulated in Table-4) to ensure further that the FEM will be the best model for this analysis. The respective p-value of the Cross-section F (df = 8, 52) is less than 0.001, the respective p-value of the Cross-section Chi-square (df = 8) is less than 0.001, Period F (df = 7, 52) is less 0.05, Period Chi-square (df = 7) less than 0.01, Cross-section/Period F (df = 15, 52) is less than 0.001, and Cross-section/Period Chi-square (df = 15) is less than 0.001. So, all the results from the redundant fixed effects tests confirm the FEM as best.

Table 3: Results of the Hausman Test

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0.777303	4	0.9415
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var (Diff.)	Prob.
LNPRGDP	-1.844212	-1.824489	0.104698	0.9514
LNPRGDP2	0.097296	0.093760	0.000492	0.8733
LNENPC	0.116961	0.200061	0.011254	0.4334
LNEO	-0.224401	-0.225278	0.000197	0.9501

Table 4: Results of Redundant Fixed Effects Tests

Effects Test	Statistic	d.f.	Prob.
Cross-section F	85.758859	(8,52)	0.0000
Cross-section Chi-square	191.001322	8	0.0000
Period F	2.353340	(7,52)	0.0363
Period Chi-square	19.814500	7	0.0060
Cross-Section/Period F	46.979731	(15,52)	0.0000
Cross-Section/Period Chi-square	192.795683	15	0.0000

The FEM can provide serious misleading or biased results in the presence of cross-section correlation, so that it is very important to check the contemporaneous correlation in the residuals. Table-5 contains the results of cross-section correlation, from where we come to see that the test statistic of the Breusch-Pagan LM test is 38.13509 and the respective p-value is 0.3726 (>0.05). Moreover, the test statistic for Pesaran scaled LM test is -0.809037 with a respective p-value of 0.41 (>0.05), Bias-corrected scaled LM test is -1.451895 with a respective p-value of 0.1465 (>0.05), and Pesaran CD test is -1.524774 with a respective p-value of 0.1273 (>0.05). So, the respective p-value of all

statistics suggest the rejection of the null, and can make a conclusion that the estimated FEM is free from cross-section dependence, and it will provide unbiased results.

Table 5: Results of Cross-Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	38.13509	36	0.3726
Pesaran scaled LM	-0.809037		0.4185
Bias-corrected scaled LM	-1.451895		0.1465
Pesaran CD	-1.524774		0.1273

The normality test results are illustrated in Figure-1. The test statistic of the JB is 1.530532, and the respective p-value is 0.4652 (which indicates the non-rejection of the null), therefore we can conclude that our data (used to estimate the FEM) are distributed normally.

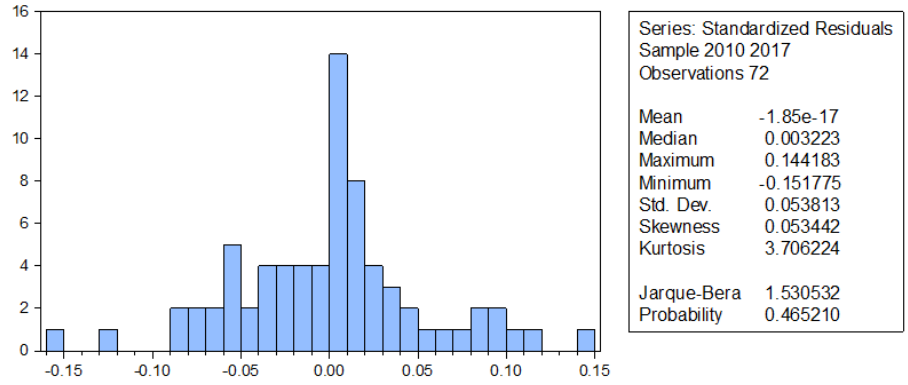

Figure 1: Results of Normality Tests

The result of the FEM is tabulated in Table-6. The R-square value is about 0.9670, and the adjusted R-square value is about 0.9549, which are very good. The explanatory variables can explain 95.49 percent of the total variation of the dependent variable after adjusting the number of regressors. The F value is 80.23 (p-value less than 0.01) and confirms the significance of the model.

Table 6: Results of the Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.19073	3.549389	5.406771	0.0000
LNPRGDP	-2.452177	0.618779	-3.962926	0.0002
$LNPRGDP^2$	0.117289	0.036265	3.234234	0.0021
LNENPC	0.319180	0.185595	1.719765	0.0914
LNEO	-0.228029	0.062381	-3.655411	0.0006
Summary				
R-squared	0.967015	Adjusted R-squared		0.954963
F-statistic	80.23591	Prob (F-statistic)		0.000000

The respective p-value of the LNPRGDP is 0.0002, and the square of the LNPRGDP is 0.0021, implies the statistical significance at less than 1 percent level of significance. But, we get an interesting results here. The coefficient of LNPRGDP is -2.452177 and square of LNPRGDP is 0.117289 that suggest a U-shaped EKC for PM2.5instead of inverted U. The results reveal that a 1% increase in economic growth will reduce the PM2.5 concentration by 2.452177 percent, while a 1% increase in the square of economic growth will increase the PM2.5 concentration by 0.117289 percent. This U-shaped EKC results is consistent with the findings of (Ozcan, 2013). By examining 12 Middle East countries over the period of 1990-2008, Ozcan (2013) found a U-shaped EKC previously. Other shapes of EKC, like N shaped EKC, is found by previous study (Friedl & Getzner, 2003). The probable underlying reasons of this finding (U-shaped EKC curve) are as follows:

(i) in our sample a combination of high income, middle income, and low income countries are included. The validity of EKC requires high level of economic development. As we included low income and middle income countries into our study, the required high level of economic development of these countries are not achieved still so that we do not get the required shaped of EKC for the PM2.5 emissions. Although the recent economic growth of these countries are showing a declining trend for the PM2.5 concentration, with increasing economic growth and industrialization the PM2.5 concentration of these countries will increase in the future.

(ii) We take the data of these countries over the period of 2010 to 2017, for 8 years. Although we get the U-shaped EKC for these time-frame, the inverted U-shaped EKC curve may be found in the future if data will be taken over the longer period of time.

The impact of per capita nonrenewable energy supply on PM2.5 concentration is found significant at10 percent (p-value = 0.0914), and the results reveal that a 1% increase in the per capita nonrenewable energy supply, on average, will increase the PM2.5 by 0.3192 percent. This findings is consistent with the studies of Pao et al.(2011), Alam et al.(2012), Jafari et al.(2012), Islam et al.(2013), Al-mulali et al.(2015), Dogan & Turkekul (2016), Rayhan et al.(2018), and Usman et al.(2020). Nonrenewable energy is the main culprit of environmental pollution, but energy is essential for economic growth. Our standard of living depends on our income, and income is dependent on various economic activities and industrialization process that depend on energy. At the same time, the byproduct of nonrenewable energy, the air pollution, is a big threat for the population health status. Therefore, a dilemma exists in the relation of energy and emissions. The best solution to overcome this dilemma is nothing but the replacement of our traditional energy supply by new source and abundant supply of renewable energy. We have to invest more on renewable energy, besides improving our energy saving technology.

Finally, a negative significant trade effect on PM2.5 is found (p-value = 0.0006. The results reveal that one percent increase of economic openness, on average, will reduce the PM2.5 concentration from the air by 0.228 percent. Therefore, we can conclude that economic openness can improve the environmental quality in these polluted countries. This finding is also consistent with many other studies (Antweiler et al., 2001; Frankel & Rose, 2005; Baek et al., 2009; Ahmed & Long, 2012; Kohler, 2013; Ling et al., 2015;

Sinha & Shahbaz, 2018). By examining 43 countries Antweiler et al.(2001), South Africa Kohler, (2013), Pakistan Ahmed & Long(2012), Malaysia Ling et al.(2015), and by examining India Sinha & Shahbaz (2018) found trade improved environmental quality. Trade can reduce PM2.5 as follows:

(i) may be the environmental laws of these countries were quite good and maintained efficiently, (ii) may be the import volume of these countries are greater than export so that the trade induced domestic economic activities and industrialization are still low,

(iii) may be these countries used environmental friendly technologies in the production process, and good environmental friendly technologies are imported as a results of more openness.

5. Conclusions

The present study explored the validity of EKC for PM2.5 emissions in some top polluted countries in the world (based on PM2.5). The study collected the data of PM2.5 (micrograms per cubic meter), economic growth (real GDP per capita), the square of economic growth (square of real GDP per capita), economic openness (trade percentage of GDP), and energy consumption (per capita nonrenewable energy supply in ktoe) for 2010 to 2017. The study employed the Hausman test for selecting the model between the FEM and REM, and get the FEM as appropriate. The study also performed the Redundant Fixed Effects Tests, and the results reinforced the FEM as appropriate. Besides, the study performed some cross-section dependence tests to check the cross-section correlation in residuals and have found no cross-sectional correlation. As no cross-sectional correlation is found in residuals, the fixed-effect model is sufficient to provide unbiased results. The study also performed the Jaque-Bera test to check the normality and have found the normal distribution of residuals. The empirical results reveal that there exists a U-shaped EKC for the PM2.5, instead of an inverted U-shaped curve. The findings imply that PM2.5 pollution will increase in the future, although current economic growth reduces it. So, policymakers have to take appropriate policy now to mitigate the future concentration of PM2.5 in the air. Besides, the results also reveal that per capita nonrenewable energy supply has a detrimental impact on environmental quality as it increases the PM2.5 concentration in the air, and economic openness has a beneficial effect on environmental quality as it reduces PM2.5 concentration in the air. Therefore, policymakers have to concentrate on replacing the per capita nonrenewable energy supply with renewable energy to mitigate future environmental pollution without affecting economic growth. Moreover, removing all trade barriers will also mitigate PM2.5 emissions.

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Exploring the Impact of Globalization, Energy Consumption, and Urbanization on CO_2 Emissions in Bangladesh: An ARDL Bounds Test Approach

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Abstract: Global warming is a dominant threat for the present world. As CO_2 emissions remain the main contributor of global warming, various studies have performed in recent years to identify its significant determinants. In this regard, the present study has explored how the CO_2 emission is influenced by the energy consumption, global integration, and urban concentration, while the Environmental Kuznets Curve (EKC) framework is used as the theoretical setting. The study has collected the data of economic growth, energy consumption, and percentage of urban population from the World Development Indicator (WDI) from 1974 to 2014, while the data of index of globalization is included from the KOF index. The cointegrating relationship among the variables has explored by the ARDL bounds test. The study has reported positive impact on pollution for energy consumption, globalization, and urbanization. Besides, the study has also reported the authenticity of the inverted U-shape EKC in Bangladesh. The policy implication concludes that although the higher economic growth will mitigate CO_2 emissions, a special policy needs to be taken for energy consumption, globalization, and urbanization as these variables significantly exacerbate pollutions.

Keywords: CO_2 emissions; energy consumption, globalization, urbanization, Bangladesh.

1. Introduction

A Global threat, termed as global warming, remains at the center of the all burning issues in the international circumference over the last few decades, and CO_2 emissions are highly responsible to accelerate this threat. Plethora of works have tried to specify the possible contributors of CO_2 emissions over the last two decades, and to do so a theoretical concept, Environmental Kuznets Curve (EKC), has widely used. The theoretical foundation of EKC was developed by incorporating the concept of Kuznets Curve of Simon Kuznets(Kuznets, 1955), while Grossman and Kruger (1991) validated it initially for establishing the relationship between pollutants and income growth. The predicted shape of the EKC is inverted U, which incorporates the higher economic growth variable as the long-run solution of pollution. The authenticity of the EKC has examined by various recent studies. For instance, the study of Dogan & Turkekul (2016),Ali et al. (2017), Dong et al. (2018), Awaworyi-Churchill et al. (2018), Rayhan & Islam (2018), Lau et al. (2019), Kirikkaleli & Kalmaz (2020), Pata & Aydin (2020),

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Villanthenkodath & Arakkal (2020), Murshed et al. (2020), Suki et al. (2020), and Ng et al. (2020) explored the authenticity of EKC. The present study has revisited the EKC hypothesis, besides exploring how globalization affect the CO_2 emissions along with urbanization and energy consumption.

National economies are now more interconnected to the world economy than before, and this interconnection includes flows of goods and services, flows of capital, and flows of labor and technologies across borders. This increasing interconnection among economies, or the convergence of the national economy to the world economy is termed as globalization. Actually, the concept of globalization is not only limited to capital mobility and economic openness now, but also includes social and political aspects besides economic indicators (Potrafke, 2015).The present study has included the KOF globalization index to represent the integration of the economies. Globalization index has three dimensions: "economic globalization, political globalization, and social globalization" (Dreher, 2006). It is assumed that globalization can impede environmental quality. Because increasing openness of a country is linked with more economic activities, increasing volume of trade, increasing domestic and foreign investment and all of these are interlinked with increasing energy consumption that are responsible for CO_2 emissions. Therefore, directly and indirectly globalization can impede environmental quality of a country.

Environmental quality of a country is highly associated with the nature and source of energy use. Energy consumption, which comes from burning of fossil fuels, causes serious destruction to the environmental quality by emitting various pernicious particles and gases. Still the main source of energy in the developing countries is the burning of fossil fuels. As energy is the vital input into the production process, it is related to economic growth. Therefore, the developing countries have continued to increase the consumption of energy to accelerate the growth process, and as a consequence, the CO_2 concentration in the atmosphere also increases rapidly.

The rate of urbanization is defined as "the number of people living in the urban areas with respect to total population of the country"(World Bank, 2020).Urbanization is also considered as one of the crucial variable in environmental pollution research and many studies (Parikh & Shukla, 1995; Liddle & Lung, 2010; Sharma, 2011; Zhang & Lin, 2012; Sadorsky, 2014; Rayhan & Islam, 2015; Rayhan et al., 2018) have found significant contribution of urbanization on CO_2 concentration into their works. Although significant inverse effect was reported on the study of Sharma (2011), majority of the studies found significant positive impact (detrimental impact of urbanization on CO_2). Basically, rapid urbanization has an adverse effect on CO_2 emissions, because rapid urbanization accelerates economic activities and industrialization without ensuring environmental safety; increases the number of vehicles and engines; increase energy consumption, bricks production, and deforestation that causes to increase CO_2 emissions.

Therefore, globalization along with urbanization and energy consumption are highly associated with environmental pollution. In this backdrop, revisiting the authenticity of EKC and exploring the impact of energy consumption, globalization, and urbanization process on CO_2 are the objectives of this study. The study has included Bangladesh as the study area, which is a burgeoning economy and continues to grow at a good rate. Besides, the economy of Bangladesh is more globalized now than before, and the

urbanization process also takes place at a faster rate. Many factories and construction activities have been going on throughout the country, and more non-renewable energies are consumed. In this background, the present study has attempted to investigate the impact of ongoing economic growth, globalization, urbanization, and energy consumption on per capita CO_2 in Bangladesh.

2. Literature Review

The desired shape of EKC is inverted U, as this shape predicts that higher economic growth is beneficial for environment. The opportunity cost of pollution becomes greater and greater as income hikes, therefore, human's demand for good environment bend the EKC curve downward after reaching the peak point. Many previous studies found the existence of EKC for various countries, for instance, investigation of Saboori et al. (2012) was found for Malaysia, Shahbaz et al.(2014) for Bangladesh, Adebola Solarin et al.(2017) for China and India, Rayhan & Islam(2018) for the South Asian countries, Akadiri et al.(2019) for 15 tourist destination countries that prioritized tourism to accelerate economic growth, Khan & Ullah(2019) for Pakistan, and the investigation of Suki et al.(2020)was found for Malaysia. These studies concluded that CO_2 per capita is inversely related with higher income per capita, although they are positively related at lower income per capita. Therefore, the policy suggestion of these studies is promoting unrestricted economic growth.

Although higher economic growth can mitigate the pollution, but there exits some constraints. One significant constraint is the source of energy consumption. As an input in the production process, the essentiality of energy use is highly recommended. The continuation of ongoing economic growth by augmenting the income per capita is strongly associated with the use of energy in an economy. Therefore, higher economic growth will increase the energy demand. But, from which source the energy will come is important, as the consumption of non-renewable energy is highly bonded with the environmental pollution. In this backdrop, energy consumption is associated with pollution, therefore, many works related to EKC have included the energy variable in the model (Rayhan, 2020). For instance, the study of Al-Mulali & Ozturk (2015), Azam & Khan(2016), Aiyetan & Olomola (2017), Zafar et al. (2019),Akadiri et al.(2019), Tachie et al. (2020), and Fatima et al. (2020)had found significant detrimental effect of energy consumption on environmental quality.

Similarly, the urbanization process can harm the environment by augmenting the non-renewable energy use, by causing deforestation and land degradation, by spreading river erosion and land degradation, etc. Many previous studies (Liddle & Lung, 2010; Zhang & Lin, 2012; Sadorsky, 2014; Rayhan & Islam, 2015; Rayhan et al., 2018; Salahuddin et al., 2019) had found statistical significant positive influence of urbanization to increase the per capita CO_2. Contrary, the study of Sharma(2011)had found different findings and reported a significant beneficiary impact of urbanization on CO_2 emissions. Besides, similar finding was also reported on the study of Haseeb et al.(2018). However, although some studies has reported different results, most of the works have reported the detrimental impact for urbanization.

Regarding Bangladesh, the detrimental effect of urbanization on per capita CO_2, along with energy consumption, was reported by the previous work of Rayhan et

al.(2018)under the EKC framework. Besides economic growth, urbanization, and energy consumption, that study also included trade openness and FDI in the model. But the results revealed that the impact of economic openness and FDI are statistically insignificant in the context of Bangladesh. Therefore, the present study has extended the previous work of Rayhan et al. (2018) by dropping the insignificant economic openness and FDI variables, and adding the globalization variable into the model. Dropping of economic openness and FDI do not create any omitted variable bias problem because one of the sub-index of globalization named economic globalization includes trade (% of GDP) and FDI (% of GDP), besides other economic indicators like portfolio investment (in % of GDP), income payment to foreign national (in percentage of GDP) etc. Therefore, include of globalization into the model actually strengthen the model.

Many studies have attempted to find out the role of globalization on CO_2 emissions and found mixed results. Shahbaz et al.(2016) studied China over the period of 1970 to 2012 and found that both overall index of globalization and sub-indices of globalization have negative impact of CO_2 emissions, which means that the more open a country will be the lesser will be the concentration of CO_2. Study of Saud et al. (2020)also found negative globalization effect on CO_2 after examining the data of "One-Belt-One-Road initiative countries" over the period of 1990 to 2014. Akadiri et al.(2019) studied 15 countries that prioritized tourism to foster economic growth. The time frame was from 1995 to 2014. The study has found positive significant globalization effect on CO_2, which means that increasing openness causes to increase CO_2 emissions in these countries. Besides,Khan & Ullah(2019) studied the data of Pakistan over the period of 1975 to 2014 and found that the three sub-indices of globalization have significant contribution on increasing concentration of CO_2. Similarly, Rafindadi & Usman (2019)has studied the data of South Africa from 1971 to 2014, and found positive short-run globalization effect on CO_2. Their innovation accountability test confirms that 0.80% globalization lead to increase CO_2 by 1.39%. Salahuddin et al.(2019) also studied South Africa by taking the data set over the period of 1980 to 2017 and tested their model by performing structural break unit root test. Their results revealed long-run globalization effect CO_2.

Some studies were also reported contradictory results. For instance, the study of Haseeb et al. (2018) had reported insignificant globalization-effect on CO_2 for BRICS countries. Besides, the study of Shahbaz (2019) had reported U-shaped relationship between globalization and CO_2 for some countries (Iran, Bangladesh, South Korea). Although some contradictory results exist in the literature, a plethora of studies have found detrimental effect of globalization besides energy consumption and urbanization. The present study has made an extension in the existing literature by revisiting the EKC model by including the globalization variable along with urbanization and energy consumption in Bangladesh.

3. Methodology of the Study

3.1 Model Specification and Expected Signs

The study has used real GDP per capita (denoted by PRGDP) to represent economic growth, and square of real GDP per capita (denoted by PRGDP2) to represent the square of economic growth. Besides economic growth, the study has included globalization (index of globalization, denoted by GI) and urbanization (urban population percentage of

total, denoted by UR) in the model to mark out their impact. Moreover, the study has also included the most relevant variable in pollution research, energy consumption (denoted by EC), in the model. The study has transformed all these variable into log form to estimate the respective elasticity.

On the basis of existing literature, the study has expected a positive sign for the growth variable (LNPRGDP), and a negative sign for the square of the growth variable (LNPRGDP2), which is required for becoming inverted U-shape EKC. Additionally, the study has expected a positive sign for urbanization (LNUR), and energy consumption (LNEC)variable, which will trace the detrimental impact of these variables on environmental quality (increasing CO_2 emissions means increasing environmental degradation). Finally, a positive sign is expected for Globalization variable (LNGI) in the context of Bangladesh, as Bangladesh is a developing country and a significant foreign investment is coming in the energy and related sector.

3.2 Sources and Nature of Data

The data of per capita real GDP, energy consumption, and the rate of urbanization have collected from World Development Indicator (WDI, 2020), while globalization data has collected from KOF index (KOF, 2019). The study has used time series data of these variables to estimate the model where the time frame of the series is raging from 1974 to 2014, 40 years. As energy consumption data is available for up to 2014 only, the study has become unable to include observations after 2014.

3.3 Unit Root Tests

The order of integration is very important in time series analysis to avoid the spurious regression(Brooks, 2019). Regression of non-stationary series may produce spurious or vague or meaningless regressions, unless cointegration exist between or among them (Brooks, 2019). The study has used the “Augmented Dickey-Fuller (ADF) unit root test”(Dickey & Fuller, 1979), and the “Phillips-Peron (PP) unit root test” (Phillips & Perron, 1988). The null hypothesis of these tests assumenon-stationarity of data which cannot be rejected unless the respective p-value of the test static is found less than 0.05 (at the 5% level of significance). So, a conclusion about the stationarity of the data only can be made if the respective p-value becomes less than 0.05. A series that becomes stationary at level is called I(0), while a series which turns into stationary after the 1st difference transformation is called I(1).

3.4 Test for Cointegration

To avoid the spurious regression, it’s important to scrutinize the Cointegration among the series after checking the non-stationarity (Brooks, 2019). The study has applied the ARDL Bounds test that has some econometric advantages, say for, it can check the cointegration for blending of I(0) and I(1) series. It’s main disadvantage is the inapplicability for any I(2) series. After the confirmation of cointegration, both short- and long-run elasticities can be estimated from this ARDL model.

3.5 Diagnostic Tests

Some diagnostic tests, essential for ARDL model, are also performed in this study. These tests has included the Jarque-Bera (JB hereafter) test (to check the normality assumptions of data), Breusch-Godfrey Serial Correlation LM (BGSCLM hereafter) test (to check the existence of serial correlation problem), ARCH heteroskedasticity (ARCHH hereafter) test (to check the heteroskedascity problem), and Rasmsey RESET (RRESET hereafter) test (to check the model specification). Besides, the CUSUM and CUSUM square have also plotted to check the structural stability of the parameters.

4. Results and Discussions

The result of ADF unit root tests has tabulated in Table-1, while the result of the PP unit root test has included in table-2.

Table 1: ADF Unit Root Test Results

				At Level			
		LNCO2	LNPRGDP	LPRGDP2	LNGI	LNEC	LNUR
With Constant	t-Statistic	1.2283	3.8119	4.4900	-0.8317	2.5490	-2.2594
	Prob.	***0.9977***	***1.0000***	***1.0000***	***0.7990***	***1.0000***	***0.1898***
		n0	n0	n0	n0	n0	n0
With Constant & Trend	t-Statistic	-4.0446	0.4950	0.8738	-2.6362	-1.1753	-8.0082
	Prob.	***0.0149***	***0.9989***	***0.9997***	***0.2673***	***0.9021***	***0.0000***
		**	n0	n0	n0	n0	***
				At First Difference			
		d(LNCO2)	d(LNPRGDP)	d(LPRGDP2)	d(LNGI)	d(LNEC)	d(LNUR)
With Constant	t-Statistic	-6.5040	-6.4696	-5.6874	-7.3873	-7.7963	-3.0890
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0359***
		***	***	***	***	***	**
With Constant & Trend	t-Statistic	-6.6698	-13.3135	-12.4761	-7.5438	-8.8758	-2.3354
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.4058***
		***	***	***	***	***	n0

Table-1 reveals that in the level form the p-value of LNCO2, LNPRGDP, LNPRGDP2, LNGI, LNEC and LNUR are 0.9977, 1.0000, 1.0000, 0.7990, 1.0000 and 0.1898 respectively for the 'constant' assumption, while 0.0149, 0.9989, 0.9997, 0.2673, 0.9021 and 0.0000 respectively for 'constant & trend assumption'. So, for 'constant' specification all the variables have unit root problem, and for 'constant and trend' specification the LNCO2 and LNUR becomes stationary at the level form, where others are non-stationary. At the first difference form, the respective p-value of the above variables have become 0.0000, 0.0000, 0.0000, 0.0000, 0000 and 0.0359 respectively for 'constant' assumption, while 0.0000, 0.0000, 0.0000, 0.0000, 0.0000, and 0.4058, respectively for 'constant and trend' assumption.

Therefore, the ADF unit root test results suggest that with constant assumption LNCO2, LNPRGDP, LNPRGDP2, LNGI, LNEC and LNUR are all I (1) in nature, but for 'constant and trend' assumption LNCO2 and LNUR are I (0) in nature, and LNPRGDP, LNPRGDP2, LNGI, and LNEC are I (1) in nature. The study takes the constant

assumption in this study and can conclude that all the variables under this study are I (1) in nature.

In PP unit root test (results tabulated in Table-2), for 'constant' assumption all variables except LNUR are I (I) in nature, while the LNUR is I (0). The PP unit root tells that there exists an admixture of I(0) and I(1) series, therefore, there is no constraint to perform the bounds test. Before going to run ARDL model for bounds test, at first it is important to select the appropriate lag length. The study has applied the VAR model to identify the appropriate lag length and the respective result is presented in Table-3.

Table 2: Phillips-Peron Unit Root Test Results

At Level							
		LNCO2	LNPRGDP	LPRGDP2	LNGI	LNEC	LNUR
With Constant	t-Statistic	1.4265	7.9577	8.8849	-0.8871	5.6437	-4.2800
	Prob.	***0.9988***	***1.0000***	***1.0000***	***0.7821***	***1.0000***	***0.0016***
		n0	n0	n0	n0	n0	***
With Constant & Trend	t-Statistic	-3.8333	1.7305	2.3024	-2.6169	-0.7101	-4.2181
	Prob.	***0.0249***	***1.0000***	***1.0000***	***0.2753***	***0.9654***	***0.0097***
		**	n0	n0	n0	n0	***
At First Difference							
		d(LNCO2)	d(LNPRGDP)	d(LPRGDP2)	d(LNGI)	d(LNEC)	d(LNUR)
With Constant	t-Statistic	-12.4472	-6.7529	-6.1612	-7.3873	-7.7836	-1.4011
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.5719***
		***	***	***	***	***	n0
With Constant & Trend	t-Statistic	-13.9017	-11.8950	-11.0762	-7.5187	-13.8999	-1.6551
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.7519***
		***	***	***	***	***	n0

Table 3: Results of VAR Lag Order Selection Criteria

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	507.1213	NA	3.27e-20	-27.84007	-27.57615	-27.74796
1	616.1724	175.6935	5.82e-22	-31.89847	-30.05103*	-31.25366
2	655.9651	50.84624	5.61e-22	-32.10917	-28.67822	-30.91168
3	708.6062	49.71655	3.70e-22	-33.03368	-28.01920	-31.28349
4	795.6886	53.21707*	7.43e-23*	-35.87159*	-29.27360	-33.56871*

"* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion"

Only "Schwarz information criterion (SC)" suggests that the appropriate lag length will be 1, but "Akaike information criterion (AIC)", "Sequential modified LR test statistic

(LR)", "Final prediction criterion (FPE)", and "Hannan-Quinn information criterion (HQ)" suggest that the appropriate lag length will be 4. Therefore, the study has taken lag 4 to estimate the ARDL model.

The study has used the HQ criterion and constant assumption to estimate the ARDL model (results are tabulated in table-4), and after evaluating 12500 models the statistical softwareEviews 9.0 concludes that the ARDL (3, 0, 3, 1, 3, 4) is the appropriate model for this study. The adjusted R-square of the ARDL model is excellent, and the respective p-value of the F-statistic is 0.0000 that indicates the statistical significance of the model.

Table 4: Results of ARDL Model

Selected Model: ARDL(3, 0, 3, 1, 3, 4)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCO2(-1)	-0.084940	0.140130	-0.606151	0.5524
LNCO2(-2)	-0.331787	0.099892	-3.321461	0.0040
LNCO2(-3)	-0.597781	0.124179	-4.813878	0.0002
LNPRGDP	4.751010	1.514964	3.136055	0.0060
LPRGDP2	-0.391074	0.125855	-3.107337	0.0064
LPRGDP2(-1)	0.024799	0.028881	0.858645	0.4025
LPRGDP2(-2)	-0.091574	0.029403	-3.114477	0.0063
LPRGDP2(-3)	0.040724	0.022957	1.773924	0.0940
LNGI	0.453553	0.127020	3.570735	0.0024
LNGI(-1)	0.193923	0.159571	1.215277	0.2409
LNEC	1.045177	0.210278	4.970441	0.0001
LNEC(-1)	0.279479	0.266607	1.048279	0.3092
LNEC(-2)	1.403651	0.198499	7.071331	0.0000
LNEC(-3)	0.461181	0.262631	1.756005	0.0971
LNUR	2.541419	0.907935	2.799120	0.0123
LNUR(-1)	-2.591269	1.776374	-1.458741	0.1629
LNUR(-2)	1.817940	1.895978	0.958840	0.3511
LNUR(-3)	-2.551515	1.489895	-1.712547	0.1050
LNUR(-4)	1.800341	0.612853	2.937641	0.0092
C	-37.85515	6.317805	-5.991820	0.0000
R-squared	0.999520	Adjusted R-squared		0.998983
F-statistic	1862.157	Durbin-Watson stat		2.481827
Prob(F-statistic)	0.000000			

Table 5: ARDL Bounds Test Results

Test Statistic	Value	k
F-statistic	15.79895	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

The study has presented the ARDL bound test results in Table-5. The computed F-statistic of the bounds test is 15.79895, which is greater than the upper bound of the critical value at 1% level of significance. Therefore, the null hypothesis of "no long-run relationship among the variables" is rejected at one percent level of significance. This implies that the variables under this study (LNCO2, LNPRGDP, LNPRGDP2, LNGI, LNEC and LNUR) are cointegrated, therefore, they have long-run equilibrium association.

Table 6: Results of Cointegrating and Long Run Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCO2(-1))	0.929568	0.127387	7.297221	0.0000
D(LNCO2(-2))	0.597781	0.124179	4.813878	0.0002
D(LNPRGDP)	4.751010	1.514964	3.136055	0.0060
D(LPRGDP2)	-0.391074	0.125855	-3.107337	0.0064
D(LPRGDP2(-1))	0.091574	0.029403	3.114477	0.0063
D(LPRGDP2(-2))	-0.040724	0.022957	-1.773924	0.0940
D(LNGI)	0.453553	0.127020	3.570735	0.0024
D(LNEC)	1.045177	0.210278	4.970441	0.0001
D(LNEC(-1))	-1.403651	0.198499	-7.071331	0.0000
D(LNEC(-2))	-0.461181	0.262631	-1.756005	0.0971
D(LNUR)	2.541419	0.907935	2.799120	0.0123
D(LNUR(-1))	-1.817940	1.895978	-0.958840	0.3511
D(LNUR(-2))	2.551515	1.489895	1.712547	0.1050
D(LNUR(-3))	-1.800341	0.612853	-2.937641	0.0092
CointEq(-1)	-2.014508	0.215635	-9.342212	0.0000
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPRGDP	2.358397	0.718164	3.283928	0.0044
LPRGDP2	-0.207061	0.058798	-3.521563	0.0026
LNGI	0.321407	0.067351	4.772139	0.0002
LNEC	1.583259	0.194259	8.150254	0.0000
LNUR	0.504796	0.061544	8.202215	0.0000
C	-18.791264	2.404833	-7.813958	0.0000

Short- and Long-run results of the estimated model are tabulated in Table-6. The short-run results reveal that EKC is valid in the context of Bangladesh, as D (LNPRGDP) is positively significant and D (LNPRGDP2) are negatively significant. This result implies that one percent increase of economic growth will increase the per capita CO_2 by 4.75 percent in the short-run, and one percent increase of square of economic growth will reduce the per capita CO_2 by 0.39 percent. The results also reveal that the LNGI, LNEC, and LNUR are also positively significant in the context of Bangladesh in the short-run. Moreover, one percent increase of GI, EC, and UR will increase the per capita CO_2 by 0.454, 1.045, and 2.541 percent respectively in the short-run. The short-run results reveal

that economic growth is the main culprit to emit CO_2 in the air, and then urbanization, then energy consumption, and then globalization.

The long-run result also justifies the existence of the EKC in Bangladesh, while 1% increase of economic growth will increase the per capita CO_2 by 2.358 percent, and 1% increase of square of economic growth will reduce it by 0.207 percent in the long-run. The absolute value of the short-run and long-run emissions elasticity of square of income is 0.39 and 0.21 respectively, meaning that a declining rate of reduction of CO_2 emissions per capita with respect to higher economic growth will be observed in the long-run. Policymakers have to focus their concentration on this. The long-run result also reveals that globalization, energy consumption, and urbanization have positive significant impact on the per capita CO_2. The result reveals that one percent increase of GI, EC, and UR in the long-run will increase the per capita CO_2 by 0.32, 1.58 and 0.50 percent, respectively.

The greater globalization elasticity in the short-run implies that the rate of globalization-induced emissions will fall over time. Similarly, the smaller long-run urbanization elasticity implies that the detrimental impact of urbanization will fall significantly in the long-run. But, the greater long-run energy elasticity implies over the time energy consumption will be more destructive as a dominant culprit of emitting CO_2 gas in the air. So, policymakers should have to concentrate their focus on this findings too, and sources and uses of renewable energy will be increased to control CO_2 emissions in Bangladesh.

The JB test result is illustrated in Figure-1, where the respective p-value of the statistic is 0.85, ensuring the normal distribution of the residuals. The results of BGSCLM, ARCHH, and RRESET tests are summarized at Table-7. The respective p-value of the F-statistic of BGSCLM test is 0.45, the ARCHH test is 0.6910, and the RRESET test is 0.53. Therefore, the null hypothesis for all these tests are not rejected; implies no serial correlation and heteroskedasticity problem, and correct specification of the model.

Finally the plot of CUSUM and CUSUM square are illustrated in Figure-2 and Figure-3 respectively. Both statistics are within the bound of 5% significance level and assure the structural stability of the parameters.

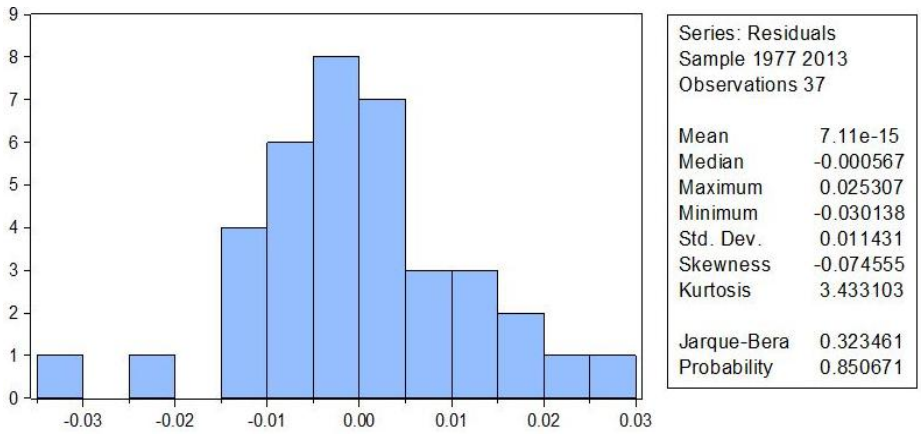


Figure 1: Normality Test Results

Table 7. Results of Serial correlation, heteroskedasticity, and model specification test

Breusch-Godfrey Serial Correlation LM Test:		
F-statistic	0.837669	Prob. F(2,15)
Obs*R-squared	3.717316	Prob. Chi-Square(2)

Heteroskedasticity Test: ARCH		
F-statistic	0.160703	Prob. F(1,34)
Obs*R-squared	0.169356	Prob. Chi-Square(1)

Ramsey RESET Test			
	Value	df	Probability
t-statistic	0.630487	16	0.5373
F-statistic	0.397514	(1, 16)	0.5373

Figure 2: Structural Stability Test: CUSUM

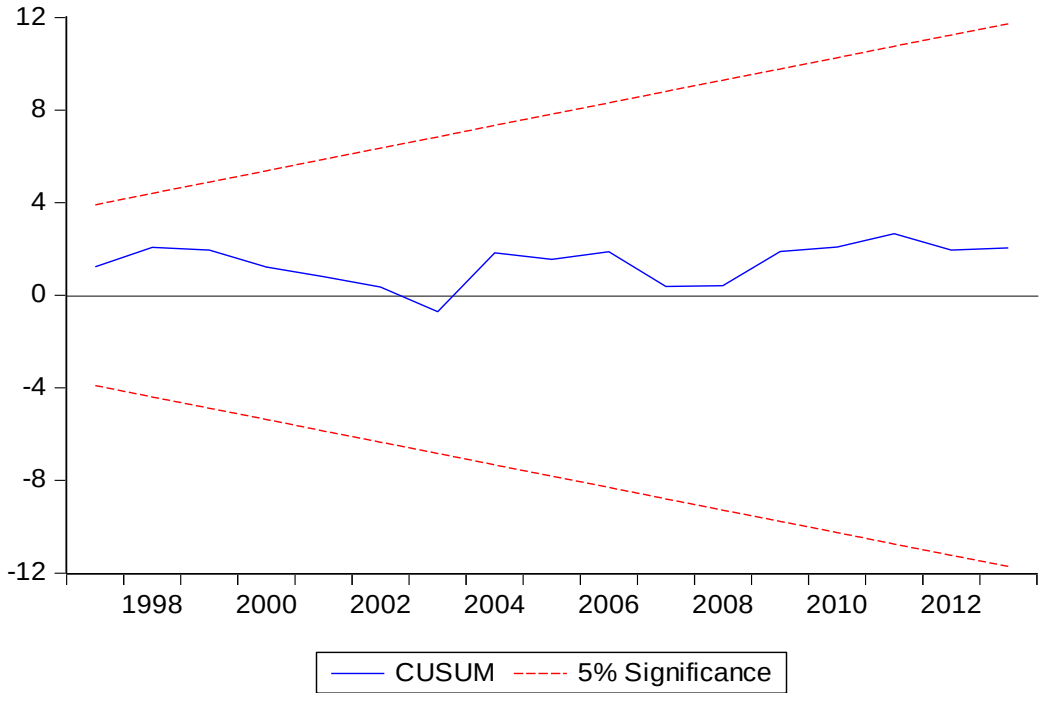
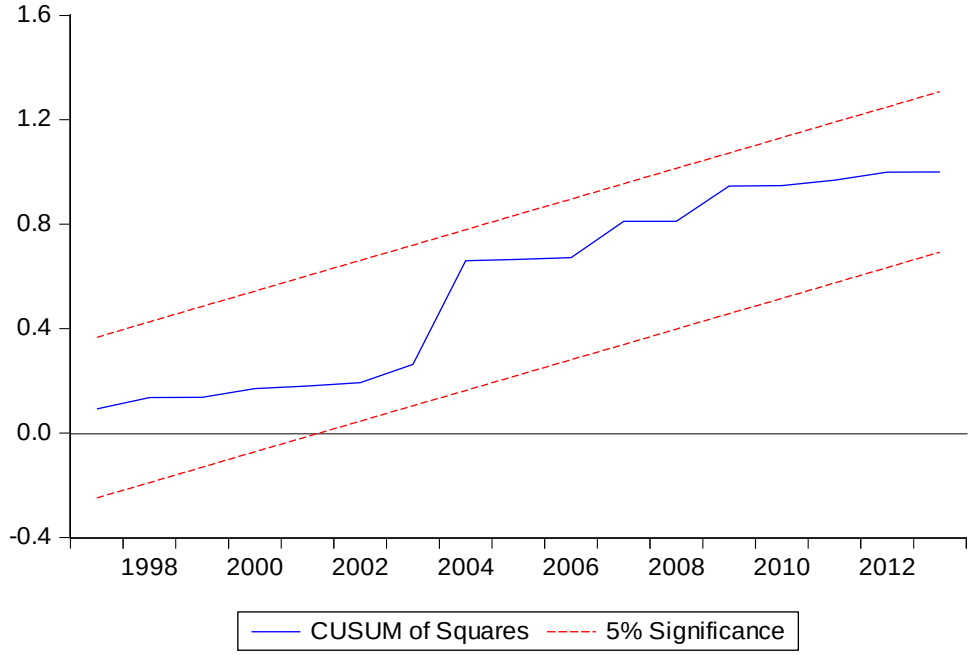


Figure 3: Structural Stability Test: CUSUM of Squares



5. Conclusion

The validity of the EKC implies that although economic growth exacerbates the per capita CO_2 concentration at present, higher economic growth will mitigate it. Therefore, increasing per capita income is the long-run solution of pollution mitigation for Bangladesh. Besides, the study has found a smaller globalization elasticity of emissions in the long-run compared to short-run, meaning that the rate of globalization-induced emissions will fall gradually as time goes. The urbanization elasticity of emission will also get smaller with time, meaning that the detrimental impact of urbanization will fall significantly in the long-run. But, the energy elasticity of emissions is showing a contradictory phenomenon compared to globalization and urbanization. The higher long-run energy elasticity of emissions implies in the energy consumption will contribute greater CO_2 gas emissions as time goes. Therefore, sources and uses of non-renewable energy should be transformed by renewable source to mitigate the per capitaCO_2 emissions in Bangladesh.

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Taxation and Economic Growth in South Asia: A Panel Data Evidence

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Abstract: Taxes, in general, are distortionary, as evident by economic theory. The choice of the right taxation policy is essential to ensure the optimal welfare of the economy. This paper explores the effect of different types of taxes (Personal Income Tax, Corporate Income Tax, General Taxes on Goods and Services) on the economic growth of countries in South Asia. We use two-panel data set over the period 1990-2015: one for the South Asian countries and the other one is for the larger sample of 85 developing and developed countries. Using the system GMM technique, we find that personal income tax has a negative impact on economic growth in South Asian countries. A one percentage point increase in the personal income tax (PIT) leads to a reduction of economic growth by 7.70 percentage point. Also, the corporate income tax (CIT) has an adverse impact on economic growth. A one percentage point increase in CIT causes a 1.70 percentage point decline in South Asian countries' economic growth. Finally, general taxes on goods and services (GTGS) negatively affect the economic growth of the countries in South Asia. In this case, a one percentage point increase in GTGS leads to a 0.66 percentage point decrease in economic growth.

Keywords: taxation, growth, South Asia, personal income tax, corporate income tax, general taxes on goods and services.

1. Introduction

Taxes are distortionary since it deters the optimal allocation of resources. The distortionary effect of taxation can be attributed either to the fact that the tax system extracts an inappropriate amount of resources from private agents or the wrong tax structure adapted to raise taxation, which in turn creates more distortions in the economy. The distortionary effect of taxation might be substantial, depending on the government's choice of tax policy.

Theoretical models predict how taxation might indirectly affect the growth of an economy by influencing growth variables. We can first explain the approach developed by Solow (1965), where he asserts that the output of an economy is determined jointly by the size and skill of the labor force and by the size and technological productivity of the stock of capital. Under this theoretical framework, taxation might affect the economic growth of a country in five ways. First, higher taxes in several forms, such as exorbitant rate of statutory taxes on the income of individuals and corporations, high rate of effective tax on capital gains, and insignificant depreciation allowances, can discourage investment. Second, taxation on labor can discourage workers from attaining more education, skills, and training. Consequently, higher taxes may shrink labor's participation in the labor market and reduce their work hours. Third, productivity growth might be discouraged by the taxation policy as it may attenuate research and development (R&D) initiatives of business corporations. In this way, higher taxation can

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deter the accumulation of venture capital required for "hi-tech" industries. Fourth, taxation might lead investors to move their investment from exorbitantly taxed sectors with higher productivity to aless harshly taxed sectors with lower productivity (Harberger, 1962, 1966). Consequently, taxation that impose excessive burden can negatively influence marginal productivity rate of the capital. Moreover, higher taxation can distort investment from those sectors that can be taxed easily or regulated heavily (manufacturing sector) to those sectors where tax can be escaped (underground economy or small-scale agriculture). Fifth, human capital cannot be used in an efficient way if tax is heavily imposed on labor supply. This is because workers become discouraged from supplying labor in highly taxed sectors, although that sector has higher social productivity. Therefore, higher taxation may retard economic growth by inducing investment in human and physical capital at a constant rate. (Engen and Skinner, 1992).

Based on the mechanism outline above, we can predict that taxation should have a significant role in long-run growth determination. However, since productivity growth is considered fixed and not affected by tax policy, the conventional Solow growth model does not suggest any impact of taxation on the long run growth rates (Engen and Skinner, 1996). Therefore, taxation policy does not hold any impact on long-term economic growth rates in the framework of the Solow growth model.

However, growth theories have been made advanced further by Romer (1986) and Lucas (1988) as they treat technological progress as an endogenous process in their analysis by redefining the term "Capital" that consists of the physical and human form. In these models, the economy grows at a steady-state growth rate compared to the Solow model's stable growth rate, and steady-state growth rates in the endogenous growth models are influenced by the taxation and expenditure policy undertaken by the government (Engen and Skinner, 1996).

Taxation can positively influence economic growth if the revenues generated through taxation are spent on human capital accumulation (Lin, 2001). Such accumulation of human capital leads to increased labor productivity, and it can be considered the source of long-term economic growth (Romer, 1986; Lucas, 1988). Countries that use tax policies to provide an incentive for individuals to accumulate capital (physical and human) can attain higher economic growth in the long run (King and Rebello, 1990). Moreover, firm-specific decisions to invest in capital or Research &Development, due to the incentives created by a country's taxation policy, can create a positive spillover effect that may benefit the overall economy. Jacobs (2007) asserts that tax reliefs motivate the employer to invest more in human capital, who otherwise invest in a lower rate for such purpose. Therefore, in the endogenous growth model framework, taxes can have persistent effects on output growth in the long run.

Although several theoretical and empirical research has been accomplished to explore the link between overall taxation level and economic growth, any consensus from these researches is hard to install. The findings of the research on the impact of taxation on economic growth ranges from weak and non-robust (Easterly and Rebelo, 1993) to robust and significantly negative (Folster and Henrekson, 2001). The reason why taxation might divergently affect economic growth is that higher tax does not mean only higher distortions but also means a higher degree of public expenditure, which may accelerate economic growth (Arnold, 2008). Therefore, the impact of taxation on economic growth might vary from country to country.

The study of the effect of tax policy on the economic growth in South Asian countries is particularly interesting. South Asia is now mentioned as the fastest economically thriving region of the world. In 2016, on average, the GDP growth rate in South Asia countries was 6.7 percent, whereas the world's average GDP growth rate was only 2.49 percent. Since economic growth has a positive influence on many other economic indicators, achieving sustained economic growth is coveted mostly all around the world as well as by the policymakers in the region. The distortionary effect of the taxation necessitates analyzing and identifying the effective tax policy in order to ensure maximum economic welfare. Therefore, it is essential to explore how various types of taxes contribute to the economic growth of South Asian countries. A meticulous inspection of tax policies' contributory role will help policymakers in that region redesign policy tools consistent with the country-specific needs. Addressing this need, we attempt to examine the effect of different tax policies on the economic growth in the countries in South Asia region.

This paper analyses the impact of various tax policies on the economic growth of South Asia as well as the world. Using a dataset for the South Asian countries and the world, we examine the effect of conventional tax instruments, namely; Personal Income Tax (PIT), Corporate Income Tax (CIT), and General Taxes on Goods and Services (GTGS). We then try to answer, "How do different tax policy (Personal Income Tax, Corporate Income Tax, General Taxes on Goods and Services) affect the economic growth of South Asian Countries?" This paper, therefore, will further contribute to the related literature by exploring the effectiveness of taxation types on the economic growth of countries in the South Asia region.

This paper has been organized as follows: section (2) provides an overview of tax policies in South Asia, a review of the literature has been discussed in section (3), section (4) provides an outline on the specification of the model, section (5) discusses data source and explanation of the variables, section (6) entails estimation methodology, interpretation of estimation results has been provided in the section (7), section (8) discusses about limitations of the research, and section (9) draws a conclusion.

2. Taxation in South Asia

The Tax-to-GDP ratio in South Asian countries is reasonably low compared to other countries that stayatsimilar development levels (World Bank, 2012). The lower tax-to-GDP ratio is also insufficient compared with the financing need of the countries in South Asia.

There are several reasons behind such a poor tax collection scenario in South Asia. The tax base is very narrow in the South Asian region. Whereas only 3 percent of the population in India pays personal income tax, this figure is less than 1 percent of the population in Bangladesh, Pakistan, and Nepal. Presence of inefficient tax administrative agency in countries in South Asia can partly explain this scenario. As the process of tax file preparation and payment is cumbersome and tedious, it also contributes to govt. failure in adequate tax collection. A typical firm in South Asia region requires 300 hours for preparation and payment of taxes than their counterparts in an advanced nation, which requires only 175 hours (World Bank, 2012). The economic structure of the South Asian countries can also be attributed to low tax collection. The agriculture sector in South Asia is under-taxed, although agriculture constitutes a large share of this region's economy. Other factors held responsible for low revenue collection are poor literacy rates, large rural populations, huge informal economies, underdeveloped financial sectors, and poor governance.

From the following table 1, it can be seen that South Asian countries have achieved an impressive gain in per capita income in the last decade. Nevertheless, the tax-to-GDP ratio has not seen a strong momentum. For all the countries over the period 2005-2015, the average annual change in Tax-to-GDP ratio was less than the average annual percentage change in per capita income.

Table 1: Comparison of Tax Revenue with Per Capita Income Growth (Constant USD) in South Asia

Country	Per Capita Income in 2005	Per Capita Income in 2015	Average annual change in per capita income (%) 2005-2015	Tax/GDP in 2005 (in percent)	Tax/GDP in 2015 (in percent)	Average annual change in Tax/GDP 2005-2015 (% point)
Afghanistan	389.4	620.1	4.80	2.53	5.73	0.32
Bangladesh	598.6	971.6	4.96	6.30	8.07	0.18
Bhutan	1534.8	2628.2	5.49	6.99	7.92	0.09
India	971.2	1758.0	6.25	14.16	13.71	-0.05
Pakistan	974.5	1140.2	1.95	10.98	10.08	-0.09
Maldives	5485	8105.5	2.67	23.28	17.47	-0.58
Nepal	502.2	690.1	3.13	15.20	8.65	-0.66
Sri Lanka	2132.4	3686.5	5.44	14.22	14.00	-0.02

Source: Author's Calculation based on data collected from World Development Indicators, WB and

International Monetary Fund-Government Financial Statistics

Tax structure in South Asia has been evolved over the past decades in accordance to changes in global trend. The changes observed in tax structure in South Asian countries include a decline in rate of trade taxes, rationalization, the decline in the statutory tax rate of income tax and corporate tax rates, and broader adoption of the VAT. Over the years, direct taxes such as personal income tax (PIT) and corporate income tax (CIT) have been rationalized and simplified in South Asian countries. As a result, direct tax collection has increased modestly for most of the countries in that region: Bangladesh, Nepal, India, Afghanistan, Pakistan(Gupta, 2015). Again, Bangladesh, Nepal, and the Maldives have also succeeded in increasing the VAT-to-GDP ratio in the last decade. In contrast, Sri Lanka performed worst as the VAT-to-GDP ratio for the country decline. On the other hand, for Pakistan, it remained flat.

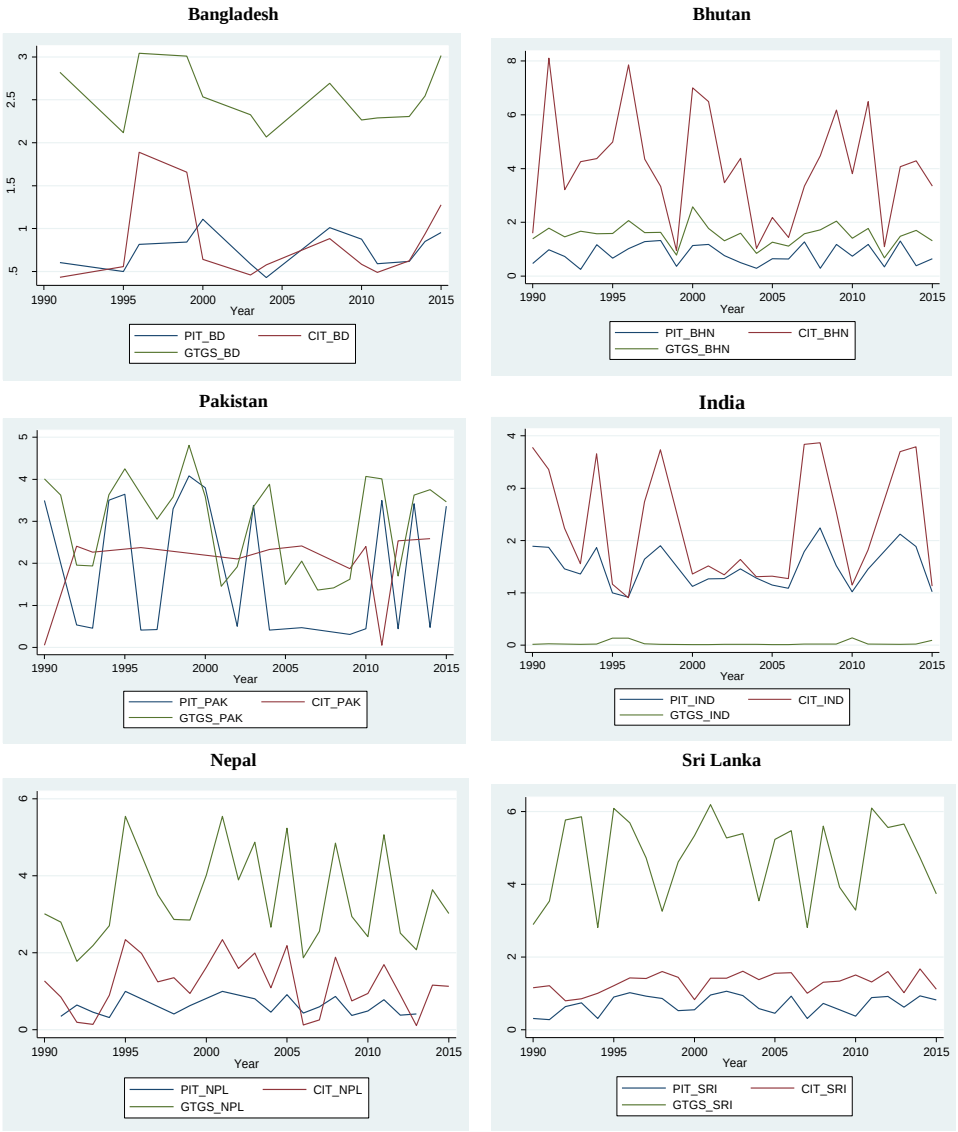
Table 2: Tax Structures in South Asian Countries

Country	Maximum PIT rate	Maximum CIT or representative rate	Representative VAT or Sales tax rate
Afghanistan	-	-	-
Bangladesh	25	27.5	15
Bhutan	25	30	-
India	30	33.9	12.5
Pakistan	25	35	16
Maldives	-	25	-
Nepal	25	25	13
Sri Lanka	24	28	12

Source: South Asia Economic Focus, 2012. Data referred to rates approximately in 2011

From table 2, we find that the highest personal tax rate exists in India. All other countries have an almost similar maximum limit of personal income tax. Pakistan has the highest corporate income tax in the South Asia region, which is 35%. However, the range of maximum corporate income tax varies in the range between 25%-35%. Although VAT is the primary source of tax revenue in South Asian countries, it is the tax rate that is relatively low compared with the PIT and CIT. The VAT in all the countries in South Asia varies between 12% to 16%.

In graph 1, we represent a relative comparison of different types of taxes collected by South Asian countries. It reveals what types of taxes are particularly important in terms of their size. For most of the countries in the South Asia region, we find Sales Tax/ General taxes on goods and services (GTGS) as the largest source of tax revenue.



Graph 1: PIT, CIT, and GTGS as a share of GDP in South Asian countries

3. Review of the Empirical Literatures

The influence of tax policy on economic growth has been discussed in literature from a wide perspective, but there is no conformity in the decision of the researchers. In general, taxes are distortionary, and it deters the optimal allocation of resources. Easterly and Rebelo (1993) provide evidence of this hypothesis, where they show that economic distortion caused by taxation or any other policy is negatively associated with economic growth. On the other hand, direct taxes have a negative impact on economic growth, while indirect taxes have been found to have a positive effect on economic growth (Petru-Ovidieu, 2015).

Since the literature on the topic is very comprehensive, we will concentrate in this section on the relationship between tax revenue and economic growth, as well as a review of the relationship between tax structures and economic growth.

Tax Revenue and Economic Growth

The literature on the relationship between overall tax levels and growth performance has produced no definitive results.

For Greece, Anastassio & Dritsaki (2005) discovered evidence of a one-way unidirectional causal association between tax revenues and economic growth. In addition, Takumah *et al.* (2017) find a clear correlation between tax revenue and economic growth in Ghana.

Many other researchers discovered a negative association between taxation and economic growth. Over the period 2000-2012, Nantob (2014) looked at the impact of various forms of taxes on the economic growth of a group of 47 developing countries. He discovered that the essence of this relationship is nonlinear and negative using system GMM estimation. Folster and Henrekson (2001), on the other hand, analyzed the relationship between government size and economic growth. Their finding is that the relationship between the two variables is negative. Johansson et al. (2008) found, in general, all types of taxes are distortionary and affect economic growth negatively. Corporate taxes, according to the researchers, are the most harmful to economic development, followed by personal income taxes, and finally consumption taxes. Arnold et al. (2008) came to the same conclusion as the argument.

In contrast, Lee & Gordon (2005) found no significant relationship between the average tax rate on labor income and economic growth. Also, work of Koester and Kormendi (1989) corroborate this finding as they revealed evidence no relationship between tax rates and growth. Using the Pooled Mean Group (PMG) estimator, on the other hand, Gemmel *et al.* (2014) find that average tax rates that are macro-based have statistically small and non-robust long-run growth effects. In contrast, micro-based marginal tax rates are negatively associated with GDP growth.

Di *et al.* (2017) raised an important question regarding the symmetric tax-growth relationship that is commonly assumed in most literature. They identified a nonlinear relationship between taxes and economic growth using a panel of twenty OECD countries from 1970 to 2012, which is robust when the total tax threshold reaches 30%. Under this threshold level, they find tax policies are ineffective and statistically

insignificant. Also, Jaimovich and Rebelo (2017) found that the nexus between tax revenue and economic growth is nonlinear. They find that at the lower or moderate tax rate, as the tax rate increases marginally, it can have a smaller impact on growth. The marginal rise in tax rate has a greater growth effect at higher tax rates.

Tax Structure and Economic Growth

Personal Income Tax (PIT) and Economic Growth

There are numerous evidences of the negative association between personal income tax and economic growth (Acosta &Yoo, 2012; Johansson *et al.* 2008).Personal income taxes have a stronger negative relationship with growth, according to Acosta &Yoo (2012).Moreover, they find that income taxes reduction can be linked with faster economic growth while coupled with increasing value-added and sales taxes. According to Mertens and Ravn (2013), a one-percentage-point drop in the average personal income tax raises real GDP per capita by 1.4 percent in the first quarter and 1.8 percent after three quarters. Personal income tax has a negative effect on a global scale as well as in Latin American countries, according to Canavire-Bacarreza et al. (2013).Personal income tax, on the other hand, is found to have a substantial positive effect on the economic growth of Latin America and the rest of the world, given the prevalence of the informal sector. Dackehag et al. (2012) found that personal income tax has a negative impact on economic growth using fixed effect estimation for a panel dataset of 25 rich OECD countries. Holcombe and Lacombe (2004) state that a rise in the income tax results in a 3.4 percent drop in per capita income. However, there is also available literature with opposite findings. Di et al. (2017) used a linear and nonlinear panel cointegrated VAR model to investigate the relation between tax structure and long-run growth. They did not find any superiority of income tax over consumption and property tax in increasing long-run GDP per capita, which is often claimed by many international organizations.

Corporate Income Tax (CIT) and Economic Growth

As compared to personal income taxes and consumption taxes, corporate taxes are found to be the most detrimental to growth(Johansson et al. 2008; Lee & Gordon 2005; Arnold *et al.* 2008). Using a fixed-effects estimate of a panel data set for 70 countries from 1970-1997, Lee & Gordon (2005) found that a ten percentage point reduction of the corporate taxes can increase the annual growth rate by 1.8%. The same approach used by Dackenhag *et al.* (2012) supports the findings derived in the literature mentioned above. Based on their study of Canadian provinces from 1977 to 2006, Ferede and Dahlby (2012) revealed that a 1% reduction in corporate income tax can boost annual growth by 0.1 to 0.2 percentage points. Mertens and Ravn (2013) found that a one-percentage-point reduction in the average corporate income tax rate causes a 0.4 percent rise in real GDP per capita in the first quarter and a 0.6 percent increase in the second quarter. These results support the theory that lowering the corporate tax rate promotes more entrepreneurial activity.

When the effect of corporate income tax on economic growth in the global sample is compared to the Latin American sample, however, Canavire-Bacarreza et al. (2013)'s results become inconclusive. Although they found a negative impact of CIT on economic

growth for the world sample, the effect is positive for the Latin American sample. The author did not provide any convincing explanation of why CIT behave differently across the two-different sample.

General Taxes on Goods and Services (GTGS) and Economic Growth

In comparison to other tax types, value-added and sales taxes are more conducive to growth (Acosta and Yoo, 2012). Canvire-Bacarreza *et al.* (2013) also found a similar result in his System GMM estimation for 19 Latin American countries. Property taxes, according to Arnold et al. (2011), are the least damaging to growth, followed by sales taxes, personal income taxes, and corporate income taxes.

4. Model

We choose to use a dynamic panel data model that can apprehend the effect of various types of taxes on the economic growth of 85 countries in the world as well as the eight countries in the South Asian region. We need to formulate an econometric model in which each country's traits are treated as specific effects. These country-specific characteristics are unobservable and time-invariant, but they affect the behavior of the countries under consideration. When sources of these unobservable heterogeneities are taken into consideration by including observable variables in the model, heterogeneity is usually completed.

The system GMM approach has been adopted for a panel data set for eight countries in South Asia. This allow an estimate of the divergent tax policy effect on economic growth. However, the sample variation might not be appropriately captured for such a small sample. Therefore, we have performed the same estimation on an extended panel data set of 85 developed and developing countries using a dummy variable for South Asian countries.

The regression model that we want to estimate for South Asian countries can be written as follows:

$$GDPPCG_{it} = \alpha_1 GDPPCG_{it-1} + \alpha_2 GDPPC_{i0} + \beta TAX_{it} + \gamma CONTROL_{it} + \upsilon_i + \varepsilon_{it} \quad (1)$$

$$i=1,2,\ldots, N \quad \text{and } t=1, 2,\ldots,T$$

For the worldwide sample, the following equation will be employed, whereas a dummy variable for South Asian countries will be used to interact with several types of tax variable:

$$GDPPCG_{it} = \alpha_1 GDPPCG_{it-1} + \alpha_2 GDPPC_{i0} + \beta_1 TAX_{it} + \beta_2 TAX_{it} * SAi + \gamma CONTROL_{it} + \upsilon_i + \varepsilon_{it}$$

$$i=1,2,\ldots, N \quad \text{and} \quad t=1, 2,\ldots,T \quad (2)$$

Where $GDPPCG_{it}$ is the dependent variable (GDP per capita growth rate of country i at time period t) which is proxied for economic growth.$GDPPCG_{it-1}$is the economic growth in the previous period, $GDPPC_{i0}$ is the GDP per capita at the beginning of the observation period,$TAX_{it}$is the vector of different types of taxes, υ_i is the country-specific fixed effect, ε_{it} is the idiosyncratic error. $CONTROL_{it}$ is the vector of some

explanatory variables that are used as the control variable in the regression analysis. SAirepresents the dummy variable for South Asian countries. In the regression model mentioned above, $\alpha_1, \alpha_2, \beta_1, \beta_2, \gamma$ are the parameters to be estimated.

The growth model for the South Asian sample and the world sample can now be written as follows:

$$GDPPCG_{it} - GDPPCG_{it-1} = (\alpha_1 - 1)GDPPCG_{it-1} + \alpha_2 GDPPC_{i0} + \beta TAX_{it} + \gamma CONTROL_{it} + \upsilon_i + \varepsilon_{it} \quad (3)$$

$$GDPPCG_{it} - GDPPCG_{it-1} = (\alpha_1 - 1)GDPPCG_{it-1} + \alpha_2 GDPPC_{i0} + \beta_1 TAX_{it} + \beta_2 TAX_{it} * SAi + \gamma CONTROL_{it} + \upsilon_i + \varepsilon_{it} \quad (4)$$

Where the variables and coefficients convey the same meaning as used for the first two equation.

5. Data

Over the period 1990-2015, we used dynamic panel data to examine the impact of various types of taxes on economic growth in 85 developing and developed countries, as well as six South Asian countries (Bangladesh, Bhutan, India, Pakistan, Nepal, and Sri Lanka).However, as Maldives and Afghanistan's data are very discontinuing, we excluded the two countries from our South Asian Sample. We use annual data for our research and collected variables from a wide variety of sources, namely: World Development Indicators (WDI), IMF Government Financial Statistics (GFS) database, International Country Risk Guide (ICRG), KOF Swiss Economic Institute. The appendix contains a description of variables with their sources.

$GDPPCG_{it}$ stands for GDP per capita growth (annual), which is the model's dependent variable. Between the period 1990-2015, the growth rate of GDP per capita of 85 countries is 2.27%, whereas, for South Asian countries, it is 4.63%.

The tax variables and the control variables constitute the set of explanatory variables of our model. Tax variables are personal income tax (PIT_{it}), corporate income tax (CIT_{it}), and general tax on goods and services ($GTGS_{it}$), all of which are measured as a percent of GDP. The control variables are GDP per capita ($GDPPC_{it}$), unemployment rate ($UNEM_{it}$), inflation rate ($INFL_{it}$), percentage of urban population ($URBAN_{it}$), gross domestic savings as a share of GDP ($GDSPGDP_{it}$), globalization index (GI_{it}), government size ($GOVTS_{it}$), education expenditure as a share of GDP ($EDUCE_{it}$), gross capital formation as a percentage of GDP ($INVEST_{it}$), labor force participation rate (LFPART), size of the shadow economy ($shadow_{it}$), health expenditure as a share of GDP ($HEALE_{it}$).

Tax Variables

PIT_{it}: Income tax introduces a distortion that deters the optimal allocation of resources. Also, income tax reduces incentives for the working of an economic agent. Therefore, when personal income tax is imposed, it can negatively impact economic growth.

CIT_{it}: Corporate income tax is also distortionary as it discourages the investment effort of corporations. Therefore, corporate income tax is negatively associated with economic growth. Since corporate income tax revenue might divergently influence economic growth because of the varying status of that country's trade openness, we decide to interact the corporate income tax variable with a globalization index as suggested by Canavire-Bacarreza *et al.* (2013).

$GTGS_{it}$: The impact of general taxes on goods and services (GTGS) on economic growth is inconclusive. Although GTGS distorts consumption-savings decisions of a consumer, reliance on it as a revenue source rather than PIT reduces the marginal tax rate and induces the consumer's incentives for more working, saving and investment (Canavire-Bacarreza *et al.*, 2013). We may expect to have a positive or no significant association between GTGS and economic growth.

Control Variables

GI_{it}: A globalized economy can be considered as an essential determinant of economic growth. We used the globalization index constructed by KOF, which measures the degree of globalization for a country on a scale of 100. The higher is the value of the globalization index, the more globalized the economy is. Consequently, globalization of trades and finances entail a growth-enhancing effect (IMF, 2017).

$UNEM_{it}$: is the unemployment variable and measured as the ratio of the working-age population being unemployed. Higher unemployment hurts economic growth by reducing the use of the available human capital stock. So, unemployment is expected to affect economic growth negatively.

$GOVTS_{it}$: This variable is measured as the percentage of total revenue to GDP. Many literature pieces uphold the importance of government size in affecting economic growth positively since a larger government can invest more in education and health, which helps to increase the level of human capital (Lucas, 1988). Also, a big government is more capable of investing in public infrastructure as well as research and development, which can significantly influence economic growth (Barro, 1990; Romer, 1990).

$EDUCE_{it}$: denotes education expenditure as a share of GDP. Higher education expenditure can be essential for human capital formation since it can enhance labor productivity. Education, therefore, can positively influence economic growth of a country.

$INFL_{it}$: represents the annual percentage of the inflation rate in the sample countries, which is calculated with the Consumer Price Index (CPI). Inflation is considered distortionary as well as a regressive tax. The increase in inflation may lower the level of business investment(Fischer, 1993). Because inflation has a negative impact on the consumer's purchasing power, we can expect to see a negative influence on inflation on economic growth.

URBANit: measures the proportion of the population living in urban areas. Urban places are the sources of physical infrastructure capital and managerial resources. Urban places are considered a hub of knowledge accumulation, which helps increase capital productivity. Urbanization plays a significant part in affecting the growth of the economy, according to Davis and Henderson (2003).

GDSPGDPit: It is measured as the gross domestic savings as a share of GDP. Savings in conducive to capital formation, which positively influence economic growth.

$INVEST_{it.}$ represents gross capital formation measured as a percentage of GDP. Capital is also considered an important determinant of economic growth. Hence, we have included it as a control variable in our model.

$LFPART_{it}$: Labor force participation rate. It positively influences economic growth.

$SHADOW_{it}$: In economic growth, the scale of the shadow economy, which is calculated as a percentage of GDP, plays an inconclusive role. Loayza (1996) found that economic growth could be adversely impacted by a broader shadow economy, as it limits the availability and productivity of public resources. Bhattacharyya (1994) found, on the other hand, that the scale of the shadow economy can have positive effects on consumer spending. Hence, the size of the shadow economy and economic growth may have a positive association.

$HEALE_{it}$: Expenditure on health is calculated as a proportion of GDP. Higher government spending on the health sector will boost the health status of a nation's population, which can increase labor productivity. Economic growth is projected to increase with higher levels of health expenditure.

Much of the literature that analyzed tax revenue-GDP growth on a single equation system assumes that the right-side variables are exogenously determined. A retrospective relationship could, however, exist between tax variables and a country's economic growth. That is, tax revenue can affect economic growth, and economic growth can also be affected by tax revenue. Addressing this issue, we treat Personal Income Tax (PIT), Corporate Income Tax (CIT), General Taxes on Goods and Services, and Government Size (GOVTS) as the endogenous variable. These variables can be correlated with the error term in the current as well as in the past period. However, all other explanatory variables are treated as a predetermined variable since the error term in the current period might have some feedback effect on the subsequent realization of these variables.

6. Methodology

A typical linear dynamic Panel-data model that includes p lag of the dependent variable can be represented as:

$$y_{it} = \sum_{j=1}^{p} \alpha_j \, y_{1,t-j} + x_{it}\beta_1 + w_{it}\beta_{it} + v_i + \varepsilon_{it} \qquad i = 1, \dots, N \quad t = 1, \dots, N \qquad (5)$$

Whereas $x_{it}$is the vector of strictly exogeneous variables, w_{it} is the vector of predetermined or endogenous variables.v_i and ε_{it} are the panel level effect and idiosyncratic errors, respectively, which are assumed to be independent for each i over all t.

In the above model, the lagged dependent variables might be correlated with the unobserved country-specific fixed effects (Nickell, 1981). Also, a problem can arise when the lagged dependent variable is correlated with the explanatory variables of the model (Baum, 2006). If explanatory variables are not strictly exogenous, country-

specific fixed effects are correlated with the explanatory variables. Therefore, OLS estimation might become inconsistent. Arellano and Bond (1991) propose using a consistent generalized method of moments (GMM) to estimate a model of this type. The GMM estimator proposed by Arellano and Bond is constructed by first differencing that helps to remove panel-level effects, v_i. They derived one-step and two-step GMM estimators using moment conditions. In these moment conditions, lagged levels of the dependent and predetermined variables were used as instruments for the difference equation.

However, Blundell and Bond (1998) proved that in the case where the autoregressive process becomes too persistent, the lagged level instruments in the Arellano and Bond method becomes weak. Blundell and Bond (1998) then develop an alternative method, which is referred to as a system estimator. System estimator uses two types of moment conditions simultaneously, whereas lagged differences and lagged levels are both used at a time as the instrument for the level equation and difference equation, respectively. This technique increases efficiency.

The use of the system estimator is dependent on the assumption that there is no autocorrelation in the idiosyncratic errors. It also requires that panel level effects should be uncorrelated with the first difference of the first observation of the dependent variable.

The use of the Blundell and Bond GMM estimator is advantageous in this case as it helps to take care of the potential problem that may arise in the estimation of the dynamic panel data model. The system GMM method helps the researcher in controlling individual-specific effects with short-run dynamics. It is also useful to deal with variable endogeneity bias, simultaneous bias, inverse causality, and omitted variable problems. Hence, the system GMM estimator can provide a more precise estimation than any other method.

The study of the relationship between tax policy and economic growth can be plagued with the endogeneity problem. The tax policy might influence economic growth, and economic growth might, in turn, influence the tax policy. Although finding an appropriate instrument is a challenge, in this case, the System GMM approach can take care of it by instrumenting differences with levels and levels with the difference (Canavire-Bacarreza et al., 2013).

The difference equation for the South Asian sample and world sample can be represented as follows:

$$GDPPCG_{it} - GDPPCG_{it-1} = \alpha_1(GDPPCG_{it-1} - GDPPCG_{it-2}) + \alpha_2(GDPPC_{i0} - GDPPC_{i0-1}) + \beta(TAX_{it} - TAX_{it-1}) + \gamma(CONTROL_{it} - CONTROL_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (6)$$

$$GDPPCG_{it} - GDPPCG_{it-1} = \alpha_1(GDPPCG_{it-1} - GDPPCG_{it-2}) + \alpha_2(GDPPC_{i0} - GDPPC_{i0-1}) + \beta_1(TAX_{it} - TAX_{it-1}) + \beta_2(TAX_{it} * SAi - TAX_{it-1} * SAi) + \gamma(CONTROL_{it} - CONTROL_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (7)$$

We see that the first difference eliminates country-specific fixed effects. By first differencing, the endogeneity of the lagged dependent variable can be solved. The term $(\varepsilon_{it} - \varepsilon_{it-1})$ is correlated with the lagged variable in difference $(GDPPCG_{it-1} - GDPPCG_{it-2})$. In the above two equations, the lagged level values of the variables are used to instrument the first differences of the corresponding explanatory variables. However, due to the presence of the lagged difference dependent variable at the right-hand side of the equation (6) and (7), simultaneity bias may occur, which needs to reduce.

In the System GMM method, the first difference equations (6 and 7) are estimated simultaneously with equations in level (1 and 2). In the level equation, the lagged differences of the variables are used to instrument corresponding level variables. It is prudential to use only the more recent lagged difference as an instrument in the level equation as Arellano and Bover (1995) stated that the use of other lagged differences might result in redundancy of moments' condition.

Assuming that the explanatory variables are stationary, we can use additional moments' conditions for equations in level.

$$\mathbb{E}[(GDPPCG_{it-\tau} - GDPPCG_{it-\tau-1}).(\upsilon_i + \varepsilon_{it})] = 0 \qquad for\ \tau = 1 \quad (8)$$

$$\mathbb{E}[(GDPPC_{i0-\tau} - GDPPC_{i0-\tau-1}).(\upsilon_i + \varepsilon_{it})] = 0 \qquad for\ \tau = 1 \quad (9)$$

$$\mathbb{E}[(TAX_{it-\tau} - TAX_{it-\tau-1}).(\upsilon_i + \varepsilon_{it})] = 0 \qquad for\ \tau = 1 \quad (10)$$

$$\mathbb{E}[(TAX_{it-\tau} * SAi - TAX_{it-\tau-1} * SAi).(\upsilon_i + \varepsilon_{it})] = 0 \qquad for\ \tau = 1 \quad (11)$$

$$\mathbb{E}[(CONTROL_{it-\tau} - CONTROL_{it-\tau-1}).(\upsilon_i + \varepsilon_{it})] = 0 \qquad for\ \tau = 1 \quad (12)$$

The moments conditions (equation 8 to 12) associated with GMM allow us to estimate the coefficients of the model.

In order to test the validity of the lagged variable as an instrument, Arellano and Bond (1991) suggest using Sargent test of over identifying conditions. To ensure the efficiency of the GMM estimator, we need to make sure that there is no autocorrelation between the error terms in the regression model. To this end, we will use the test proposed by Arellano and Bond (1991), which allows verification of first and second-order autocorrelation. Under this test, the non-significance in the second-order autocorrelation test ensures that there is no autocorrelation.

7. Estimation Result and Interpretation

A brief review of the summary statistics of the characteristics of the different variables in South Asia and the World will be helpful for understanding the effectiveness of the different types of tax policy on economic growth. The average GDP per capita growth rate in South Asia is higher than the average of those countries included in the worldwide sample. The South Asian region is characterized by a large shadow economy, the smaller size of the government (Total revenue to GDP), a low degree of globalization, a higher degree of inequality, etc. The Tax-to-GDP ratio in the South Asia region is significantly low compared to the world level. Tax evasion is relatively high, mostly due to the inefficient tax collection system underlying these countries. Also, countries in South Asia are observed to depend more on indirect tax rather than direct tax. Only a small

share of government revenue comes from sources of direct taxes. General Taxes on Goods and Services (GTGS) is the primary government revenue source in the South Asia region. On average, personal income tax constitutes only 1 percent of South Asian countries' GDP, whereas, for the world sample, it constitutes 5.04 percent of the GDP. Corporate Income Tax (CIT), on average, is only 1.82 percent of the GDP of the countries in South Asia. For the world sample, it is 2.89 percent of GDP. The average size of GTGS is 2.59 percent of the GDP for South Asian countries, which amounts to 5.77 percent for countries included in the world sample. Outlining the difference in the characteristics of the South Asian region and the larger worldwide sample of developing and developed countries presents the rationale for generating contrasting results from these two cases.

Table 3: Descriptive Statistics (1990-2015)

Variable	South Asian Sample		World Sample	
	Mean	Std. Dev.	Mean	Std. Dev.
GDP per capita growth (GDPPCG)	4.63	12.97	2.27	5.32
GDP per capita	1261.87	1636.32	13289.10	17874.21
GINI Index (GINI)	34.94	4.59	40.00	10.06
Globalization Index (GI)	40.70	10.14	62.81	15.52
Unemployment (UNEM)	4.35	2.66	8.27	4.89
Corruption (Corruption)	2.36	0.70	3.30	1.33
Government Size (GOVTS)	19.91	8.37	30.84	11.69
Education Expenditure (EDUCE)	3.31	1.27	4.64	1.48
Health Expenditure (HEALE)	4.99	2.14	6.87	2.31
Inflation (INLF)	7.48	5.03	28.59	285.56
Urbanization (URBAN)	25.50	7.73	61.73	20.13
Bureaucracy (Bureaucracy)	2.15	0.62	2.55	1.09
Shadow Economy Size (shadow)	32.58	7.59	27.71	12.79
Personal Income Tax (PIT)	1.00	0.83	5.04	4.78
Corporate Income Tax (CIT)	1.82	1.62	2.89	2.07
Sales Tax (GTGS)	2.59	1.89	5.77	2.96
Gross Domestic Savings (GDSPGDP)	16.63	14.53	21.65	10.81
Gross Capital Formation (INVEST)	26.37	11.39	22.63	6.18
Labor Force Participation (LFPART)	49.24	12.45	48.73	12.67
Tax Revenue (Tax_Rev)	10.96	3.78	19.80	7.80

Source: Author’s estimation based on data collected from different sources.

Table 4: Regression Results for South Asian Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$GDPPCG_{-1}$	-0.127	-0.128	-0.125	-0.207***	-0.111	-0.302***	-0.297***
	(0.099)	(0.112)	(0.126)	(0.069)	(0.090)	(0.113)	(0.105)
$GDPPC_0$	-0.010***	-0.006*	-0.008*	-0.006	-0.012***	-0.014	-0.015*
	(0.003)	(0.004)	(0.004)	(0.008)	(0.004)	(0.009)	(0.008)
GLOB	0.068***	0.125***	0.126***	0.178***	0.092**	0.185**	0.176**
	(0.021)	(0.041)	(0.043)	(0.066)	(0.036)	(0.078)	(0.081)
UNEM	0.155	-0.040	-0.050	0.286	0.104	0.257	0.247
	(0.199)	(0.235)	(0.239)	(0.276)	(0.246)	(0.254)	(0.252)
GOVTS	0.163***	0.110	0.147*	0.107*	0.195**	0.284**	0.278**
	(0.063)	(0.068)	(0.079)	(0.062)	(0.081)	(0.123)	(0.134)
EDUCE	-0.969**	-1.035**	-1.180***	-0.934*	-1.207***	-1.774***	-1.761***
	(0.436)	(0.412)	(0.346)	(0.495)	(0.413)	(0.350)	(0.373)
HEALE	-0.440	-0.210	-0.242	-0.570	-0.148	-0.386	-0.294
	(0.629)	(0.543)	(0.528)	(0.714)	(0.544)	(0.653)	(0.701)
INFL	-0.030	0.030	0.016	0.057	-0.022	0.006	0.006
	(0.051)	(0.050)	(0.049)	(0.063)	(0.055)	(0.063)	(0.064)
URBAN	0.016	-0.020	0.032	-0.115	0.034	-0.080	-0.088
	(0.052)	(0.098)	(0.116)	(0.102)	(0.094)	(0.115)	(0.133)
SHADOW	0.075	0.022	0.143	-0.073	0.119	0.059	0.028
	(0.069)	(0.122)	(0.185)	(0.141)	(0.133)	(0.191)	(0.266)
GDSPGDP	0.268	0.151	0.167*	0.143*	0.224***	0.153	0.147
	(0.051)	(0.100)	(0.089)	(0.079)	(0.063)	(0.097)	(0.114)
INVEST	0.063	0.125**	0.128***	0.150***	0.085**	0.139***	0.140***
	(0.042)	(0.052)	(0.044)	(0.040)	(0.037)	(0.036)	(0.040)
LFPART	0.065	0.044	0.056	0.076	0.050	0.035	0.020
	(0.056)	(0.058)	(0.064)	(0.059)	(0.049)	(0.056)	(0.078)
PIT		0.201	2.795			-0.378	-1.938
		(0.251)	(2.453)			(0.430)	(5.067)
PIT*SHADOW			-0.081				0.054
			(0.072)				(0.172)
CIT				0.775		1.214	1.027
				(0.576)		(0.876)	(1.057)
CIT*GLOB				-0.018		-0.026	-0.020
				(0.012)		(0.017)	(0.024)
GTGS					-0.196	-0.606**	-0.664***
					(0.121)	(0.259)	(0.252)
Constant	3.431**	27.628	69.227	137.450	40.787	227.369*	248.015
	(83.747)	(169.766)	(164.881)	(94.376)	(75.899)	(121.386)	(171.853)
Observation	71	56	56	55	62	52	52
Number of Countries	6	6	6	6	6	6	6
Sargan[1]	0.985	1.00	1.000	1.000	1.000	1.000	1.000
AR2[1]	0.018	0.138	0.142	0.129	0.910	0.078	0.086

Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1; [1]P-value, Countries included: Bangladesh, Bhutan, India, Pakistan, Nepal, Sri Lanka. Afghanistan and Maldives dropped from the sample.

Table 5: Regression Results for World Sample

	(1)	(2)	(3)	(4)	(5)	(6)
$GDPPCG_{-1}$	0.138*	0.201**	0.207***	0.196**	0.205***	0.210***
	(0.074)	(0.080)	(0.078)	(0.076)	(0.079)	(0.078)
$GDPPC_0$	-0.00019***	-0.00019***	-0.00019***	-0.0002***	-0.00016***	-0.00016***
	(0.0000511)	(0.0000465)	(0.0000456)	(0.0000443)	(0.000044)	(0.0000412)
GLOB	0.056	0.037	0.039	0.053	0.035	0.033
	(0.038)	(0.033)	(0.032)	(0.039)	(0.036)	(0.035)
UNEM	-0.065	-0.077*	-0.058	-0.057	-0.065	-0.057
	(0.060)	(0.045)	(0.043)	(0.0441)	(0.040)	(0.040)
GOVTS	0.068**	0.067**	0.067*	0.081**	0.054*	0.059*
	(0.033)	(0.036)	(0.034)	(0.032)	(0.032)	(0.031)
EDUCE	-0.297	-0.331*	-0.244	-0.271	-0.212	-0.157
	(0.194)	(0.193)	(0.176)	(0.169)	(0.169)	(0.164)
HEALE	-0.629***	-0.460***	-0.474***	-0.449***	-0.345**	-0.362**
	(0.175)	(0.173)	(0.172)	(0.170)	(0.162)	(0.160)
INFL	-0.057***	-0.049***	-0.046***	-0.049***	-0.048***	-0.045***
	(0.015)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
URBAN	0.024	0.030*	0.024	0.0247	0.015	0.012
	(0.019)	(0.016)	(0.016)	(0.0158)	(0.016)	(0.016)
SHADOW	-0.053*	-0.052*	-0.039	-0.04903**	-0.039*	-0.034
	(0.032)	(0.028)	(0.029)	(0.0240831)	(0.023)	(0.023)
GDSPGDP	0.071**	0.072**	0.066**	0.073***	0.082***	0.077***
	(0.032)	(0.030)	(0.029)	(0.027)	(0.025)	(0.026)
INVEST	0.079**	0.046	0.050	0.052	0.052	0.059
	(0.039)	(0.033)	(0.033)	(0.041)	(0.037)	(0.037)
LFPART	0.022	0.022	0.016	0.035**	0.021	0.014
	(0.020)	(0.018)	(0.019)	(0.016)	(0.015)	(0.016)
PIT		0.021	0.118		0.005	0.059
		(0.059)	(0.101)		(0.054)	(0.087)
PIT*SA		0.125	-0.683		0.070	-7.710***
		(0.256)	(2.136)		(0.245)	(2.034)
PIT*SHADOW			-0.006			-0.004
			(0.005)			(0.004)
PIT*SHADOW*SA			0.025			0.282***
			(0.066)			(0.072)
CIT				0.071	0.104	0.049
				(0.362)	(0.382)	(0.379)
CIT*SA				-1.233	-1.219	-1.696**
				(0.855)	(0.794)	(0.830)
CIT*GLOB				-0.003	-0.003	-0.002
				(0.005)	(0.005)	(0.005)
CIT*GLOB*SA				0.038*	0.034*	0.055***
				(0.022)	(0.019)	(0.005)
GTGS					0.121	0.109
					(0.085)	(0.086)
GTGS*SA					0.020	-0.636**
					(0.210)	(0.296)
Constant	108.769	105.635	115.041	106.637	103.087	108.694
	(76.825)	(71.032)	(70.417)	(73.463)	(70.750)	(70.291)
Observations	943	819	819	830	810	810
Number of Countries	73	68	68	70	68	68
Sargan[1]	0.000	0.000	0.000	0.000	0.000	0.000
AR2[1]	0.818	0.711	0.687	0.618	0.726	0.714

Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1; [1]P-value

We evaluate the effect of tax instruments (personal income tax (PIT), corporate income tax (CIT), general taxes on goods and services (GTGS)) on the economic growth of the entire South Asian region and for a worldwide sample of developing and developed countries, by adopting panel data estimation models. We present System GMM results in two tables: one for countries in South Asia (table 4), another for 85 sample countries worldwide (table 5). Because of the discontinuity of data over the different years, we had to drop two countries from our South Asian Sample, Afghanistan, and the Maldives. In our explanation of the panel regression results of the System GMM, we generally refer to the last column of table 4 and table 5. A fixed-effect regression results have been presented in the appendix section.

At first, we consider table 4, where we use different model specifications to check its robustness. For countries in the South Asian sample, we found that personal income tax has a negative impact on economic growth. This finding, although, goes in line with the literature (Acosta & Yoo, 2012; Johansson *et al.* 2008; Mertens and Ravn 2013; Holcombe and Lacombe 2004), is insignificant and non-robust. This may be due to the fact that PIT constitutes only an insignificant portion of the total revenue collection in South Asian countries. Although any concluding remarks regarding the significant negative impact of PIT on economic growth cannot be drawn for South Asian countries from table 4, we can find such evidence from a broader international sample. The coefficient of the interaction of South Asian dummy with PIT indicates how the impact of the PIT on economic growth changes in the presence of South Asian countries in the observed sample. We found that PIT negatively affects economic growth when South Asian countries are included in the sample. As observed, a one percentage point increase in the personal income tax (PIT) leads to a reduction of economic growth by 7.70 percentage points. Since the result is highly significant, we can claim that income tax has a distortionary effect in South Asian countries. Using the world sample, our estimation found that there is a positive association between personal income tax and economic growth. Although insignificant, this result is robust even we change the specification of the model.

On the other hand, when we consider the informal (shadow) economy's presence, personal income tax exerts a small but positive effect on economic growth (in table 4). A highly significant consistent result that corroborates this finding can be found from the world sample when considering the interaction of personal income tax with the extent of the shadow economy in South Asian countries (in table 5). A one percentage point increase in the extent of the informal economy can lead to a 0.28 percentage point increase in the impact of the PIT on economic growth in South Asian countries. This is plausible because a sizeable informal sector or shadow economy constitutes the economy of most countries in South Asia.

In the regression for the South Asian sample, we found a robust and positive impact of corporate income tax on economic growth, although it is insignificant. However, in the presence of globalization, CIT affects economic growth negatively in South Asian countries. Again, in spite of being insignificant, the result is robust when we change the specification of the model. These findings are consistent with the result that we found in the estimation of the worldwide sample.

For the worldwide sample, corporate income tax is positively associated with economic growth. However, the effect of CIT on economic growth is negative and highly significant when we use an interaction term using the South Asian dummy, which is opposite to the rest of the world. As we see from specification (6) of table 5, a one percentage point increase in CIT causes a 1.70 percentage point decline in economic growth in South Asian Countries. This finding is consistent with the theory as higher corporate tax leads to reduced investment, productivity gains, and, in turn, lower output and reduced economic growth. Empirical research (Johansson et al. 2008; Lee & Gordon 2005; Arnold *et al.* 2008; Ferede and Dahlby 2012) also support this finding. In table 5, when we interact corporate income tax with the level of globalization, a slightly negative and insignificant effect of corporate income tax on economic growth is found in general. It means that as the economy becomes more globalized, a higher CIT induces capital to move elsewhere. Since corporate investment reduces due to the increase in corporate tax, economic growth is affected negatively. Also, as CIT increases, the openness of the economy negatively affects the economic growth of the countries included in the worldwide sample.

Estimating the interaction of globalization with CIT in South Asia reveals a significant and positive impact of CIT on economic growth in South Asia. It implies that, inSouth Asia, if globalization increases by one percentage point, the impact of CIT on economic growth increases by 0.05 percentage points. This, in turn, supports the idea that in the presence of globalization, the higher CIT can lead to capital outflow from South Asian countries.

The system GMM estimation for the South Asian sample in table 4 finds that general taxes on goods and services (GTGS) have an adverse impact on the economic growth in countries in South Asia. This finding is highly robust and statistically significant. For the South Asian sample, one percentage point increase in GTGS leads to a 0.66 percentage point decrease in economic growth. In the regression result for the world sample in table 5, we found GTGS positively affect economic growth in the world. However, the estimated coefficient of GTGS for the worldwide sample is statistically insignificant. On the other hand, the coefficient of the interaction of GTGS with the South Asian dummy implies that the effect of GTGS becomes negative and statistically significant. We can observe that one percentage point increase in the GTGS causes a 0.64 percentage point decline in the economic growth of South Asian Countries. It, therefore, supports the earlier findings that an increase in GTGS in the countries in South Asia has an adverse effect on their economic growth.

8. Limitations

Our analysis may be plagued with the following shortcomings:

1. As our analytical framework is linear, it implicitly assumes that the effects of taxes on growth are symmetric. This assumption may be too restrictive, as many authors suggested that the effects of taxes on growth are asymmetric (Auerbach and Gorodnichenko 2012; Baum et al. 2012).
2. The availability of data for several variables in the South Asian region is limited. To increase the number of observations, we had to drop some variables from our analysis, which might have significant relevance. That may adversely affect the quality of our analysis.

3. Our regression model suffers from too-many-instrument problems. Ideally, the number of the instrument should not be greater than the number of the group. For the estimation of the dynamic panel model, we used xtdpdsys command. Compared to other alternatives (xtabond2, xtdpdgmm, or xtseqreg), xtdpdsys has much less flexibility. So, we were not able to reduce the number of instruments.

9. Conclusion

This paper aims to examine the effect of various forms of taxes on economic growth in South Asia. Over the period 1990-2015, a panel data set of South Asian countries was used. In addition to this, we also use an extensive sample of 85 developing and developed countries along with a dummy variable for South Asian countries to better capture the variance in the sample. System GMM estimation has been applied since it effectively deals with endogeneity, simultaneous bias, inverse causality, and omitted variable problems.

The large scale of the informal sector, high levels of inequality, pervasive corruption, and dysfunctional bureaucracy characterize countries in South Asia. Although South Asian countries are dissimilar with respect to the tax structure, efficiency in collecting taxes, they have some common characteristics. The Tax-to-GDP ratio in the South Asia region is significantly low compared to the world level. Tax evasion is relatively high, mostly due to the inefficient tax collection system underlying these countries. Also, countries in South Asia are observed to depend more on indirect tax rather than direct tax. Hence, the share of general taxes on goods and services (GTGS) to GDP is larger than that of personal income tax (PIT) and corporate income tax (CIT).

We find that personal income taxes have a negative effect on South Asian economic growth. This result is in line with the literature. Regression of the global sample also suggests that personal income tax could have a significant negative impact on economic growth in South Asia. A rise in the personal income tax (PIT) by one percentage point decreases economic growth by 7.70 percentage points. However, when we interact with the size of the shadow economy, we find that personal income tax has a positive impact on economic growth in South Asia. An increase of one percentage point in the size of the informal economy may lead to a 0.28 percentage point increase in the effect of the PIT on South Asian countries' economic growth. Since the informal sector accounts for a large part of the South Asian economy, the extension of the tax net to those participating in the informal sector could contribute positively to economic growth.

From our Worldwide sample, we find a negative and highly significant impact of corporate income tax (CIT) on economic growth. We find that a one percentage point increase in CIT triggers a 1.70 percentage point decline in South Asian countries' economic growth. The influence of CIT appears to have a negative impact on South Asia's economic growth in the presence of globalization. Our result shows that, in South Asia, the effect of CIT on economic growth increases by 0.05 percentage points if globalization increases by one percentage point. This means that if the South Asian economy becomes globalized on a larger scale, the increase in CIT will lead capital to flee to countries where the rate of corporate tax is relatively low.

Finally, our empirical results strongly indicate that general taxes on goods and services (GTGS) have an adverse impact on the economic growth in South Asia countries since

we observe from our analysis that a one percentage point rise in GTGS leads to a decrease in economic growth of 0.66 percentage point.

In conclusion, we would like to point out that the weak availability of data on different variables in South Asian countries may have a negative effect on our study of the impact of different types of taxation on South Asian economic growth. As the data becomes more accessible, it will be feasible to conduct more econometrically sound research.

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Appendix

Variable	Description	Source
GDPPCG	Annual percentage growth rate of GDP per capita	WDI
GDPPC	GDP per capita (USD)	WDI
PIT	Personal income tax (as % GDP)	IMF GFS database
CIT	Corporate income tax (as % of GDP)	IMF GFS database
GTGS	General tax on goods and services (% of GDP)	IMF GFS database
UNEM	Unemployment, total (% of total labor force) (modeled ILO estimate)	WDI
INFL	Consumer price inflation (annual %)	WDI
URBAN	Urban population (% of total)	WDI
GDSPGDP	Gross domestic savings as a share of GDP, current prices (in %)	WDI
INEQ	Income Inequality measured by the Gini Index	WDI
GLOB	Globalization Index which consists of three dimensions of globalization: economic, social and political	KOF
Corruption	Assessment of corruption in a country. The scale of this index is 1 to 6.	ICRG
GOVTS	Government Size is the ratio of the total revenue to GDP (%)	IMF GFS database
GDSPGDP	Gross Domestic Savings as a Percentage of GDP	WDI
Bureaucracy	Quality of bureaucracy measured on a scale from 0 to 4.	ICGR
Shadow	Size of the Shadow economy (% of GDP)	Medina et al. (2018)
Invest	Gross Capital Formation (% of GDP)	WDI
LFPART	Labor Force Participation for Ages 15-24, total (%)	WDI
EDUCE	Total education expenditure as a share of GDP (%)	IMF GFS database
HEALE	Total health expenditure as a share of GDP (%)	IMF GFS database
SOPE	Total expenditure for social protection as a share of GDP (%)	IMF GFS database

Table 6: Descriptive Statistics(means) by South Asian Country

Variable	Afghanistan	Bangladesh	Bhutan	India	Pakistan	Nepal	Sri Lanka	Maldives
GDPPC	4.06	3.60	5.14	4.83	1.74	2.66	4.55	14.93
GINI	-	31.84	41.23	35.2	31.39	37.27	37.47	39.85
GLOB	27.25	38.63	32.30	49.30	49.59	37.98	55.23	39.83
UNEM	4.86	3.82	2.67	3.96	6.02	2.96	8.23	2.31
GOVTS	20.97	9.55	35.59	18.47	14.61	15.63	16.94	25.85
EDUCE	3.33	1.96	5.61	3.60	2.49	3.51	2.35	4.90
HEALE	8.25	2.73	5.59	4.29	2.83	5.85	3.66	7.86
INFL	7.25	6.18	6.41	7.84	8.84	7.96	9.67	5.56
URBAN	22.22	25.95	27.80	28.72	34.20	14.0	18.42	32.66
SHADOW	-	33.59	26.93	23.91	33.10	37.50	45.58	27.44
GDSPGDP	-22.52	17.79	30.69	29.88	13.25	11.32	17.95	-
INVEST	18.24	23.60	48.57	28.78	15.92	20.96	24.75	-
LFPART	48.73	46.92	43.12	44.21	42.58	79.23	42.71	46.43
Bureaucracy	-	1.59	-	-	2	-	2	-
Corruption	-	1.99	-	2.48	1.99	-	2.30	-
PIT	0.56	0.75	0.80	1.48	1.92	0.60	0.70	0.12
CIT	0.90	0.85	4.08	2.28	1.98	1.19	1.30	1.00
GTGS	1.42	2.54	1.53	0.04	2.97	3.42	4.74	4.40
Tax Revenue	6.34	7.08	9.34	15.15	10.59	9.70	14.28	13.03

Table 7: Fixed Effects Regression, South Asian Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$GDPPCG_{-1}$	-0.146	-0.123	-0.124	-0.147	-0.161	-0.120	-0.119
	(0.108)	(0.111)	0.112)	(0.112)	(0.110)	(0.120)	(0.122)
$GDPPC_0$	-	-	-	-	-	-	-
GLOB	0.134	0.167	0.191	0.331*	0.210	0.287	0.294*
	(0.114)	(0.143)	(0.154)	(0.150)	(0.131)	(0.169)	(0.172)
UNEM	-0.082	-0.296	-0.243	-0.348	0.026	-0.269	-0.215
	(0.344)	(0.461)	(0.480)	(0.491)	(0.406)	(0.522)	(0.548)
GOVTS	0.220*	0.211*	0.187	0.229**	0.186	0.335*	0.317*
	(0.095)	(0.110)	(0.123)	(0.107)	(0.114)	(0.166)	(0.174)
EDUCE	-0.618	-0.924*	-0.919	-0.528	-0.759	-0.983	-1.002
	(0.506)	(0.540)	(0.546)	(0.585)	(0.533)	(0.648)	(0.660)
HEALE	0.077	0.084	0.060	-0.548	0.035	-0.369	-0.295
	(0.537)	(0.647)	(0.656)	(0.723)	(0.611)	(0.794)	(0.828)
INFL	0.001	0.025	0.036	0.015	0.005	-0.031	-0.030
	(0.057)	(0.069)	(0.074)	(0.077)	(0.063)	(0.087)	(0.088)
URBAN	0.202	0.138	0.083	0.149	0.055	0.179	0.131
	(0.212)	(0.299)	(0.325)	(0.305)	(0.270)	(0.328)	(0.356)
SHADOW	0.117	0.110	0.051	0.070	0.051	0.086	0.043
	(0.153)	(0.181)	(0.222)	(0.190)	(0.175)	(0.206)	(0.237)
GDSPGDP	0.320***	0.233*	0.203	0.255*	0.290**	0.226	0.215
	(0.104)	(0.121)	(0.138)	(0.128)	(0.116)	(0.146)	(0.151)
INVEST	0.089	0.137*	0.144*	0.126	0.102	0.145*	0.147*
	(0.074)	(0.077)	(0.079)	(0.079)	(0.076)	(0.082)	(0.084)
LFPART	0.133*	0.149	0.148	0.261**	0.137	0.196	0.175
	(0.075)	(0.090)	(0.091)	(0.108)	(0.089)	(0.119)	(0.132)
PIT		0.118				-0.234	-1.882
		(0.303)				(0.587)	(4.360
PIT*SHADOW			0.037				0.057
			(0.079)				(0.149)
CIT				1.500		2.014	1.720
				(1.084)		(1.309)	(1.534)
CIT*GLOB				-0.026		-0.038	-0.030
				(0.025)		(0.029)	(0.036)
GTGS					0.112	-0.411	-0.446
					(0.323)	(0.536)	(0.551)
Constant	-28.472***	-27.014**	-23.927	-38.708**	-25.525**	-34.826**	-31.564*
	(10.301)	(12.862)	(14.595)	(14.240)	(12.497)	(14.984)	(17.441)
Observations	71	56	56	55	62	52	52
R-Squared	0.33	0.41	0.46	0.32	0.51	0.26	0.30

Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1

Table 8: Fixed Effects Regression, World Sample

	(1)	(2)	(3)	(4)	(5)	(6)
$GDPPCG_{-1}$	0.136***	0.145***	0.144	0.141	0.146***	0.145***
	(0.034)	(0.034)	(0.035)	(0.035)	(0.035)	(0.035)
$GDPPC_0$	-	-	-	-	-	-
GLOB	-0.085**	-0.056	-0.055	-0.048	-0.029	-0.026
	(0.036)	(0.038)	(0.038)	(0.045)	(0.044)	(0.044)
UNEM	-0.009	0.012	0.011	0.019	0.013	0.011
	(0.049)	(0.050)	(0.050)	(0.052)	(0.050)	(0.051)
GOVTS	0.035	0.014	0.015	0.053	0.032	0.033
	(0.030)	(0.040)	(0.040)	(0.039)	(0.050)	(0.051)
EDUCE	-0.547***	-0.436**	-0.444**	-0.682***	-0.449**	-0.460**
	(0.177)	(0.196)	(0.198)	(0.201)	(0.202)	(0.203)
HEALE	-0.683***	-0.754***	-0.755***	-0.742***	-0.777***	-0.772***
	(0.119)	(0.123)	(0.124)	(0.130)	(0.126)	(0.127)
INFL	-0.057***	-0.047***	-0.047***	-0.051***	-0.047***	-0.047***
	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
URBAN	0.118**	0.077	0.077	0.109**	0.067	0.065
	(0.047)	(0.049)	(0.049)	(0.052)	(0.051)	(0.051)
SHADOW	-0.161***	-0.150	-0.155***	-0.177***	-0.158***	-0.166***
	(0.045)	(0.047)	(0.050)	(0.048)	(0.048)	(0.051)
GDSPGDP	0.087***	0.096***	0.095***	0.074**	0.091***	0.091***
	(0.029)	(0.031)	(0.031)	(0.032)	(0.032)	(0.032)
INVEST	0.086***	0.097***	0.097***	0.105***	0.095***	0.097***
	(0.033)	(0.034)	(0.034)	(0.035)	(0.034)	(0.034)
LFPART	0.022	0.003	0.001	0.013	0.006	0.002
	(0.030)	(0.031)	(0.031)	(0.033)	(0.032)	(0.032)
PIT		0.026	0.000		-0.003	-0.051
		(0.105)	(0.179)		(0.112)	(0.191)
PIT*SA		0.026	-0.825		-0.127	-2.733
		(0.428)	(2.645)		(0.801)	(4.317)
PIT*SHADOW			0.001			0.002
			(0.007)			(0.007)
PIT*SHADOW*SA			0.025			0.091
			(0.078)			(0.149)
CIT				0.333	0.415	0.441
				(0.453)	(0.468)	(0.470)
CIT*SA				0.396	0.389	-0.106
				(1.134)	(1.165)	(1.448)
CIT*GLOB				-0.007	-0.007	-0.007
				(0.006)	(0.007)	(0.007)
CIT*GLOB*SA				-0.006	-0.007	0.007
				(0.028)	(0.028)	(0.037)
GTGS					-0.050	-0.055
					(0.117)	(0.119)
GTGS*SA					-0.050	-0.096
					(0.527)	(0.531)
Constant	5.627	6.789	6.973	4.831	6.053	6.422
	(4.458)	(4.921)	(4.959)	(5.233)	(5.221)	(5.259)
Observations	943	819	819	830	810	810
R-squared	0.07	0.11	0.11	0.08	0.12	0.12

Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.

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Technical, Allocative and Economic Efficiency of Commercial Banks of Bangladesh: A DEA based Non-Parametric Approach

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Abstract: The present study estimates the technical efficiency (TE), allocative efficiency (AE), and economic efficiency (EE) of leading private commercial banks of Bangladesh over the period of 2012 -2017 by using Data Envelopment Analysis (DEA) with the assumptions of both constant returns to scale (CRS) and variable returns to scale (VRS). The input-oriented DEA shows that mean TE over the study periods are 69% and 86% respectively under CRS and VRS assumptions. On the contrary, mean allocative efficiencies were 71% and 88% respectively under CRS and VRS assumption. Average EE indices were 50% under CRS and 76% under VRS assumptions. The results of the Malmquist Index (MPI) based DEA exhibited an average negative growth of -26.7% and it was attributed to negative efficiency change of -1.5% and technical change of -25.2% respectively. Based on different estimations methods the study has identified the sources of inefficiencies that may provide insights to the bankers and policy makers to formulate strategic decisions to remain competitive in this industry. Finally, some policy guidelines have been suggested for smooth functioning of the banking industry towards ensuring effective and efficient operations of the same in Bangladesh.

Keywords: Efficiency, Data Envelopment Analysis, Malmquist index, VRS, CRS, TE, AE, EE. JEL Classification: G21, C58

Introduction

There is considerable evidence that the Banking sector makes substantial contribution towards the progress long-run growth of an particular economy (Allen and Carletti, 2012; Cetorelli and Gambera, 2001). Banks are directly related to economic activities and as a result they affect the economic development of a country to a major great extent (Bongini et al., 2017; Brissmis et al., 2006; Levin 1997, 2004; Watchel, 2001). Given the paramount significance of banks for inducing the general economic condition of a nation, the competence of banks is important for unflawed monetary advancement and smooth performance of an economy (Tandon et al., 2014). Efficiency of banks is crucial and absence of which can jeopardize the investment scenario and thus pose a credible threat to the economy (Lipsey and Harbury, 1992). Thousands of people are directly related to the banks for financial services and therefore the business of the banks should be run with diligence as the clients invests their hard-earned money on the creditworthiness of the banks. As banks play a significant role to promoting economic growth and contributing to employment generations, attention has been given to measuring banks' performance over the past several years (Wanke et al., 2015; Uddin and Bristy, 2014).

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The pivotal role of commercial banks in the smooth functioning of the economy has instigated investigations on the banking efficiency in both developing and emerging economies (Roghanian, 2012). It can be assumed that efficiency in the banking system may contribute to a large extent by ushering greater innovation, higher profitability, and greater safety; and bolstering capital cushions that absorb risk (Casu et al., 2004). Efficiency analysis shows how a particular decision-making unit (DMU, in this case a bank) of any sector of interest attempts to produce the optimum outputs from a given combination of inputs (Alrafadi et al., 2016) and these measures and comparison of efficiency in banking industry is very pivotal for guiding the smooth functioning and permanence of financial market (Berger and Humphrey, 1997). It may exert a considerable impact on ensuring firmness of banking sector in one hand and safeguarding the efficacy of a country's whole monetary system on the other hand (Alrafadi et al., 2016).

With the passage of time a good number of new commercial banks have embarked in the banking industry in Bangladesh that promulgated huge competition among the commercial banks (Uddin and Suzuki, 2014). This fierce competition among the banks has amplified for different reasons which include, *inter alia*, market liberation, technological developments, and the entrance of non-banking institutions (Islam et al., 2017). These factors force the commercial banks for improving their efficiency and due to this all the stakeholders like investors, government, and all other policymakers remain highly vigilant about the banking performance and efficiency.

The present paper endeavors to assess the efficiency and productivity of the twenty Dhaka Stock Exchange Listed commercial banks in Bangladesh that are rated by prestigious and well-known rating agencies in Bangladesh over a period of 6 years ranging from 2012 to 2017. Both parametric and non-parametric techniques are widely applied by almost all recent literature for measuring efficiency and productivity (Murillo-Zamorano and Vega-Cervera, 2001). The non-parametric procedures use linear programming tools which are constructed as a piecewise linear combination of best-practice firms and DEA is commonly used under this approach (Kocisova 2015). Among the parametric approach, Stochastic Frontier Approach (SFA) is commonly used in empirical estimations that pre-identifies a functional form of production and or cost function. While both methods are used and when both methods yield the same results then DEA is treated to be more reliable by researchers (Hwang et al., 2016).

This paper has utilized both conventional DEA and the Malmquist based DEA. Different strategies for estimating the efficiency change are used in literature that include Fisher Index, Tornqvist record and the Malmquist Index. The Malmquist Index has been widely used for productivity measurement (Wang and Lan, 2011). This Index can be used to measure how the bank's productivity and efficiency changed over time. One can use DEA method using either input based or an output-based assumption condition to that these approaches rely upon input distance function or output distance function. Input oriented DEA approach has been used in this paper with one output variable and four input variables. Operating profit is treated as an output variable while four input variables like operating income, operating expense, total asset, and deposit are used input variables. The corresponding unit prices of these variables were used to calculate AE and EE.

The rest of the paper is designed as follows. Section two presents the literature review of prior similar studies. Section three deals with the conceptual framework of the study followed by section four that presents the methodology and suggested DEA approaches. Section five analyzes the results and make the discussions. The last section represents the conclusions and prescribes some policy guidelines based on the results obtained.

Literature Review

Lately there has been an increasing attention in estimating productivity change and efficiency change of commercial banks both in developing countries and developed countries. Akhtar et al. (2011) used DEA to estimate the relative efficiencies of Pakistani commercial banks and their findings suggested that by effectively handling operating expenses, advances, and capital and by making prudential investment decisions banks can successfully enhance their efficiency. By using non-parametric DEA and second stage-Tobit regression, Ariff and Can (2008) found that Chinese medium-sized banks are more effective than their contemporaries of large commercial banks.

In another study, Samad (2013) carried out a comparative study among the TE of Islami banks and other conventional banks across several countries by applying SFA and the estimated results indicated that the difference between the TE scores of these two categories of banks were statistically insignificant. Jackson and Fethi (2000) studied the efficiency levels of Turkish banks and claimed that the profitable banks operated at higher levels of TE compared to their peer of less profitable banks. Zaim (1995) explored the impact of financial reforms on the economic efficiency levels of Turkish commercial banks and concluded that the policy changes resulted in escalated levels of technical and allocative efficiency levels.

By applying non-parametric DEA, Sathye (2003) tried to measure efficiency of banks in India and revealed that the average efficiency score of Indian commercial banks are akin with the world's best performing banks. Sufian (2016) used DEA based panel data analysis over the period of 1999-2008 on Malaysian banks and showed that DEA efficiency scores increased gradually during the study period. Moreover, the panel regression analysis showed that efficiency scores were positively associated with bank size, foreign ownership, and capitalization. In a study, Agarwal et al. (2014) applied DEA method for estimating the efficiency of 18 Indian Banks over the period of 2004 - 2013 and the study stated that Indian private sector banks were superior to those of the Indian public sector banks and indicated that there is ample scope for improving the efficiency of public sector banks.

By using DEA model Ismail et al. (2013) made a comparative study between the efficiency of eight Islamic and nine standard commercial banks in Malaysia by relying upon panel data for the period of 2006 to 2009. The study claimed that scale efficiency is the most important reason for technical inefficiency for both Islamic and traditional conventional commercial banks. The results indicated that all the estimated efficiency indices of conventional banks superseded the corresponding efficiency scores of Islamic banks.

Isik and Hassan (2002) investigated the input and out efficiency of Turkish banks by employing both parametric and non-parametric methods and found that TE plays a

stronger role than the AE in influencing the inefficiency levels of the banks. Further, Aly et al. (1990) employed a non-parametric frontier approach with a sample of 322 independent banks operating in the U.S. and found that TE was more influential than AE in affecting inefficiency of the banks. However, Kumar and Gulati (2008) conducted cross-sectional analysis with DEA techniques to evaluate of efficiency of 27 public sector banks in India for the year 2004-2005 and observed that both TE and AE dominated the inefficiencies of the banks.

Several studies have been conducted by relying upon commercial banks in Bangladesh as well. Using a cross-section data, Khanam and Nghiem (2004) estimated the efficiency levels of 48 commercial banks in Bangladesh and according to this study the TE score of banks in the sample was 84 percent under income-based model while the same was found to be 80 percent under user-cost model. However, the study did not find any noteworthy connection between foreign ownership and bank efficiency.

Using panel data over the period of 2001-2008, Uddin and Suzuki (2011) endeavoured to measure the degrees of efficiency of commercial banks in Bangladesh before and after the implementation of financial reforms and the study claimed that income efficiency and cost efficiency of sampled banks improved by 37.84 percent and 15.28 percent in 2008 and 2001, respectively. Ahmed and Liza (2012) analyzed data of 35 commercial banks of Bangladesh for a period from 2002 to 2011 using DEA and found that third generation banks are among the most efficient ones among the banks studied.

Roy and Siddiqua (2013) analyzed data of 41 major banks in Bangladesh for a single year only (the year 2013) and applied both VRS and CRS models of DEA with five input variables and four output variables to calculate efficiency scores and found that foreign commercial banks were more efficient than the local commercial banks mainly because of more efficient access to technology. Hossian et al. (2016) also analyzed single year data (2014) of 21 commercial banks in Bangladesh using both input-oriented DEA and output-oriented DEA under the assumption of VRS and found only five banks from the sample to be efficient.

Hoque et al. (2014) examined data of selected commercial banks for the period 2006-2011 and applied input-oriented DEA (both VRS and CRS) on four input variables and three output variables and found that only three out of the twenty-nine banks studied were inefficient. The paper claimed that pure technical efficiency contributed more than scale efficiency when the efficiency scores are evaluated. The paper also concluded that the larger the banks are, the more efficient they are.

In a recent study, Baten et al. (2015) estimated the changes in TE and productivity change of nationalized commercial banks (NCBs) and private commercial banks (PCBs) of Bangladesh by applying different DEA models like cost, profit and Malmquist based DEA. In that study the authors discoursed that the cost efficiency and profit efficiency are to some extent higher for PCBs than those for NCBs. The average TE and AE scores were stated as 75.4% and 35.9% respectively under the approach of cost DEA; while 74.0% and 31.8% respectively for-profit DEA. Jahan (2019) also applied MPI approach on data of 29 listed commercial banks in Bangladesh for the period of 2011-2015 and revealed that private Islamic banks exhibited less variability in TFP change in comparison with the private non-Islamic banks. The paper further concluded that

development in TFP was more due to improvement in efficiency shift than technological change.

Hassan and Hassan (2018) deployed single stage SFA to measure cost efficiency with data on 35 commercial banks over the period 2011-2015 and found that private commercial banks, both Islami banks and Non-Islami banks, are more efficient than the state-owned commercial banks. The paper attributed lack of efficiency to low technological advancement and non-performing loans. Nabi et al. (2019) also used DEA to evaluate 19 commercial banks comprising state owned banks, and private Islamic and Non-Islamic banks with data for the period of 2009-2014 and found state owned banks to be the most inefficient among the sample. The paper attributed technical inefficiency of state-owned banks and private Islamic banks to scale inefficiency and technical inefficiency of private non-Islamic banks to pure technical efficiency. Similar work was also done with 36 commercial banks in Bangladesh by Alam et al. (2014) and with twenty banks by Hossain (2015) who also identified state-owned banks to be less efficient in performance than the private banks.

While there has been a plethora of literature concentrating on the issues of banks' productivity, technological change, and efficiency; there is hardly any study dealing with the efficiency measurement of the commercial banks in Bangladesh which are highly rated by different credit rating agencies like CRAB, CRISL, ECRL. Moreover, none of the research works explored by the author (s) used price information in their analysis. This paper uses price information in analyzing the efficiency scores of the banks which is an important contribution to the existing body of knowledge in this area according to the best of knowledge of the authors. Besides, this paper selects only those banks that are highly rated by the different reputed rating agencies in Bangladesh. The present paper applies conventional DEA method to estimate TE, AE, and EE of banks and utilizes Malmquist DEA to investigate the efficiency and productivity changes using a panel data over the period of 2012-2017. The results may provide indication of the possible presence of substantial economies of scale or diseconomies of scale for smaller banks and larger banks respectively; and help devise the banking operations in the right way to realize the optimum benefit of economies of scale.

Theoretical Framework

Charnes - Cooper and Rhodes (hereafter CCR) (1978) are considered as the originator of a new model of efficiency to introduce the DEA approach in its present form which is now widely used to evaluate the relative efficiency of each from a homogenous DMU by comparing it with the best performing firm (Cooper et al., 2011). The estimations of relative efficiency of homogenous DMUs can be accomplished using either output expansion or input contractions perspective (Athanassopoulos, 2019). Under input-orientated DEA approach, we can calculate the efficiency of DMUs by radially reducing the inputs to the levels of input of the best performing DMUs for producing the same level of output. It may be noted that one can apply DEA method using either input distance function or output distance function and these two methods would not lead to same outcomes unless we assume that the DMUs are operating under CRS (Färe et al., 1994).

To aiding better understanding, the input-based DEA model is portrayed in the following figure *1* where a particular DMU (bank, in this case) produces a single output (*q*) by using two variable inputs like (x_1, x_2). If we assume that a particular bank is fully efficient then it would lie on the Iso-quant represented by S′. If a particular bank produces a single output, *y*, by using two variable inputs like x_1 and x_2, then we can represent the inefficiency of that bank by the distance *QP*. It is worth noting that this distance, represented by *QP*, shows the contraction of inputs that may be radially decreased while keeping the outputs constant.

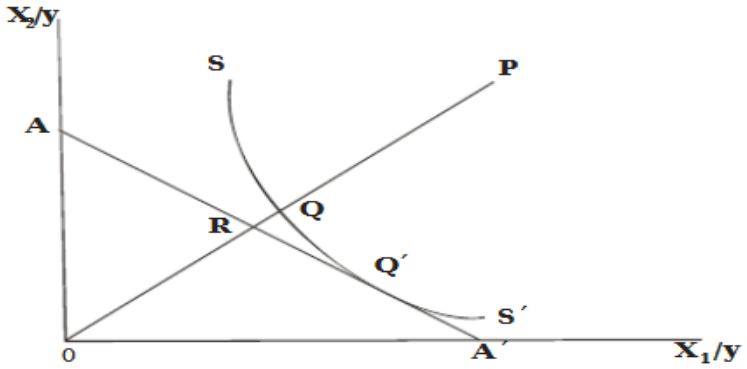


Figure 1: Input-based efficiency indices. Source: Coelli et al., 1998, p. 135

The TE of the assumed bank is given in terms of the ratio of 0Q/0P. In other words, it can be measured by 1- QP/0P. If a bank obtains an efficiency score of *1*, it will indicate that the bank is technically efficient or in other words the bank is producing the optimum output using a given combinations of inputs. If we consider the Iso-cost line as *A A ′* by assuming that we know the input price ratio representing the slope of the Iso-cost line, then for the DMU operating at point *P*, we can denote AE as the ratio of 0*R/0Q*. The distance *RQ* embodies the contraction of production cost if a bank operates at point Q′ which is efficient from the perspective of both technical and allocative sense. After calculating TE and AE, one can easily calculate the EE which is simply the multiplication of TE and AE. From the figure it may be shown by the ratio 0R/0P, where *RP* epitomises the likely lessening of cost if the farm is capable to operate in economically efficient way.

Data Envelopment Analysis

The DEA linear programming technique was developed by CCR (1978). The CCR model assumes that all DMUs are input efficient and operate under CRS. The model also holds that there is no considerable relationship between the scale of operations and efficiency, and it estimates the overall TE accordingly. Thus, if we assume that all DMUs are operating under CRS assumption when at least one of these DMUS are operating at inefficient scale, may be due to the existence of either economies or diseconomies of scale, then the estimated measures of efficiency may be biased with scale efficiencies. To handle the limitations of the CCR model, Banker et al. (1984) relaxed the assumptions of CRS model and estimated the model with the assumptions of VRS and it is a measurement of TE without regard to scale efficiency. This model of

Banker et al. (1984) is commonly known as BCC model (Banker, R. D. A., Charnes, C. and. Cooper, W. W. 1984.). Sufian (2007) claims that if there is a discrepancy between the estimated technical and pure technical efficiency, then it would indicate the presence of scale inefficiency. Let us define the production opportunity set of a particular bank by encompassing the observations as firmly as plausible by a piecewise linear outward limit and as specified by Farrell (1957) and Islam et al. (2011):

$$T = \{(x,y): \sum_{j=1}^{J} \lambda_j x_{nj} \leq x_{n,}(n = 1, \dots N), \sum_{j=1}^{J} \lambda_j y_{mj}\,(m = 1, \dots, M), \sum_{j=1}^{J} \lambda_j = 1(j = 1, \dots J)\} \qquad (1)$$

In the above equation (1), *J* represents the number of banks while the nonnegative weights, λ_j, dictates the reference point on the frontier. When the constraint is $\sum \lambda_j = 1$, then it would ensure that we can estimate the DEA model under the assumption of VRS; *M* represents the number of outputs while *N* denotes the number of inputs and *T* symbolises the production possibility set. For the i^{th} bank, out of *J* banks, we can calculate the *TE* under CRS by solving the following equations:

$$\mathrm{TE_i} = \mathrm{Min}_{\theta\lambda,} \theta^{\mathrm{CRS}}$$

$$\text{Subject to: } \sum_{j=1}^{J} \lambda_j y_{mj} - y_{mj} \geq 0, m = 1, \dots\dots, M \qquad (2)$$

$$\theta_i x_{ni} - \sum_{j=1}^{J} \lambda_j x_{nj} \geq 0, n = 1, \dots\dots, N$$

$$\lambda_j \geq 0, j = 1, \dots\dots, J$$

$$\theta_i \in (0,1)$$

Here *x* and *y* are respectively the input and output vectors, θ is a scalar that defines the TE of a particular bank *i* under CRS and it satisfies $1 \leq \theta$, while a score of 1 indicates that the bank is producing on the efficient frontier and hence the bank is technically efficient; otherwise it is DEA inefficient with respect to other banks in the sample according to the definition provided by Farrell (1957). It is important to note that we need to solve the above equation (2) for *N* times to calculate efficiency score of each of the banks under the study. One can easily convert the CCR (Charnes-Cooper-Rhodes, 1978) model and make it operational under the assumption of VRS by adding the convexity constraint: $\sum \lambda_j = 1$, , where $\lambda_j \geq 0$, $j = 1, \dots, J$, to equation (2) (Banker et al., 1984). The convexity restriction $\sum \lambda_j = 1$, confirms that the inefficient bank is 'benched mark' only against banks of comparable size. The overall technical efficiency (OTE) scores can be decomposed into its two collective exhaustive components: pure technical efficiency (PTE) and scale efficiency (SE) (see Thanassoulis, 2001; Ataullah et al., 2004).

The EE and AE are derived through solving the following cost minimization LP:

min λ, $xi^{*}w_i' x_i^{*}$

$$min_{\lambda, xi*wixi*}$$

Subject to:

$$\sum_{j=1}^{J} \lambda_j y_{mj} - y_{mj} \geq 0, m = 1, \ldots\ldots, M$$

$$\theta_i x_{ni} - \sum_{j=1}^{J} \lambda_j x_{nj} \geq 0, n = 1, \ldots\ldots, N \quad (3)$$

$$\sum_{j=1}^{J} \lambda_j = 1$$

$$\lambda_j \geq 0, j = 1, \ldots\ldots, J$$

$$\theta_i \in (0,1)$$

Here, w_i, is a vector of input prices for the i^{th} bank and λn_i is the cost minimizing vector of input quantities for the i^{th} bank, given the input prices w_i and the output levels, y_i. We can calculate EE of the i^{th} bank by comparing the minimum cost of the farm to the genuine cost of the same:

$$EE_i = \frac{w_i' x*i}{w_i' xi} \quad (4)$$

Following the definition of Farrell (1957), we can calculate AE residually by using the following equation:

$$AE_i = \frac{EE_i}{TE_i} \quad (5)$$

Malmquist Index

This study relies on DEA based output oriented MPI. This index is commonly used to see the changes of productivity a particular decision-making unit over time. The MPI depends on CRS and output-based orientation approach and it implies that results would not be different from the input oriented approach (Coelli, 1996; Thanassoulis, 2001; Yao, Han & Feng, 2008). Fare et al. (1994) combines productivity measurement and efficiency measurement to construct MPI by utilizing the DEA methodology. The MPI are formed using DEA and estimated using software DEAP Version 2.1 developed by Coelli (1996). Forsund (1991) decomposed the MPI into two components like – the technical efficiency change (EFFCH) and the technical change (TECHCH). For two technologies *s* and *t*, Fare et al. (1989) disintegrated MPI into its two components and following Fare using et al. (1989) we can write them as follows:

$$M_0^{s}(q_s, q_t, x_s, x_t) = d_0^{s}(q_t, x_t)/d_o^{s}(q_s, x_s) \quad (6)$$

The output- oriented MPI for period *t*- technology cane be written as:

$$M_0^{t}(q_s, q_t, x_s, x_t) = d_0^{t}(q_t, x_t)/d_o^{t}(q_s, x_s) \quad (7)$$

Since there are two possible Malmquist Factor Productivity (MFP) measures, which are based on period *s* and period *t*, the changes in MFP and its components are also measured as the geometrical average of MPI (Fare et. al., 1994) and it can be written as follows:

$$M_0 (q_s, q_t, x_s, x_t) = [M_0^s (q_s, q_t, x_s, x_t) \times M_0^t (q_s, q_t, x_s, x_t)]^{0.5}$$
$$= [d_0^s(q_t, x_t)/d_o^s(q_s, x_s) \times d_0^t(q_t, x_t)/d_o^t(q_s, x_s)]^{0.5} \quad (8)$$

Following Fare et al. (1989), we can write equation (8) as follows:

$$M_0 (q_s, q_t, x_s, x_t) = d_0^t(q_t, x_t)/d_o^s(q_s, x_s)[\, d_0^s(q_t, x_t)/d_o^t(q_t, x_t) \times d_0^s(q_s, x_s)/d_o^t(q_s, x_s)]^{0.5} \quad (9)$$

Where: M_0 = output-oriented Malmquist Productivity Index, *d* = distance function, x and y represent inputs and outputs, respectively, across time *s* and *t*. *M = EFFCH × TECHCH*. Here EFFCH stands for technical efficiency change, and TECHCH stands for technical change.

Technical efficiency change (EFFCH) is assessed by the ratio outside the parenthesis between time *s* and *t* and it represents the relative distance of the observed production from the maximum attainable production. On the other hand, the components appearing inside the parenthesis denote geometric averages of the two productivity measures, representing a shift in the production technology (technical change, TECHCH), over the periods *s* and *t*. We can further decompose technical efficiency change (EFFCH) into pure technical efficiency change (PECH) and scale efficiency change (SECH).

Total factor productivity (TFP) change is the results of multiplication of change in technical efficiency and technological change. Likewise, technical efficiency change is the multiplication of scale efficiency change and pure technical efficiency change. It may be noted that if '*MPI*' takes a value greater than 1 then it implies the productivity growth with respect to both technological change and efficiency change, and a value less than one implies productivity loss.

Table 1: Level of Productivity Index

Malmquist Productivity Index (MPI)	Level of Productivity
MPI > 1	Increase in productivity
MPI =1	Unchanged productivity
MPI <1	Loss of productivity

Data and selection of variables

This study analyzed data from twenty private commercial banks of Bangladesh which are highly rated by CRISL, CRAB, NCL, and ECRL and selection criteria of the banks in the study was dictated by the availability of data. The data used in this study were acquired from the audited annual reports of respective commercial banks during the study period of 2012–2017. To estimate efficiency of a particular DMU using DEA, we need to define the input, output, and per input price in case of estimating cost efficiency.

Different methods are available to define the input-output relationship of a DMU which include among others, intermediation approach, production approach, asset, and profit approach. As bank is a financial intermediary that mainly transforms liabilities (deposits) into loans (assets), therefore this study applies the intermediation approach to measure the efficiency of banks.

Empirical Results and Discussions

Table 2 provides the descriptive statistics of inputs, outputs, and per unit input price used in this study, including mean, standard deviation, minimum and maximum. It is evident from Table 2 that there exists substantial disparity of the operations of private commercial banks in Bangladesh over the study period of 2012 – 2017 and this disparity of the scale of operations may exert an influence to determine the performance of the banks which has not been explicitly considered to address the scale effect on performance measurement. This study considers one output namely operating profit and four inputs and their corresponding per unit prices like operating income, operating expenses, total assets, and deposits to calculate efficiency of commercial banks.

Table 2: Summary statistics of output and inputs for twenty Banks from 2012 to 2017 (In million BDT)

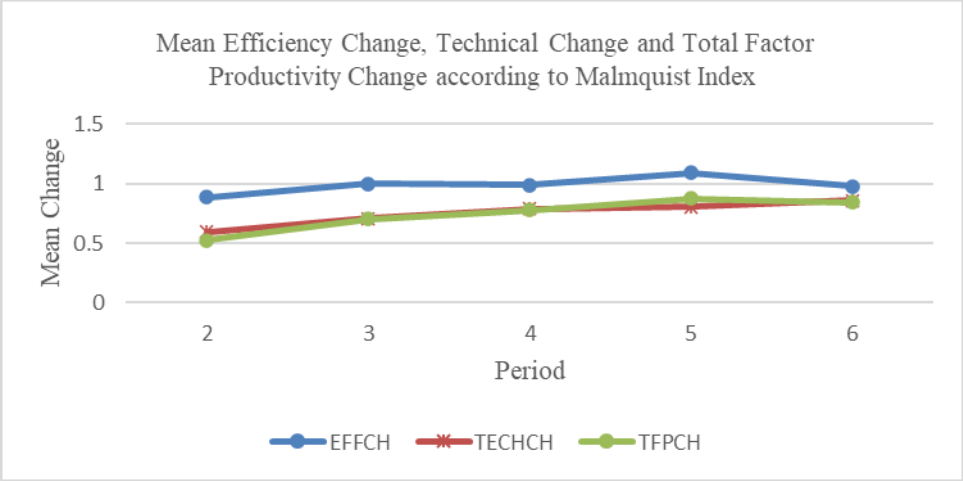
Variables	Mean	Std.	Max	Min.
Operating Profit	3461.46	1706.46	8423.13	157.93
Operating Income	9747.86	3754.48	18709.68	935.60
Operating Expense	5009.04	2330.37	13949.05	371.30
Total Assets	199026.22	69421.09	368314.62	9113.68
Deposits	154329.82	52967.09	278195.49	96.49
Per employee Operating Income	3.56	1.52	7.78	0.45
Per employee Operating Expense	1.81	0.75	6.47	0.18
Per employee Total Assets	78.27	32.36	158.95	4.40
Per employee Deposits	60.57	24.51	122.99	0.05

Source: Calculated from annual reports during the periods 2012-2017, the number of banks, $N = 20$.

This study estimated the efficiency scores of banks using DEA under the assumptions of CRS and VRS. For empirical analysis, the study used DEAP 2.1 software developed by Tim Coelli (1996). It may be noted that CRS assumption of efficiency measurement is only valid if all DMUs operate at an optimal scale. However, this strong assumption becomes invalid if all DMUs fail to operate at optimal scale due to the presence of scale inefficiency. Therefore, we estimate the efficiency scores under assumptions of both CRS and VRS.

Table 3 and Figure 2 summarize the average technical, allocative, and economic efficiency scores of all the banks over the study period. It is observed that Bangladeshi private commercial banks are more allocatively efficient than technically efficient. In addition, the variability of relative efficiency, measured as standard deviation, is more

for technical efficiency compared to allocative and cost efficiencies. The mean TE score reached its zenith in the year 2015 (under VRS assumption) and displayed the smallest score in the year 2012. However, it is observed that the average TE score of all banks gradually increased over the study period. One plausible explanation of such improvement in TE could be since most of the commercial banks could utilize the benefits of upgrading their operating systems particularly with respect to the level of staffing and properly positioning their branches.



The mean AE score showed a bit fluctuating trend over the study period. Under both CRS and VRS assumption AE had a lowest efficiency score of 35% and 76% respectively and this finding suggests that banks confronted to bear additional costs to handle their increased non-performing loans (NPLs) while banks' output, as measured by operating profit, declined simultaneously. The mean economic (cost) efficiency score shows similar pattern like that of AE score. This implies that AE has a larger impact on cost efficiency than TE as cost efficiency is simply the product of technical and allocative efficiencies.

Table 3: Mean Technical, allocative and Economic efficiency: all banks, 2012-2017

	CRS							VRS						
	2012	2013	2014	2015	2016	2017	**Mean**	2012	2013	2014	2015	2016	2017	**Mean**
Technical efficiency	0.61	0.67	0.73	0.77	0.68	0.67	0.69	0.70	0.88	0.89	0.91	0.89	0.88	0.86
S.D.	0.23	0.19	0.17	0.17	0.20	0.19	0.19	0.25	0.15	0.12	0.12	0.15	0.12	0.15
Allocative efficiency	0.35	0.89	0.94	0.57	0.76	0.75	0.71	0.76	0.92	0.93	0.84	0.91	0.89	0.88
S.D.	0.17	0.08	0.05	0.11	0.19	0.10	0.12	0.22	0.07	0.07	0.17	0.10	0.08	0.12
Economic efficiency	0.23	0.60	0.70	0.44	0.52	0.51	0.50	0.55	0.81	0.83	0.76	0.81	0.78	0.76
S.D.	0.20	0.18	0.17	0.12	0.21	0.19	0.18	0.28	0.15	0.14	0.17	0.16	0.14	0.17

Note: S.D. stands for Stand Deviation

Table 4 presents the results of Friedman's non-parametric tests of the mean efficiency scores calculated respectively according to constant returns to scale and variable returns to scale across the years 2012-2017.

Table 4 : Friedman's Non-parametric Test of Related Samples for Mean Efficiency Scores

Friedman's Non-parametric Test of Related Samples for Mean Efficiency Scores Across 2012-2017	Test Statistic	Df	*P*-value	Null Hypothesis ($\alpha = 0.05$)
Constant Returns to Scale				
TE	10.066	5	0.073	Accepted
AE	77.489	5	0.000	Rejected
EE	49.907	5	0.000	Rejected
Variable Returns to Scale				
TE	10.542	5	0.061	Accepted
AE	12.626	5	0.027	Rejected
EE	17.644	5	0.003	Rejected

The results show that there were no statistically significant changes (at 0.05 significance level) in the mean TE scores (according to both CRS and VRS) during the periods. However, the results are statistically significant at 0.05 percent level of significance and rejects the null hypothesis in support of the notion that there have been statistically significant changes in the mean AE and EE scores (according to both CRS and VRS) during the same period. These findings also support the conclusion that the AE of the industry as a whole had a greater effect on the EE of the industry.

Table 5 displays the results of individual bank's TE over the study periods. The results of the DEA efficiency scores under the assumption of both CRS and DRS are presented in the same table. Under the CRS assumption, the mean efficiency of sampled banks during the study period were 61%, 67%, 73%, 77%, 68%, and 67%, respectively and the average efficiency calculated using the CRS ranges from 61% to 77%. Southeast Bank displayed the highest mean efficiency score of 91% followed by Eastern Bank (85%) and Pubali Bank (83%).

Table 5: Technical Efficiency (CRS& VRS) of selected PCBs.

DMUs	**CRS**							**VRS**						
	2012	2013	2014	2015	2016	2017	**Mean**	2012	2013	2014	2015	2016	2017	**Mean**
AB Bank	1	0.51	0.56	0.97	0.35	0.58	0.66	1	0.65	0.66	1	0.55	0.81	0.78
Bank Asia	0.66	0.74	0.84	1	0.60	0.70	0.76	0.73	0.90	0.89	1	0.79	0.84	0.86
BRAC Bank	0.30	0.59	0.79	0.69	1	1	0.73	0.37	0.76	0.83	0.71	1	1	0.78
Dutch Bangla Bank	0.70	0.62	0.76	0.88	0.41	0.64	0.67	1	0.72	0.80	0.92	0.64	0.73	0.80
IFIC Bank	0.38	0.72	0.60	0.41	0.54	0.50	0.53	0.42	0.92	0.82	0.76	1	0.84	0.79
Prime Bank	0.72	0.48	0.47	0.48	0.38	0.31	0.47	1	0.56	0.59	0.60	0.64	0.71	0.68
The City Bank	0.35	0.41	0.85	0.78	0.82	0.79	0.66	0.42	0.74	0.92	0.81	0.91	0.89	0.78
Trust Bank	0.37	0.40	0.77	0.86	0.82	0.85	0.68	0.38	1	1	1	0.98	1	0.89
Jamuna Bank	1	0.70	0.52	0.65	0.71	0.82	0.73	1	1	0.93	1	1	1	0.99
Uttara Bank	0.58	0.70	0.72	0.61	0.45	0.24	0.55	0.70	0.89	0.86	0.90	0.95	1	0.89
Eastern Bank	0.87	1	0.96	0.75	0.83	0.73	0.85	1	1	1	0.85	1	0.92	0.96
Dhaka Bank	0.47	0.77	0.80	0.73	0.61	0.63	0.67	0.53	0.99	1	1	0.96	0.90	0.89
Southeast Bank	1	1	1	1	0.83	0.64	0.91	1	1	1	1	0.89	0.80	0.95
Pubali Bank	0.63	1	0.89	0.90	0.99	0.53	0.83	0.80	1	0.9	0.91	1	0.63	0.87
United Commercial Bank	0.63	0.88	0.91	0.99	0.62	0.66	0.78	0.74	0.94	1	1	0.70	0.72	0.85
National Bank	0.43	0.53	0.71	1	1	1	0.78	0.56	0.61	0.76	1	1	1	0.82
Mercantile Bank	0.66	0.78	0.49	0.69	0.67	0.75	0.67	0.77	0.94	0.80	0.87	0.91	0.87	0.86
Mutual Trust Bank	0.36	0.46	0.61	0.71	0.64	0.56	0.56	0.37	1	1	0.96	0.98	1	0.89
One Bank	0.75	0.59	0.92	0.73	0.69	0.72	0.73	0.86	0.96	1	0.99	0.95	0.93	0.95
Premier Bank	0.37	0.52	0.51	0.66	0.62	0.78	0.58	0.39	1	1	1	1	1	0.90
Mean	0.61	0.67	0.73	0.77	0.68	0.67		0.70	0.88	0.89	0.91	0.89	0.88	

Based on the average estimates it may be deduced that most of the banks failed to generate output on the efficiency frontier in most of the years covered by the study. Out of the surveyed banks only several banks namely, Bank Asia, Jamuna Bank, Eastern Bank, Southeast Bank, Pubali Bank, United Commercial Bank, Mercantile Bank and One Bank had efficiency scores above 50% in each year of the study period under the assumption of both CRS and VRS. Efficiency scores of most of the banks seemed to improve when the assumption of VRS built in BCC model is used. Under the VRS assumption the mean efficiency of sampled banks during the study period were 70%, 88%, 89%, 91%, 89%, and 88%, respectively and the efficiency scores range from 68% to 99%. Jamuna Bank displayed the highest mean efficiency score of 99% followed by Eastern Bank (96%) and Southeast Bank (95%).

Table 6 presents the results of individual bank's AE during the study periods. Under the CRS assumption the mean efficiency of sampled banks during the study period were 35%, 89%, 94%, 57%, 76%, and 75% respectively and the efficiency calculated using the CRS ranges from 35% to 94%. BRAC Bank displayed the highest mean AE score of 85% followed by Dutch Bangla Bank (83%) and The City Bank (79%). However, one out of four banks that were studied had an AE score of only 25% or less in the year 2012 under the assumption of CRS. Trust Bank exhibited the lowest scores 19% and 29% respectively under the assumptions of CRS and VRS. As expected under the VRS assumption efficiency scores of all banks improved significantly and it ranges in between 70% to 97%.

Table 6: Allocative Efficiency (CRS& VRS) of selected PCBs

DMUs	**CRS**							**VRS**						
	2012	2013	2014	2015	2016	2017	**Mean**	2012	2013	2014	2015	2016	2017	**Mean**
AB Bank	1	0.9	0.98	0.45	0.60	0.56	0.75	1	0.90	0.90	0.53	0.91	0.72	0.83
Bank Asia	0.31	0.92	0.96	0.29	0.73	0.72	0.66	0.81	0.88	0.97	0.45	0.88	0.84	0.81
BRAC Bank	0.40	0.99	0.94	0.75	1	1	0.85	0.89	0.96	0.94	0.96	1	1	0.96
Dutch Bangla Bank	0.46	0.98	0.98	0.73	0.93	0.91	0.83	1	0.99	0.97	0.74	0.98	0.98	0.94
IFIC Bank	0.33	0.90	0.98	0.54	0.19	0.65	0.60	0.73	0.94	0.92	0.97	0.84	0.85	0.87
Prime Bank	0.35	0.91	0.96	0.58	0.80	0.75	0.72	1	0.92	0.84	0.94	0.97	0.94	0.93
The City Bank	0.44	0.99	0.89	0.68	0.90	0.88	0.79	0.93	0.94	0.89	0.87	0.93	0.95	0.92
Trust Bank	0.19	0.67	0.82	0.50	0.65	0.65	0.58	0.29	0.74	0.80	0.76	0.84	0.796	0.70
Jamuna Bank	0.21	0.88	0.89	0.59	0.80	0.72	0.68	0.57	0.91	0.87	0.93	0.97	0.92	0.86
Uttara Bank	0.38	0.91	1	0.68	0.89	0.76	0.77	0.89	0.95	0.99	1	0.99	0.99	0.97
Eastern Bank	0.40	1	0.89	0.61	0.88	0.82	0.77	0.99	1	0.91	0.91	0.96	0.90	0.94
Dhaka Bank	0.24	0.87	0.89	0.46	0.74	0.70	0.65	0.53	0.85	0.798	0.78	0.85	0.90	0.78
Southeast Bank	0.195	0.87	1	0.53	0.72	0.65	0.66	0.59	1	1	0.59	0.79	0.73	0.78
Pubali Bank	0.37	0.74	0.98	0.59	0.40	0.75	0.64	0.90	0.79	0.98	0.61	0.57	0.89	0.79
United Commercial Bank	0.29	0.93	0.99	0.62	0.85	0.80	0.75	0.75	0.99	1	1	0.88	0.87	0.92
National Bank	0.40	0.87	0.99	0.63	0.91	0.77	0.76	0.91	0.89	0.96	1	1	0.78	0.92
Mercantile Bank	0.25	0.90	0.97	0.53	0.85	0.76	0.71	0.61	0.90	0.87	0.87	0.95	0.89	0.85
Mutual Trust Bank	0.22	0.84	0.87	0.55	0.77	0.68	0.66	0.35	0.88	0.97	0.97	0.97	0.92	0.84
One Bank	0.32	0.91	0.99	0.60	0.73	0.70	0.71	0.78	0.98	1	0.88	0.92	0.862	0.90
Premier Bank	0.31	0.89	0.92	0.49	0.78	0.79	0.70	0.59	1	1	1	1	1	0.93
Mean	0.35	0.89	0.94	0.57	0.76	0.75		0.75	0.92	0.93	0.84	0.91	0.89	

The mean EE under the assumptions of both CRS and VRS follow the exact pattern like those of AE. The results indicate that AE has exerted more pronounced effect on EE than the TE. It can be seen from the table that like the patterns observed in case of AE, EE scores were also low as only four out of five banks that were studied scored less than 25% in the year 2012 under the CRS assumption. The average EE under CRS assumptions are 23%, 60%, 70%, 44%, 52%, and 51% respectively over the study period whereas the scores stand as 55%, 81%, 83%, 76%, 81% and 78% respectively under VRS and these figures indicate significant improvement over the efficiency scores of CCR model.

Table 7: Economic Efficiency (CRS& VRS) of selected PCBs

DMUs	CRS							VRS						
	2012	2013	2014	2015	2016	2017	Mean	2012	2013	2014	2015	2016	2017	**Mean**
AB Bank	1	0.46	0.55	0.44	0.21	0.33	0.50	1	0.58	0.59	0.53	0.50	0.586	0.63
Bank Asia	0.21	0.68	0.82	0.294	0.44	0.51	0.49	0.59	0.79	0.86	0.45	0.690	0.709	0.68
BRAC Bank	0.12	0.58	0.74	0.52	1	1	0.66	0.33	0.73	0.79	0.68	1	1	0.75
Dutch Bangla Bank	0.32	0.61	0.74	0.642	0.39	0.59	0.55	1	0.71	0.78	0.65	0.63	0.72	0.75
IFIC Bank	0.13	0.65	0.59	0.23	0.11	0.33	0.34	0.31	0.87	0.76	0.74	0.84	0.71	0.70
Prime Bank	0.25	0.44	0.45	0.27	0.30	0.23	0.33	1	0.52	0.49	0.56	0.62	0.66	0.64
The City Bank	0.15	0.40	0.75	0.53	0.73	0.69	0.54	0.39	0.692	0.81	0.71	0.85	0.85	0.72
Trust Bank	0.08	0.27	0.63	0.43	0.53	0.56	0.41	0.11	0.74	0.80	0.761	0.82	0.80	0.67
Jamuna Bank	0.21	0.62	0.46	0.38	0.57	0.60	0.47	0.57	0.91	0.81	0.93	0.97	0.92	0.85
Uttara Bank	0.22	0.63	0.72	0.42	0.40	0.19	0.43	0.63	0.85	0.86	0.90	0.94	0.99	0.86
Eastern Bank	0.35	1	0.86	0.452	0.73	0.599	0.66	0.99	1	0.91	0.78	0.96	0.83	0.91
Dhaka Bank	0.11	0.67	0.72	0.34	0.45	0.44	0.45	0.28	0.84	0.79	0.78	0.81	0.81	0.72
Southeast Bank	0.20	0.87	1	0.53	0.59	0.42	0.60	0.59	1	1	0.59	0.7	0.58	0.74
Pubali Bank	0.24	0.75	0.88	0.53	0.39	0.40	0.53	0.72	0.79	0.88	0.55	0.57	0.56	0.68
United Commercial Bank	0.18	0.82	0.908	0.62	0.52	0.53	0.60	0.56	0.93	1	1	0.62	0.63	0.79
National Bank	0.17	0.465	0.71	0.626	0.908	0.77	0.61	0.50	0.54	0.72	1	1	0.78	0.76
Mercantile Bank	0.17	0.695	0.48	0.36	0.57	0.57	0.47	0.46	0.84	0.70	0.75	0.87	0.77	0.73
Mutual Trust Bank	0.08	0.391	0.54	0.388	0.489	0.38	0.38	0.13	0.88	0.97	0.93	0.96	0.91	0.79
One Bank	0.24	0.537	0.914	0.433	0.509	0.51	0.52	0.67	0.94	1	0.87	0.876	0.80	0.86
Premier Bank	0.12	0.463	0.47	0.323	0.488	0.61	0.41	0.23	1	1	1	1	1	0.87
Mean	0.23	0.60	0.70	0.44	0.52	0.51		0.55	0.81	0.83	0.76	0.81	0.78	

Based on the results discussed above, it is observed that private commercial banks of Bangladesh exhibit some common features throughout the study period. One probable explanation of lower TE score could be the fact that most of the banks might have held excessive fixed assets and therefore they were unable to utilize these assets for generating operating profits. Based on the TE scores, it may be presumed that Bangladeshi private commercial banks are, on an average, appeared to be efficient and their level of efficiencies changed only marginally in the study period. As expected, number of efficient banks increased significantly under the assumption of VRS of BCC model which decomposes inefficiency of production units into two components: the pure technical inefficiency and scale inefficiency and thereby eliminate the effect of banks' size on efficiency.

As the study uses balanced panel data, it is interesting to see what has happened to the efficiency of banks during the periods studied and whether there was any technical change that took place in the study period. To detect these changes, we calculated MI and decomposed it to its different components like technical efficiency change (TEC), technological change (TCC), pure technical efficiency change (PTEC) and scale efficiency change (SEC). It may be noted here that the VRS or CRS option has no impact on the MI because both are used to calculate the various distances necessary to build the

Malmquist indices. Table 8 presents the results of the average Malmquist indices over the study period.

Total factor productivity change (TFPCH) along with its components efficiency change (EFFCH) and technological change (TECHCH) are shown in Table 8 and Figure 3. Table 8 also shows the two other sub-components of EFFCH – pure technical efficiency change (PECH) and scale efficiency change (SECH). TFPCH shows the changes in the productivity growth over time that may arise due to the adoption of innovative methods, ideas, designs, or technology that may enable the banks to carry out their operations more efficiently to produce maximum output with the given level of inputs.

Table 8: Malmquist Index Summary of Annual Means

Year	EFFCH	TECHCH	PTECH	SECH	TFPCH
2	0.885	0.593	0.85	1.042	0.525
3	0.997	0.706	1.001	0.995	0.703
4	0.987	0.788	1.041	0.948	0.777
5	1.09	0.803	0.996	1.094	0.875
6	0.979	0.859	1.015	0.964	0.84
Mean	0.985	0.744	0.978	1.007	0.733

Note: EFFCH = Technical Efficiency Change; TECHCH= Technological Change.
PTECH=Pure technical efficiency change; SECH = Scale efficiency change.
TFPCH= Total factor productivity change). All Malmquist index averages are geometric means.

Table 8 and Figure 3 presents the mean TFPCH under study period of 2012 to 2017. Within these periods, the financial market has experienced lots of turmoil that hamper the productivity and efficiency of banking industry as well. The mean value of EFFCH registered 0.985 or under 1.00 indicating a negative efficiency change and it is composed of pure and scale efficiency changes. Pure efficiency change (PECH) characterizes core efficiency due to enhanced processes and management. The results show that PECH score is 0.978 and it indicates that banks failed to improve their core efficiency. SECH indicates the returns to scale effects and the value of 1.007 shows a positive scale economies effect.

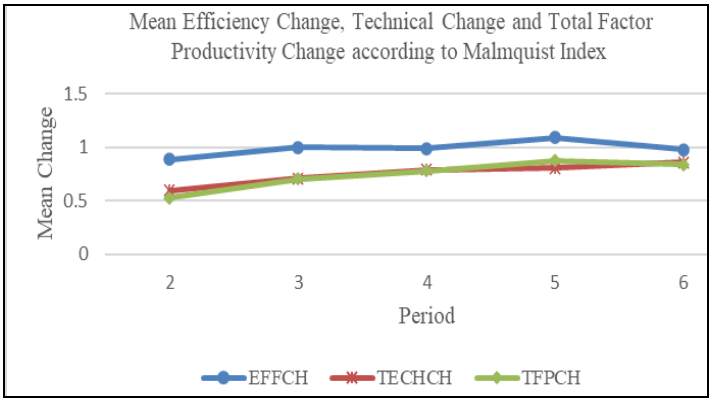


Figure 3: Mean Efficiency Change, Technical Change and Total Factor Productivity Change during the Study Period

TECHCH represents the shifts or change of the frontier and it may be due to technological change or innovation in the banking system. The average TECHCH score is only 0.744, a negative growth of -25.6%. During those periods, banking industry seemed to pay more attention for survival rather than improvement in technology. The average TFPCH of the sampled bank is 0.733 and this result indicates that the Malmquist index reached an annual average negative growth of -26.7%. This negative change can be dichotomized into efficiency change and technological change which are also displayed in Table 8.

The individual banks' Malmquist indices are given in Table 9. The average efficiency change achieved negative growth for most of the banks. However, IFIC bank, Uttara Bank and Prime Bank displayed positive efficiency change, which is a value of more than 1.00, during the study period. Technological efficiency change register below 1.00 in all analyzed banks which implies that technology has little impact on the total efficiency change.

We may further decompose the efficiency change index into its two components -pure technical and scale efficiency components. This decomposition suggests that decline in efficiency change may be attributed to a decline of both pure efficiency change and scale efficiency change. TECHCH values were under *1* in most of the sampled banks, which suggest deteriorating progress in terms of operations and management. It is evident that most of the banks operated at an optimal scale which implies that positive scale economies prevailed over the study period for most of the sampled banks.

Table 9: Malmquist Index Summary of Banks' Annual Means

Banks	EFFCH	TECHCH	PTECH	SECH	TFPCH
AB Bank	0.708	0.745	0.558	1.269	0.528
Bank Asia	0.997	0.73	0.997	1	0.728
BRAC Bank	1	0.699	1	1	0.699
Dutch Bangla Bank	1	0.699	1	1	0.699
IFIC Bank	1.017	0.731	1.017	1	0.743
Prime Bank	1.051	0.71	1.051	1	0.747
The City Bank	1	0.704	1	1	0.704
Trust Bank	0.99	0.826	1.133	0.874	0.818
Jamuna Bank	0.896	0.828	0.861	1.041	0.742
Uttara Bank	1.149	0.737	1.149	1	0.846
Eastern Bank	1	0.713	1	1	0.713
Dhaka Bank	0.99	0.795	0.99	1	0.787
Southeast Bank	0.989	0.769	0.989	1	0.76
Pubali Bank	1	0.724	1	1	0.724
United Commercial Bank	1	0.7	1	1	0.7
National Bank	1	0.699	1	1	0.699
Mercantile Bank	0.997	0.742	0.997	1	0.74
Mutual Trust Bank	1	0.799	1	1	0.799
One Bank	0.99	0.772	0.99	1	0.764
Premier Bank	1	0.777	1	1	0.777
Mean	0.985	0.744	0.978	1.007	0.733

Results suggest that TFPCH decreases due to decline in TECHCH for majority of the banks. TECHCH is characterized with the development of new products or technologies which result in improvement and shift in production frontier upfront. During the study

period stock market crisis, financial market development, and banking crisis might hinder the opportunity for developing new products and services to the PCBs.

Comparison of results

Under the CRS assumption, the mean technical efficiency of sampled banks of the present study during the study period were 61%, 67%, 73%, 77%, 68%, and 67%, respectively and the average efficiency calculated using the CRS ranges from 61% to 77%. These estimated range of efficiency scores are lower than those scores reported by Alam et al. (2014) who reported that the overall technical efficiency of banks in Bangladesh range from 76.6% to 91.3%. In a recent study Nabi et al. (2019) also documented higher efficiency scores (94.19%) of conventional commercial banks of Bangladesh. Roy and Siddiqua (2015) estimated the TE of Bangladeshi Commercial banks and their study reported average technical efficiency scores to be 80.55% and this result is similar with the results of the present study. Based on the available empirical evidence it is observed that results of different studies may vary, and this variation of the results may be due to the variation of inputs and outputs used.

The study reports EFFCH, PECH, SECH, TFPC scores to be 0.985, 0.978, and 0.733, respectively. In a recent study Jahan (2019) reported that TE, pure efficiency change, and scale efficiency change of conventional banks in Bangladesh are 1.01, 1.008, and 1.003 and these findings are consistent with the findings of present study. Roy and Siddiqua (2015) in a similar study documented scale efficiency to be 0.84 while Banna et al. (2017) reported scale efficiency to be 0.99 and this finding is also consistent with the findings of the present study. Baten et al. (2015) also documented similar results and their results suggested that EFFCH, PECH, SECH, TFPC values are 0.982, 1, 0.982., and 0.916, respectively.

Conclusion

The present attempted to assess efficiency and efficiency change of Bangladeshi Commercial Banks over the period of 2012 -2017 using DEA and Malmquist index. Based on the results it is observed according to the input-oriented DEA that mean TE over the study periods are 69% and 86% respectively under CRS and VRS assumptions. Conversely, mean allocative efficiencies were 71% and 88% respectively under CRS and VRS assumptions; and average economic efficiencies were 50% and 76% under CRS and VRS assumptions. Under all estimated efficiency indices, it may be noted here that BCC model displayed higher efficiency compared to its peer CCR model as the BCC model can eliminate the inefficiency that might be caused by size differences of production units (bank in this case). The results of the Malmquist based DEA exhibited an average negative total factor productivity growth of -26.7% and it is attributed to negative efficiency change of -1.5% and technical change of -25.2% respectively.

The somewhat large negative growth of total factor productivity is apparently because of large negative technological change rather than due to technical efficiency change over the study period. The substantial negative growth of technical change suggests that over the study period commercial banks struggled more to survive and to remain competitive rather than concentrating on bringing innovation and ensuring technical progress. This negative growth could be attributed to the fact that commercial banks over the study period paid less attention to the development of technology and innovation with a view to achieving positive productivity growth.

The efficiency of Bangladeshi rated commercial banks is still quite low specifically in case of technical efficiency and the banks need to improve it further. These findings imply that Bangladeshi commercial banks lag to attain optimum performance because of inefficient management, handling of too much of customers' deposits, gradual creeping of non- performing loan, and inability to garner the benefits of economies of scale. It has been also observed that over the period, the non-performing loans in Bangladesh were steadily accumulating not only for the banks' ineptitude but also due to undue pressure on banks to sanction loans to clients with deteriorating repayment records and coupled with pressure to sanction fresh loans with economically unviable projects.

To derive the benefits of optimal scale, small banks may be merged that may enable the banks to fully optimize their operations and thereby ensure a steady and higher efficiency and productivity growth. Sufian (2012) also reached similar conclusion regarding optimization of the benefits from scale of operations. Through different estimations, the study identified the sources of inefficiencies that may help the banks to formulate strategic decision to remain competitive in the grim struggle characterized by this industry. Moreover, government may actively ensure the level of fair competitions among the banks, boost up the institutional structure, ensure good governance practices, and warrant accountability of the directors to all the stakeholders to contribute to improvement of efficiency of Banks in Bangladesh.

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Appendix 1: Name of the banks along with their credit rating

SL.	Name of Bank	Credit Rating		Rating Company
		Long Term	Short Term	
1.	AB Bank	AA3	ST-2	CRAB
2.	Bank Asia	AA2	ST-2	CRAB
3.	BRAC Bank	AA2	ST-2	CRAB
4.	Dutch Bangla Bank	AA1	ST-1	CRAB
5.	IFIC Bank	AA2	ST-2	CRAB
6.	Prime Bank	AA2	ST-2	CRAB
7.	The City Bank	AA3	ST-2	CRAB
8.	Trust Bank	AA2	ST-2	CRAB
9.	Jamuna Bank	AA3	ST-2	CRAB
10.	Uttara Bank	AA3	ST-2	CRAB
11.	Eastern Bank	AA	ST-2	CRISL
12.	Dhaka Bank	AA-	ST-2	ECRL
13.	Southeast Bank	AA	ST-2	CRISL
14.	Pubali Bank	AA	ST-1	NCRL
15.	United Commercial Bank	AA	ST-2	ECRL
16.	National Bank	AA	ST-2	CRISL
17.	Mercantile Bank	AA-	ST-2	CRISL
18.	Mutual Trust Bank	AA	ST-2	CRISL
19.	One Bank	AA	ECRL-2	ECRL
20.	Premier Bank	AA+	ST-3	NCRL

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Do Earnings Differ at the Same Position Across Different Firm? The Case Study of RMG Sector

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Abstract: The Earning inequalities is a board dimension of labor issues that can be portioned into some categories, like regional inequality, racial inequality, gender disparities, etc. This study seeks to estimate why there is earnings gap among a selected sample of a garment sector worker in Bangladesh, by controlling for differences between women and men in terms of relative endowments and demographic differences. The study used primary data for analyses, which was collected between October 2018 to January 2019 from Uttara, Savar and Gazipur area. The study found that mostly education, experience, training, and expertise are responsible for the difference of the salary in a same profession. Besides, location and the negotiation between employer and employee are also important factors for the wage differentials.

Introduction

Wage differential based on gender is a violation of human rights, and it's a serious gender issue of global concern. In many countries female workers are less likely to pay equal salary compare to the male workers. Again, within a country wage differentials exist in various sectors; say, female wage workers are paying lass compare to male in Bangladesh, although they are doing same kind of work, and same physical activities. Without eradicating this inequality on wage, it's nearly impossible to achieve the sustainable development goals. This study focused to examine the underlying reasons of earning differentials across age, gender, region, instead of only comparing the mean.

Recent literature on growth concentrated on the quality of growth, besides fostering the rate of growth (Smeru, 2005). Quality of growth has some pre-requisites, and unless fulfil them, desired quality cannot be achieved. These pre-requisites include the following questions- growth for whom? Who will be the beneficiary? Does it gender biased? Does the equal share of benefits go to the women? Does equal distribution exist across various income groups? Whether the benefits of growth concentrate on particular industry or firms or on the whole community? Whether regional inequality insignificant or not? And finally, does this growth ensure welfare to the society and country? If the growth becomes free from gender and regional inequality, equal distributions exist across various income groups, the benefits spread on the whole community, and ensures welfare to society and country, then it can be said that the quality of growth is achieved.

In reality, developing countries are far away from achieving the quality of growth, and Bangladesh is not an exception among them. Bangladesh has some problems regarding the labor issues. Bangladesh is currently enjoying the demographic dividend, and it's the time to take off the economy from lower middle income country to upper middle income country. Doing that, labor force absorption is important. Unless we include the new labor force into productive activities, the desired benefits of demographic dividend will not achieve. But, some shorts of inequality still exist in the labor market in Bangladesh. Besides, youth unemployment is a major exiting challenge of Bangladesh that should be controlled.

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Ready Made Garments (RMG) sector is the main export earing sector of Bangladesh, and almost 85% of the export earnings come from this sector. This sector has a great role to the economic transformation of Bangladesh. Almost 50 percent of the workers of the RMG sector are female, and it is said that RMG sector played a significant role to empower women in Bangladesh. But, the reality is not so good. Those women, who are working in the RMG sector, failed to transform their socio-economic conditions. The main reason behind is the low wage rate in the RMG sector. Minimum rate was not adjusted with the increasing inflation so that real income of the workers deteriorate and their socio-economic conditions did not change significantly.

The Earning inequalities is a board dimension of labor issues that can be portioned into some categories, like regional inequality, racial inequality, gender disparities, etc. This study seeks to estimate why there is earnings gap among a selected sample of a garment sector worker in Bangladesh, by controlling for differences between women and men in terms of relative endowments and demographic differences. In addition to the overall gender wage gap, the study also estimated the industry-level wage gaps between male and female with different educational, experience and age levels. A clear picture of the ongoing situation and drivers of wage differentials in the RMG sector come into light with the disaggregated results of the study.

Literature Review

The study of Mincer (1974) was the pioneer work that delivered the analytical framework for exploring the determinants of wage by estimating monetary return of various factors like education, quality of education, working experience, age, etc. Lots of studies have been carried out since then by extending the framework of Mincer (1974). Some studies focused on the race and gender induced discrimination in the labor market too. Labor market analysis comprised on many complex things, and any pooled analysis of wage differentials without considering relative endowments like education, experience, etc. will produce biased results.

Owing to ensure robustness of the estimates, these factors should be considered and controlled at the time of wage differential estimation. Moreover, estimating the rate of returns from the productive forces may also be biased sometimes. Therefore, it's necessary to understand the core determinants of wage differentials in Bangladesh at first. The study or Rahman (2004) found that workers' age has a positive impact on earnings, but it is subject to diminishing returns. The study also found that rural urban wage differentials exist in Bangladesh, and urban workers earn more compare to the rural workers. Moreover, years of education and skill have a significant role on wage determination. A study of International Labor Organization (ILO) uncovered that women are considered inferior participants in the labor market in Bangladesh. Traditional social views with fanaticism and fundamentalism consider that women are for domestic works, rather participating in the labor force outside the home (ILO, 2004). Many families even restrict female students to acquire higher education. Early marriage and forced marriage are common phenomenon. These social obstructers restrict women's choice of engaging into various works in the industry, and inadequate education and skills intend to get less wage to them compare to male. The study of Hossain and Tisdell (2005) examine the 1990s data of 16 manufacturing industries and found that on average women are earning 20% incomes compare to men.

The study of Al-Samarri (2007) analyzed the "Household Income and Expenditure Surveys (HIES)" data for the year of 2000 and 2005 and found that wage gap is gradually reducing in Bangladesh. The gap for salaried workers was reduced from 52 percent (in 2000) to 32 percent (in 2005). This study concluded that this declining wage gap will induce more women to participate in the labor force. Moreover, the study also found that increasing levels of female education has played a key role to reduce the wage differentials.

Based on these literature reviews, this paper will try to examine the wage differential on the readymade garment (RMG) sector in Bangladesh across the gender, age, experiences as well as for the position.

Objective of the study

The objective of this study is to analyze the earnings differential at the same position, is it due to age and gender at the RMG sector in Bangladesh. Secondly, we also try to gather information regarding the following:

A. To assess the causes and nature of earnings differences.

B. To identify the shortcomings of the official rules and regulations at the institutional levels to reduce this gap in intra-industry and other industry in Bangladesh.

C. Implicit assumption has been underlying that the male has more earnings than a female and age on earnings should in some way be positive. While this statement may not be justified in every case, because there is a lack of empirical data to support them as a general conclusion.

D. To assess the channels and impacts of earnings differential.

A living wage in Bangladesh:

Living wage specification varies across the institutions and methodologies. Different techniques of calculating living wage are available to the literature. Despite the differences, all living wage calculators agreed that the current minimum wage in Bangladesh is insufficient not only to maintain minimum quality of life but also ensure even basic needs. The "Global Living Wage Coalition (ISEAL Alliance)" has calculated a living wage in 2016, which suggested that monthly 16,460 Bangladesh money (BDT) is needed to ensure basic needs in Dhaka. By assuming four family members, and 1.58 earning members, this living wage was calculated. The study also revealed that minimum wage for outside Dhaka is comparative low, 13,630 BDT per month.

The "Wage Indicator Foundation (WIF)" calculated another living wage, where the initial assumption were-1.77 earning members in every family and 2.29 children. The study also included the minimum calorie requirement, which was 2100 calories (according to World Bank). The WIF suggested an interval of living wage, 12,200-18000 BDT, for garment workers in Bangladesh to support the family.

The "Center for Policy Dialogue (CPD)" of Bangladesh and "Berenschot" also calculated a living wage for workers by combining three methodologies. The first one focused on the national upper poverty line, second one included the purchasing power and real expenditures of the workers, and the final one considered the necessary

nutritional requirements. Based on these three methodologies, they suggested the living wage in Bangladesh should be 17,786 BDT. On that basis, they assessed that a living wage amounts to BDT 17,786.

Finally, the "Asia Floor Wage Alliance (AWFA)" also suggested a living wage for garment workers in 2015, which was 29,442 BDT. This living wage is comparatively high compared to other studies. The study of AWFA included several assumptions on their methodologies, which were- wage earned from the garment sector is the only or main family income, earners have two additional consumption units, 3000 calories requirement per day for an adult (or two children), workers food expenditure consume 50 percent of the wage, and non-food expenses consume 40 percent.

Table 1: Living wage calculations for Bangladesh

Global Living wage (2016)	**Wage Indicator**	**CPD**	**Asia Floor Wage (2015)**
BDT 16,460 (Dhaka) BDT 13,630 (satellite cities)	> BDT 12,200 < BDT 18,000	BDT 17,786	BDT 29,442

Clearly, there is a large gap between these estimations and the current minimum wage. In reality, most Bangladeshi garment workers earn less than the 2016 World Bank Poverty Line Wage for Bangladesh, which was BDT 7,418 per month. To reach even the lowest living wage estimate, the current minimum wage would have to be increased by 230 percent.

Methodology

Data Description and Sources

The study used primary data, which was collected between October 2018 to January 2019 from Uttara, Savar and Gazipur area. The study covered various RMG factories of the study area. Some secondary data were also collected from various sources like BBS, Bangladesh Economic Review, and Statistical Bulletin.

Why Wages Vary

Wages within the same occupation can vary for various reason. It's dependent on the nature of job. Naturally discrimination is low in some jobs, for example, constructions workers. Those who perform their daily routine in the construction sector, get more or less equal wages. The main reason behind this is that education, and experience have little role in performing routine tasks in the construction sector. Therefore, wage difference is low among the construction workers. Contrary, wage differences may high in business professionals, because education and experience have significant role in this case. Moreover, education, experience and skill are very important factor for wage differentials.

Table 2: Skill of various location

	Skill		
Location |	Yes	No	**Total**
----------+----------			
Gazipur |	.225	.15	.375
Savar |	.35	.025	.375
Uttra |	.225	.025	.25
Total |	.8	.2	1

Source: Field Survey, 2018

Location: Skills and wages of workers can vary from area to area. Skills of various location based on area are tabulated in Table 2.

Credentials: Professional certifications, licensing and advanced education all contribute to wage disparity within an occupation. Obviously, those with advanced education, professional licensure and industry certifications typically earn more than those without similar credentials. Industry and vendor specific credentials are also highly sought after by employers.

Table 3: Education and of location

	Education (Year)									
Location	7	8	9	10	11	12	13	14	15	Total
Gazipur	----------	.05	.1	.075	.05	.05	.025	.025	0	.375
Savar	.025	.05	.05	.025	.025	.1	.025	.05	.025	.375
Uttra	0	0	0	.05	0	.175	0	.025	0	.25
Total	.025	.1	.15	.15	.075	.325	.05	.1	.025	1

Source: Field Survey, 2018

Job description and responsibilities: Responsibilities in Job can make a difference in wage. Workers with high responsibilities are paid higher wages compare to less responsibility bearing workers. Job description is also important. Those who perform complex tasks and hold more pressure, receive more wages compare to others.

Industry or employer: Wage difference among workers within an occupation is often a function of industry and employer. Employer success, market dominance, corporate culture and clientele are all factors influencing how much an employer is willing to pay its employees.

Success and performance: Success and performance of the workers sometimes determine the wages. If the rules and regulations of the industry or company set in a manner that successful and high performance achieved person get more wage compare to the others then wage differentials arise.

Table: 4 Summery of some variables.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Education	40	10.725	2.0379	7	15
Experience	40	3.825	1.73778	1	7
Training	40	2.4	1.08131	0	4
Salary	40	301500	94449.82	180000	600000

Source: Field Survey, 2018

Table 5: Regression results

salary	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
education	3227.49	477.83	6.75	0.000	22584.07	41965.77
experience	1030.55	558.89	1.84	0.073	-1029.282	21640.26
training	1468.47	691.28	2.12	0.041	664.7904	28704.52
_cons	-11931.02	4187.33	-2.85	0.007	-204233.1	-34387.25

Source: Field Survey, 2018

From the table 5 we observe that, the income of a person may increase due one year more education irrespective of other variable changes is about 3227Tk. monthly. Similarly, we interpret that for an increase of experience of the respondent's income will increase about 1030Tk. when other variables remain unchanged, likewise training has also a positive effect on the salary.

On the other hand, location and skill have a positive effect to increase the salary of the workers. Who are working at Uttra, getting more than Savar and Gazipur area's workers and skill has the same effects all over the location.

Pay May Correspond to Seniority or Experience

Sometimes wages are set on the basis of seniority or experience within a company, which implies that senior workers will get more wages compare to junior workers. It is assumed that senior persons are more productive and experienced so that their role in the company is more valuable compare to junior workers, and for this ground they get high compensation.

Table 6: Experience of respondents

	Experience (Year)				
Location	4	5	6	7	Total
Gazipur	.125	.15	.075	.025	.375
Savar	.125	.15	.075	.025	.375
Uttra	.025	.1	.1	.025	.25
Total	.275	.4	.25	.075	1

Source: Field Survey, 2018

Pay May Correspond to Qualifications or Expertise

In some cases, employees with the same job role may have very different qualifications, credentials or areas of expertise. In such cases, the decision to compensate the more qualified employee at a higher level may be a matter of remaining competitive: An employee with in-demand credentials, such as IT certifications, often has more job options than the employee who does not have these credentials. As a result, employers may opt to raise the pay the better-qualified employee so as to keep her from moving to another company.

Table 7: Training of respondents

	Training (Year)							
Location	0	1	2	3	4	5	6	Total
Gazipur	.025	.05	.1	.125	.05	0	.025	.375
Savar	0	.05	.125	.125	.075	0	0	.375
Uttra	.025	.025	.075	.075	.025	.025	0	.25
Total	.05	.125	.3	.325	.15	.025	.025	1

Source: Field Survey, 2018

Pay May Correspond to Performance

Two workers with similar endowments and same position may get different compensation based on the performance. Employer can provide high compensation to those whose performances are excellent.

Pay May Correspond to Employee Negotiation

At the beginning, negotiation with the employer may create wage differentials. Based on education, skills, or experiences, the employer can recruit an employee with high salary at the same position. The negotiation between an employer and employee is important factor here.

Conclusion

Existing living wage in Bangladesh is not sufficient to lead a quality life by full filling the basic needs adequately. Therefore, revision of living wage is urgent. The study explore the underlying factors of wage differentials in Bangladesh various analyzing various issues. We have found that mostly education, experience, training and expertise are responsible for the difference of the salary in a same profession. Besides, location and the negotiation between employer and employee are also important factors for the wage differentials.

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An Overview of the BCIM-EC and its Impact on Bangladesh A Critical Analysis

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Abstract: This study provides an overview of the BCIM-EC and its impact on Bangladesh. BCIM-EC is a mechanism to make strong connectivity among Eastern China, South Asia as well as Southeast Asia. The purpose of the study is to analyses the motivation of member countries and the expectation of Bangladesh from this project. The study also attempts to analyze how China and India are using economic statecraft policy to make influence over South Asia, specifically in Bangladesh under this project. My first argument is China is using the BCIM-EC as a mechanism to expand trade and economic cooperation in South Asia, specifically with Bangladesh. Second argument is that under the project of the BCIM-EC, both India and China are in a competition to make influence in South Asia, particularly in Bangladesh, due to its geopolitical importance. The study findings suggest that, Bangladesh is following look east policy, which is designed for a more open relationship with China, the Bangladesh government is getting support from the Chinese government. Though BCIM-EC is in the implementation stage, it has a profound impact on South Asia, particularly in Bangladesh. On the other hand, Bangladesh can't increase its export to India due to lack of service sector industries in Bangladesh. As a result, trade volume with India is increasing. At the same time, the trade deficit with India is also increasing very rapidly. The study uses analytical-qualitative approach and secondary sources of data from different journals, books, and government report to explain the impact of BCIM-EC.

Keywords: BCIM, Economic Corridor, Economic Statecraft, Trade and Economic Cooperation, FDI and South Asia.

Introduction

Over the last few decades, one of the most important issues in international relations has been regional economic cooperation and the rise of China. As a significant regional initiative for the countries, the Bangladesh-China-India-Myanmar (BCIM) economic corridor is becoming a major mechanism for enhancing economic and geopolitical influence in South Asia. Several international political economist and strategic analysts have been written about the BCIM-EC and its positive impact on those countries. Yhome (2015) explained that geopolitical and economic dynamics in Southeast Asia are changing very rapidly, and the growing economy of China and its regional presence has created enormous economic and geopolitical opportunities for the Southeast Asian countries. Ganguli and Pardesi (2012) conducted a joint study and found that China and India are in a competition for power in Asia. Asa new global power, India is transforming the geopolitical landscape of Asia. Despite the growing role of China and India in South Asia, both countries are working on strengthening regional connectivity among the BCIM region (Deepak, 2018).

However, despite the importance of regional cooperation, very few researches have been devoted to explaining the political and economic impact of the BCIM-EC on South Asia; specifically in Bangladesh. With very few exceptions, previous studies have focused on

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only the positive impact of BCIM-EC on the region. No studies seem to focus on the geopolitical impact of the BCIM-EC. As a result, the argument made in these studies has often been too narrow; making it difficult for researchers to grasp the overall picture of the political and economic impact of BCIM-EC on Bangladesh. The major objectives of this paper are to ascertain the politics behind the Bangladesh-China-India-Myanmar economic corridor (BCIM-EC) and to analyze the political and economic impact of the BCIM-EC in South Asia, particularly in Bangladesh. This paper also explains the factors that lead to China for proposing the BCIM-EC and how China and India are transforming their economic cooperation into political and economic influence over South Asia, particularly in Bangladesh under this project?

Historical Background of the BCIM-EC

The idea of economic cooperation within the BCIM region was first developed by Professor Rehman Sobhan in 1990. He suggested that multi-modal transport connectivity could facilitate trade by reducing transport cost. He also suggested that it would bring the backward provinces of India and China to the mainstream. His ideas lead to the development of the platform in the 1990s, which is known as Kunming initiative. The first meeting of this initiative was held in 1999 in Kunming with the presence of Center for Policy Dialogue (CPD) from Bangladesh, Ministry of Trade from Myanmar, and Center for Policy Research (CPR) from India and Yunnan Academy of Social Science from China. In 2013, they formed the BCIM forum to identify the prospects and the challenges of the BCIM economic corridor, and they have submitted their reports and emphasize to build BCIM-EC for trade expansion in this region. This forum agreed in 2013 for enhancing connectivity by road, rail, water, and air (Deepak, 2018). China's President Xi Jinping has been declared the BCIM economic corridor as part of China's Belt and Road Initiative (BRI) in 2013(Deepak, 2018). Figure 2 indicates that the BCIM-EC starts from Kunming, the capital city of Yunnan province of China, and it goes to the Dali and Baoshan; another province of China. Then it connects Mandalay, the Northeast part of Myanmar and goes to the Chittagong port of Bangladesh via Northeastern part of India. Both the Kunming and Northeastern part of India's is the landlocked region.

Figure 1: BCIM-EC Route Map

Note. Data from Belt and Road News. (February 2019). Tapping potential of connectivity through BCIM-EC

Literature Review

Regional connectivity is playing pivotal role for economic and social development as well as regional development. Karim and Islam (2018) focusing on regional connectivity and explained how China is making strong regional network by using One Belt One Road(OBOR) initiative and BCIM economic corridor. They also showed how BCIM-ECis making connections among eastern China, South Asia, and Southeast Asia, to enhance economic and cultural connectivity. This corridor also makes people to people linkage among member countries. This linkage goes along with huge investment and infrastructure among member states.

Uberoi (2013) conducted a study on the problems and prospects of the BCIM-EC and found that the project was proposed to create a sub-regional cooperation zone connecting the relatively backward regions stretching from landlocked areas of Southeast China to Northeast Indian parts, along with the adjoining least developed countries Bangladesh and Myanmar. This project can open a new door for landlocked parts of India and China. Sing (2015) shows the North-Eastern region of India is rich in the natural resource but still struggling with extreme poverty due to the improper initiative of the government. Even human development indicators make this region as the poorest region in India. Regional connectivity is essential to ensure the development of these areas.

Another study conducted by Goswami (2014) demonstrates that all exports and imports of this region operates through Kolkata port, but it is 2000 kilometers far from Guwahati, Northeast province of India. He also shows Chittagong port is only 75 kilometers from Guwahati. As the BCIM-EC linkage with Chittagong port and Kolkata port, this economic corridor has immense potential to strengthen connectivity in the sub-region. India can make this region as centers of the integrated economic zone.

Trade expansion is the major purpose of initiating BCIM-EC project. The trade imbalance with China and India is increasing, and this corridor is creating an insurgency threat to Bangladesh. China's trade and investment in Bangladesh is evidence of Beijing's deepening relationship across South Asia. According to Gateway House, China has committed to $31 billion worth of projects in Bangladesh, including the BCIM economic corridor.

According to East Asia, Forum China and India are in a geopolitical tug of war for expanding their spheres of influence to Bangladesh (Prothomalo, 2018). China's huge investment in establishing BCIM-EC showed geostrategic and economic interest to gain unrestrained access to the Bay of Bengal region. Geostrategic interest, the security community, and economic integrations lead China, India, Myanmar, and Bangladesh to join in BCIM-EC. Karim and Islam (2018) found that South Asian and Northeast Asian countries are divided on the issue of regional cooperation. The relation between China and India is stumbling over the issue of Auronachol province and disputed areas of Kashmir. They also classified India's Northeast and Myanmar as insurgency infested area. In this case, it may hamper the greater benefit of the BCIM-EC project for all of the member countries.

On the contrary, another study conducted by Brautigam and Xiaoyang (2012) on how economic instruments like foreign aid and export credits use to make influence over other country's policy. They found that China and India both are using foreign aid and export credits for the construction of public works, power plants, railways, and hospitals. Figure 8 shows in 2018, China's major investment in Bangladesh goes to power sectors. In 2017 India's major investment also goes in the power sector (Bangladesh Bank Survey, 2017).

As a means of economic statecraft, China is using foreign aid and investment tool to control maritime channels in IOR and expanding their scope of power through the development of different ports like Chittagong seaport in Bangladesh and Hambantota port in Srilanka and kyaukpyu port in Myanmar. On the eve of BCIM-EC, China has increased its investment in Bangladesh. The longest road-rail project of Bangladesh `The Padma Bridge` is constructing by the China Major Bridge Engineering Company. According to graph 8, China is the highest investors in Bangladesh. The Daily ProthomAlo (13th July 2019) shows that Bangladesh is the second largest receiver of Chinese investment, behind Pakistan. The report shows that the growing dependence of Chinese investment is making Bangladesh beholden to China.

Key Research Question

1. To what extent, Chinese economic statecraft cohesively promotes economic growth and development for escalating influences on Bangladesh under the project of BCIM-Economic Corridor?
2. What sort of strategies India has adopted to expand trade volume with Bangladesh amid China's economic influence on Bangladesh?
3. How can Bangladesh capitalize on BCIM-EC for escalating its trade and economic interests?

Conceptual framework

By using economic statecraft framework, the study investigates the impact of China and India over Bangladesh under the project of the BCIM-EC. The paper explains different techniques of economic statecraft, which will address the motivation of China, India, Myanmar, and Bangladesh to join this project. I also explore the politics behind the BCIM-EC.

As a realist, Baldwin demonstrated that state actors could successfully assert international influence and power by using economic means. He developed economic statecraft theory to analyze how a country crafts its policy to make influence over the other country. Economic statecraft encompasses all of the economic means by which foreign policymakers might try to influence other international actors. Ahuja and Kapur, 2018) examined India's economic statecraft and found that India is using some economic instrument for achieving geopolitical goals. They also explained that how to trade expansion altered India's economic statecraft. Most of the portion of the trade of India is operated through sea routes (Ahuja and Kapurm 2018) as BCIM-EC has a link road with Chittagong seaport and connected a link with Northeastern parts of India. BCIM would be a major tool for the expansion of India's trade. Like China, India is using bilateral aid

or financial lending for attaining geopolitical ends. Baldwin also explained that a state could apply different techniques of statecraft like granting most favored nation treatment, tariff reduction, direct purchase, providing aid, and investment guarantee (Baldwin, 1985). Black will and Harris (2016) demonstrated that how states are applying economics as an economic instrument to advance geopolitical ends.

Baldwin(1985) identified some means of economic statecraft. The most important ways of economic statecrafts are embargo, boycott, tariff increase, tariff discrimination, withdrawal of most favored nations (MFN), aid suspensions, and controls on import and export. But in the project of BCIM-EC, both China and India are using positive means of economic statecraft like granting MFN (Most Favored Nations) treatment, tariff reduction, direct purchase, subsidies to exports and imports, providing aid and investment guarantee.

Methodology

The paper attempts to answer the research questions through qualitative analytical approach by reviewing sources such as government agreements and government reports. I also use the secondary data, specifically books, journals, research reports, newspaper, and various websites on the internet. This paper uses economic statecraft framework to explore the politics behind the BCIM-EC. This paper also uses different techniques of economic statecraft to explain the level of impact of China and India over South Asia; specifically on Bangladesh under the project of the BCIM-EC. I also explain, how China and India are using foreign direct investment as a tool to make influence in Bangladesh and how they are expanding their trade with Bangladesh under the project of the BCIM-EC? At first, I explain economic statecraft, and then I explain the motivation of these countries to join in this project. By using different techniques of economic statecraft, I investigate how Bangladesh is politically and economically impacting by the BCIM-EC.

Motivations of Participants Country

The motivation of China to initiate a BCIM economic corridor

Boothalingam (2012) examined China's approach towards neighboring countries. He identified three approaches of China towards adjoining countries. First one is China creating and maintaining a web of infrastructure and physical connectivity to the adjoining countries. The second one is China considers the border as a tool that expedites the interaction across the countries. The third one is the promotion of tourism, and people to people linkage goes along with huge investment and infrastructure. BCIM-EC initiative has been taken by China for connecting the neighboring countries of India, Myanmar, and Bangladesh. Deepak (2018) termed the BCIM initiative as China's global rebalancing targeting to build inclusiveness and win-win partner.

China's motivation to invest in regional connectivity project has been studied by Brautigam and Xiaoyang (2012) and found that natural resource is the important drivers, which motivate China to invest in South Asian countries like Bangladesh, Myanmar, and India. Sing (2015) shows the North-Eastern parts of India are rich in natural resources. Bangladesh is also rich in natural resources. China's investment in the power and energy

sector is increasing, and it indicates their motivation to build a BCIM economic corridor. China's initiative of BCIM-EC can play a pivotal role in China's economy. Currently, China is pumping huge investment in the development of seaports in South Asian countries like Bangladesh, Pakistan, and Nepal as Chittagong port has a link road with BCIM-EC, so China has a special intention on the development of Chittagong port. In this way, China is trying to dominate the South and Southeast Asian regions politically and economically through this corridor.

In another study on transport cooperation of China with six countries India, Nepal, Myanmar, Bangladesh and Yunan province of China, Mauryama, and Rahmatullah (2004) found that Chinese intention of regional connectivity is more prone to trade expansion than politics. To increase the trade with South Asian countries, China has taken some projects like silk route, BCIM-EC, and China-Pakistan economic corridor (CPEC). Taylor (2013) shows how China motivates their national companies to invest in other nations to meet up the growing demand for energy. To increase trade and secure energy supply, China has taken the initiative to establish deep seaports in South Asian countries like Pakistan, Bangladesh, and Srilanka. As BCIM-EC starts from Kunming, capital of Yunnan province of China and connects Northeast parts of India, Myanmar, and Bangladesh, it makes connectivity with landlocked parts of Yunnan province.

However, Mearsheimer (2013) finds China's intention to become a regional hegemon. He compares China's today's behavior with United States behavior during the nineteenth century when the USA emerged as a regional hegemon in the Western Hemisphere. So, China may transform their economic power to political power.

The motivation of India to join the BCIM economic corridor

Mishra (2015) conducted a study on India's motivation in joining BCIM-EC and founds three reasons for India to join in BCIM economic corridor. First one is BCIM is a subset of India's Look East Policy(LEP); the second one is the failure of SAARC motivate India to make a new regional organization, and the third one is it makes an opportunity for India to play a leading role in regional groupings.

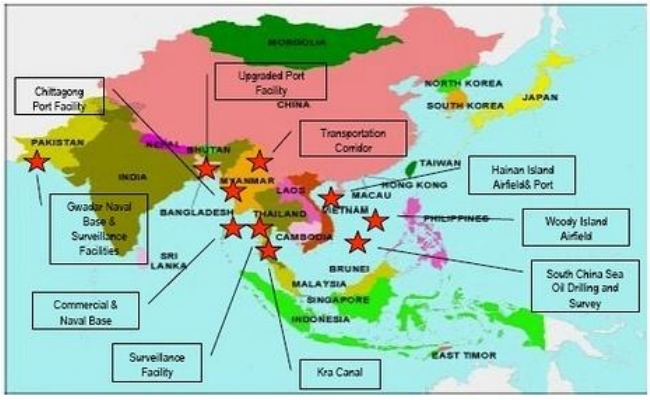
The trade deficit with China was gradually increasing since 2013-2014(Business insiders, 2019), but the trade deficit with China reduced by $10 billion to $53 billion in the financial year 2018-2019(Ministry of commerce, 2019).BCIM-EC could act a great platform for India to continue the reduction of trade deficit with its third-largest trading partner.

The motivation of Myanmar to join the BCIM economic corridor

After the restoration of partial democracy, Myanmar has been adopted enormous economic reforms for the development of the country. To make credibility to its endeavors, regional cooperation and connectivity are important for Myanmar. Das, Paul, & Mathur (2015) demonstrate that BCIM could bring benefit to Myanmar in improving its socio-economic structure**.** They also identified poor infrastructure as the hindrance for private investment. In this regard, the BCIM could work as an opportunity to build local infrastructure and to expand regional production.

The motivation of Bangladesh to join the BCIM economic corridor

Bangladesh has become a lower-middle-income country in 2016. Despite some impediments such as extreme poverty, overpopulation, lack of energy infrastructure, natural disaster and political confrontation Bangladesh is now booming economic country in South Asia with her gross domestic product (GDP) growth of over 6.0 percent over the last couple of years. The cheap labor cost attracts different nations to invest in Bangladesh. Despite labor resources, capital scarcity deters the development. In this regard, The BCIM-EC could act as an amplifier (Mishra, 2012).The geographical location of Bangladesh makes it a major participant in the BCIM growth quadrangle. In Asia, both India and Pakistan are continuing the nuclear race with each other to make an influence in the South Asian region. Hussein (2014) demonstrates that three Asian countries are holding nuclear power, out of seven nuclear-proven powers in the world. That's why he considered this region as the most porous region in the world. Most of the countries of this region have geopolitical disputes among themselves. Both the USA and China are taking advantage of these disputes and trying to increase their economic stakeholders in this region. Bangladesh could not skip this regional and global politics. Due to the geostrategic location of Bangladesh, Both India and China are increasing their investment in Bangladesh to serve their economic, political, and military interest. Bangladesh is surrounded by three sides of India and small borders with Myanmar. At south, Bangladesh has access in the Bay of Bengal, which makes geopolitical advantage for Bangladesh. In the north, Nepal and Bhutan have only 12 miles territory with India (which is known as Shiliguri corridor), which is separated from Bangladesh. As Nepal and Bhutan is a landlocked country, they have the interest to use Bangladeshi territory to get access with other parts of the world. Schiliguri corridor has a land connection with Northeastern Indian parts, but these parts are insurgent- infested areas. In this case, Bangladesh borders can be alternative options for India to make connections with India's Northeastern parts. This geographical location gives geopolitical importance of Bangladesh to India and China.



Source: Adapted from Juli MacDonald, Amy Donahue, and Bethany Danyluk, *Energy Futures in Asia*, Booz Allen Hamilton report sponsored by the Director of Net Assessment, November 2004, 17.

Figure 2: Geographical Location of Bangladesh

Note. Data from Hussein (2014, May 31).Geostrategic Importance of Bangladesh. The Probe Magazine

In this regard, Bangladesh could act as a hub of transit, under the framework of BCIM-EC for the landlocked countries like Nepal and Bhutan. This location also insists India and China make relation for building peaceful Indian Ocean region.

BCIM is likely to assist Bangladesh in leveraging its geo-political and economic advantage to the fullest. Bangladesh can get economic benefit by providing market access to the member countries. As the northeast region of India and Myanmar is rich in natural resource, Bangladesh can get this natural resource to develop its energy sector.

The Impact of the BCIM-EC in Bangladesh

Economic Impact of the BCIM-EC on Bangladesh

Bangladesh economy is booming in South Asia, with her average GDP growth of 6.5% over the last couple of years. In addition, most of the economically powerful countries are considering Bangladesh as a business hub for their trade and investment expansion (Paul, 2015). Since the agreement of BCIM forum in 2013, Bangladesh is following strategic partnership with China and the trade volume started increasing more rapidly than the last years. As the BCIM-EC has a linkage with Chittagong sea port, Both China and India are investing for the development of this port. In this way, Chittagong port is enhancing the capacity to handle more cargo as well as contributing in increasing trade volume. Rahman (2015) states that from the year 2013-2014 Bangladesh is getting the zero tariff export facility in some products in China and Bangladesh has increased its export to China. Though, the export to China is not remarkable in comparison to import. The geopolitical location of Bangladesh is important is playing a pivotal role in expanding economies of Northeast India, Nepal and Bhutan, as these countries are using Bangladeshi seaports for maritime access for their landlocked parts (Rahamatullah, 2013). China is also considering Bangladesh as a potential gateway for its landlocked parts of Yunnan, which is connected by BCIM-EC. Bangladesh is politically and economically impacted by the project of BCIM-EC.

Trade Impact over Bangladesh

Bangladesh Trade with China

Figure 3 shows that since 2005, China's trade and economic ties with Bangladesh was deepening and strengthening. Bangladesh total trade with China increased from 2067.45 thousand USD in 2005 to 6909.71 thousand USD in 2012. Bangladesh export share increased from less than 65.19 thousand in USD in 2005 to less than 431.77 thousand USD in 2012. Its import share was much higher, increasing from 2002.26 thousand USD in 2005 to 6477.94 thousand USD in 2012. Bangladesh export was not increased in the same pace with import, and it is increasing the trade imbalance with China.

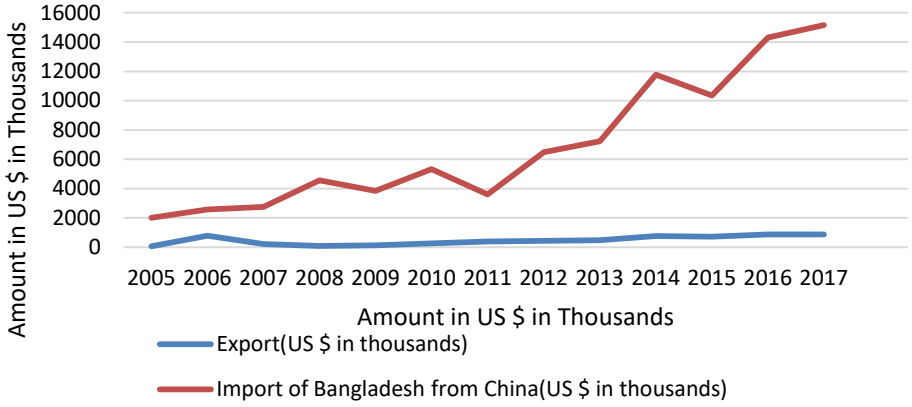


Figure 3: The Trend of Bangladesh Trade with China (2005-2017)

Note. Data from World Bank Group. World Integrated Trade Solution, 2019

In the financial year of 2012, Bangladesh total export to China was 65.19 thousand USD, and import was 6477.94 thousand USD. In this year the total trade imbalance with China was 6046.17 thousand USD. The figure implies that after agreement in 2013, trade imbalance increased 6733.58 thousand USD to 14293.88 thousand USD in 2017. China accounts for 15.85% of Bangladesh import partner share in 2005, and it goes up to 22.73% in the year of 2016.

Though Bangladesh trade with China was increasing from the beginning of 2005, the trade volume was not increased too much up to 2011. After the agreement of the BCIM forum in 2013, the trade volume increased rapidly. China is also focusing on making deep relation with Bangladesh on the eve of BCIM-EC. Though the project is under implementation stage, due to lower prices of products and low tariff rates, Bangladeshi importers are importing capital machineries, raw materials of industry and other consumer goods from China. Bangladesh import partner share of China accounts for 17.82% in 2012 and it goes 21.53% in the year of 2015(Figure 6 & 7). Despite zero tariff export facility to China in different products from the fiscal year 2013-2014, Bangladesh failed to increase its export due to diversification of products.

Bangladesh trade with India

Figure 4 shows that the trade of Bangladesh with India is increasing since 2005. In compare to China, Bangladesh trade with India was much more modest. Its total trade value with India increased from 1549.33 thousand USD in 2005 to 4813.72 thousand USD in 2012. Similar to its trade with China, Bangladesh trade share with India increased, but it was at a modest level. Bangladesh import share with India was increased from 1372.03 thousand USD in 2005 to 4370.04 thousand USD in 2012. Export share was increased by 177.3 thousand in USD in 2005 to 443.32 thousand USD in 2012. In comparison with the import share, its export share was minuscule. The trade deficit between India and China was increased during this period.

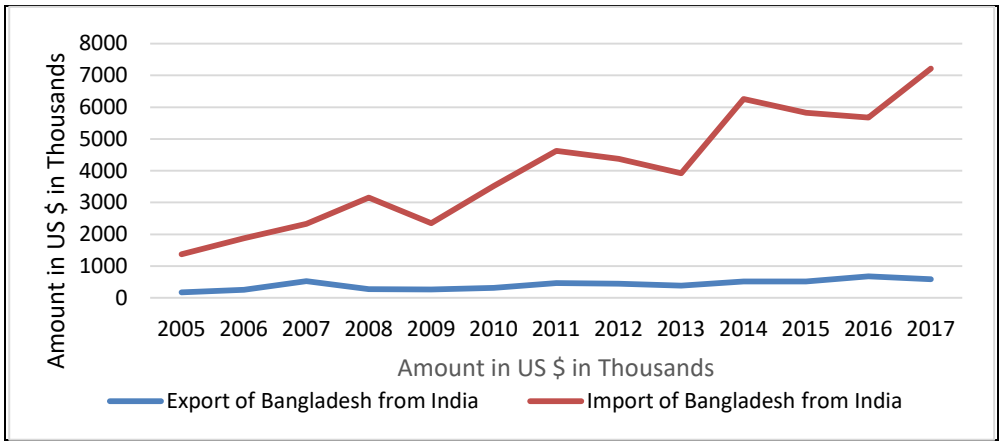


Figure 4**:** The Trend of Bangladesh Trade with India (2005-2017)

Note. Data from World Bank Group. World Integrated Trade Solution, 2019

Trade imbalance increased from 3927.08 thousand USD in 2012 to 6618.52 thousand USD in 2017. Since 2013 trade imbalance with India has been increasing rapidly. In comparison to China trade imbalance with India is minuscule. In comparison to import, Bangladesh export has not grown at the same pace.

As a means of economic statecraft, India has provided Most Favored Nations treatment to Bangladesh in 2012. Though enjoying MFN by India, Bangladesh cannot increase its export to India, due to the diversification of goods. As a result, the trade imbalance between these countries is increasing very rapidly. Though BCIM-EC is not started yet, on the eve of this project, India is constructing different industries in Northeastern parts, which will contribute to increasing trade volume.

Bangladesh Trade with Myanmar

Figure 5 shows that Bangladesh total trade with Myanmar was considerably modest as compared to its trade with India and China. The import share of Bangladesh with Myanmar was increased more than export share. The figure illustrates that trade with Myanmar was not higher in comparison to India and China.

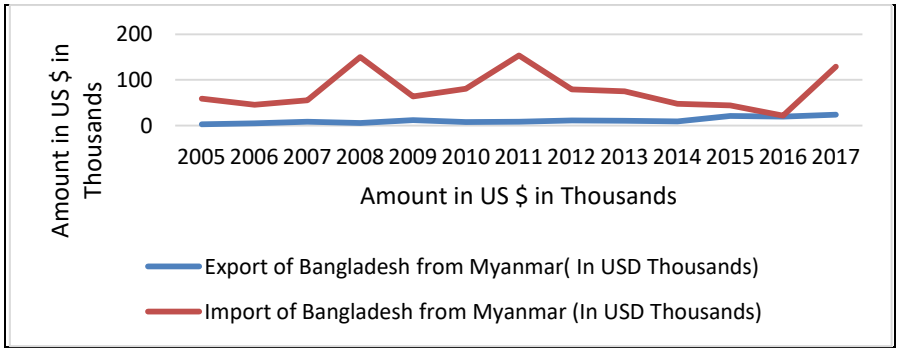


Figure 5: The Trend of Bangladesh Trade with Myanmar (2005-2017)

Note. Data from World Bank Group. World Integrated Trade Solution, 2019

Trade imbalance was an increase from 67.55 thousand USD in 2012 to 105.05 thousand USD in 2017. After the BCIM forum agreement, trade imbalance increased. In 2012 Bangladesh import share with Myanmar was 78.99 thousand USD, but in 2017 it increased to 128.85 thousand USD. Export was not increased at the same pace of import. Since the agreement of BCIM forum, Bangladesh has been reducing import from Myanmar, but from 2016 the import from Myanmar started to increase.

Bangladesh Import Partner Share in 2012

Before the agreement of BCIM forum, China placed 17.82% of Bangladesh import share, while India placed 12.02% and Singapore placed 5.46% of import share. Figure 6 indicates that the major portion of the goods come from China. Singapore, Indonesia, and other countries have a little share of Bangladesh import.

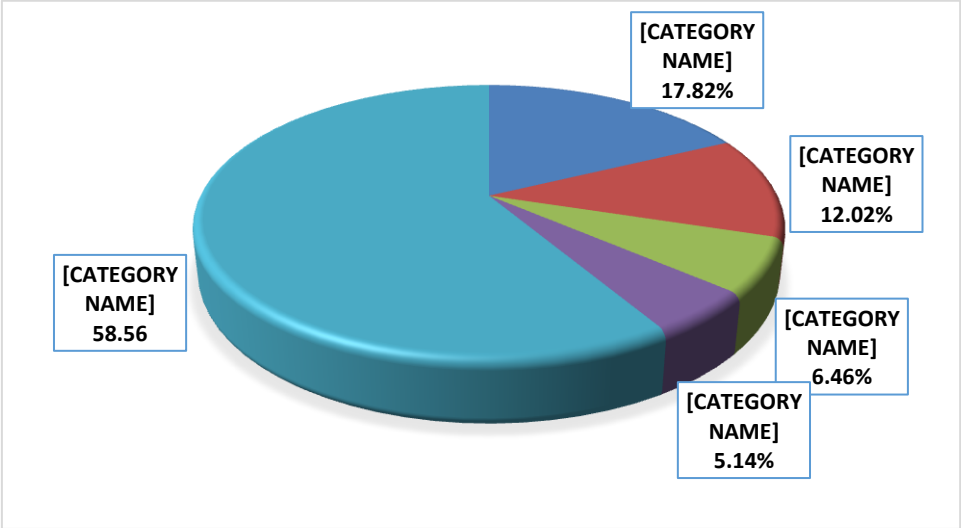


Figure 6: Bangladesh Import Partner share in Percentage in FY 2012

Note. Data from World Bank Group. World Integrated Trade Solution, 2019

Bangladesh Import Share in 2015

Bangladesh import share with China increased from 17.82% in 2012 to 21.53% in 2015. At the same time, Bangladesh import share with India was increased from 12.02% in 2012 to 12.24 in 2015.

In comparison to China, India's share was not increased at the same pace. The trade between China and Bangladesh is increasing very rapidly, especially after the agreement of the BCIM Forum. On the eve of BCIM-EC, Bangladesh followed the Look East policy, which is designed to make a strategic partnership with China and to follow more open to China. As a result, Bangladesh import partner share with China increased more rapidly than India. China is using foreign aid as a means of economic statecraft to make a strategic partnership with Bangladesh.

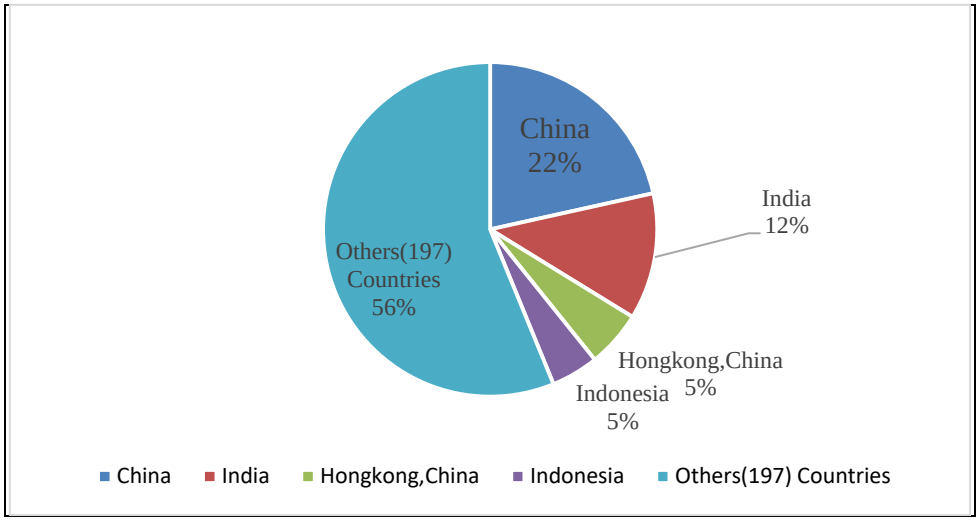


Figure 7: Bangladesh Import Partner Share in Percentage in FY 2015

Note. Data from World Bank Group. World Integrated Trade Solution, 2019

Foreign Direct Investment in Bangladesh

Figure 8 illustrates that total foreign direct investment reached 3613.30 US$ million in the year 2018. In the year 2018 China People's Republic(P.R) invested US$ 1029.90 million, Netherlands US$ 691.92 million, United Kingdom(U.K.) SS$ 370.58, United States of America(U.S.A) US$ 174.25 million, Hong Kong: SAR of China US$ 169.78 million and India invested US$ 121.46 million. Bangladesh Bank survey(2019) shows most of the attracted FDI sector in 2018 is power sector US$ 1012.01 million 28.01%, food (US$729.69 million) 26.60% and textile and wearing (US$ 408.08 million) 11.29%. The People's Republic of China invested the highest amount in Bangladesh in 2018.

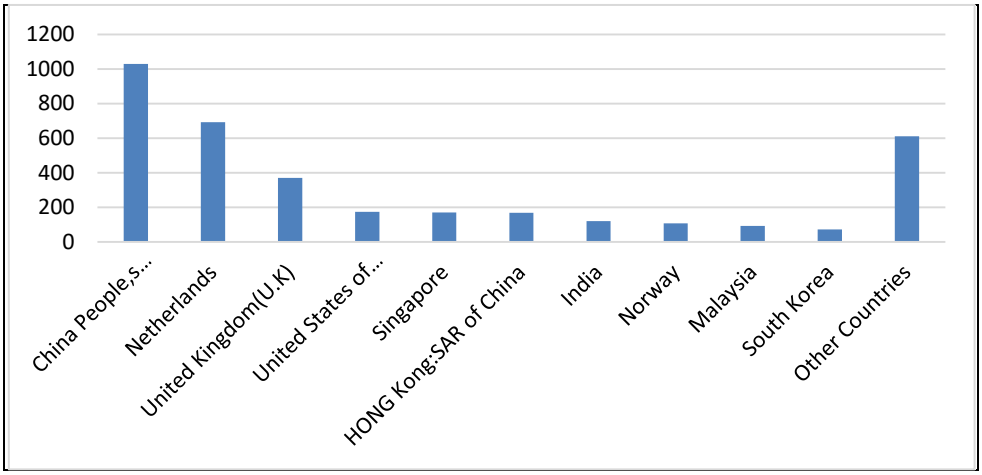


Figure 8: Foreign Direct Investment in Bangladesh in FY 2018

Note. Data from Bangladesh Bank, FDI in Bangladesh, Survey report July-December 2018

Klaus Knorr uses "economic leverage" to analyze how economic factors influence on state policy, which is similar to the term of economic statecraft. Since the BCIM forum in 2013, Chinese investment in Bangladesh has been increasing very rapidly. According to the report of the United Nations Conference on Trade and Development (UNCTAD) in 2018, Chinese investment is 68% higher than the last year. Currently, Bangladesh dependson Chinese investment to achieve its ambitious goal of producing 24,000 megawatts of energy by 2022 up from 17,000 megawatts now (The Daily ProthomAlo, 2019).

The trend of India's Foreign Direct Investment in Bangladesh

Figure 9 illustrates that India's foreign investment in Bangladesh was increased US$ 1.01 million in 1996 to US$ 121.46 million in 2018. During 2007 and 2008, India decreased its foreign direct investment in Bangladesh due to the interference of the military in Bangladesh politics. Bangladesh Bank survey (2019) shows that India is more interested in investing in the power sector.

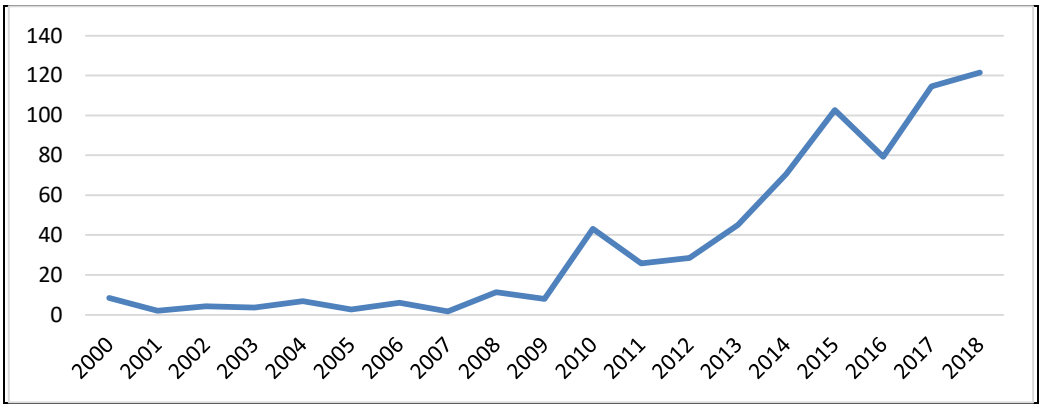


Figure 9: The Trend of India's Foreign Direct Investment in Bangladesh

Note. Data from Bangladesh Bank, FDI in Bangladesh, Survey report July-December 2018

The above figure implies that on the eve of BCIM-EC, India has been increasing its foreign direct investment in Bangladesh. Baldwin (1985) explained how a country uses foreign aid and investment as a tool of economic statecraft. India is using foreign aid tool to make an influence on Bangladesh. In February 2016 Bangladesh canceled China's proposal of building seaport on Sonadia deep seaport after getting pressure from India. (Stacey, 2018)

The trend of China's Foreign Direct Investment in Bangladesh

Islam (2013) demonstrates that China starts to invest in outside of the country in the late 1970s, and it opened its economy in the late 1980s. Figure 10 implies that China's foreign direct investment in Bangladesh was increased very rapidly. In the financial year 2000, China's FDI was US$ 67.69 million and increased in US$ 1029.90 million in 2018. China's FDI in Bangladesh is higher than in India. The amount of Chinese foreign direct investment in Bangladesh was not noteworthy; until 2006. Bangladesh did not get priority for FDI due to its political turmoil. China started to invest in a mega amount in Bangladesh from the year 2007. In 2006 China's FDI was only US$ 181.26 million, and it increased to US$ 239.28 million in 2007.

China is using its foreign investment tool as a way of economic statecraft. By investing in Bangladesh, they have made a strategic partnership. Kabir. Islam, & et. (2018) show that due to the strategic partnership, China became the major supplier of military instruments to Bangladesh. In another article, Hussein (2014) shows that Bangladesh has bought $ 351.3 million military equipment's from China and Bangladesh becomes the second-highest position in purchasing Chinese arms.

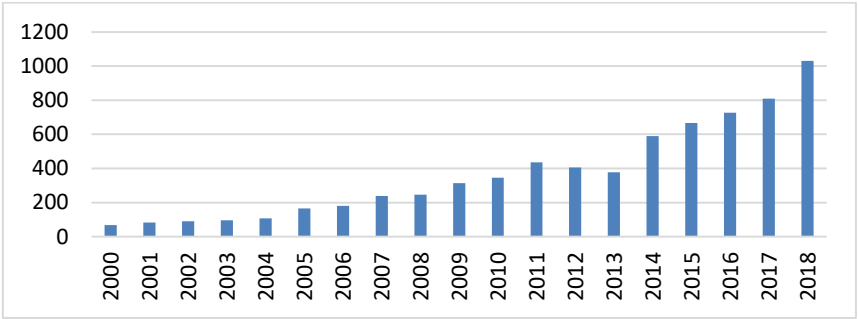


Figure 10: The Trend of China's Foreign Direct Investment in Bangladesh

Note. Data from Bangladesh Bank, FDI in Bangladesh, Survey report July-December 2018.

China's Major Investment in Bangladesh

Sethi et al. (2003) researched trends in foreign direct investment flows and found that three factors motivated a country to invest in another country. These are natural resource seeking, market seeking, and efficiency-seeking. In the case of China, natural resource seeking and market seeking are important to invest in Bangladesh. Figure 11also shows China's major investment in Bangladesh in 2018 goes to the power sector. China also assists Bangladesh in making infrastructures like Rail Bridge, roads, mega power plants, and gas plants for expansion of its trade (Bukhari & Bakht, 2013). The figure implies that Chinese investment in manufacturing sectors is negligible, and the outcomes of infrastructure investment are not up to the mark.

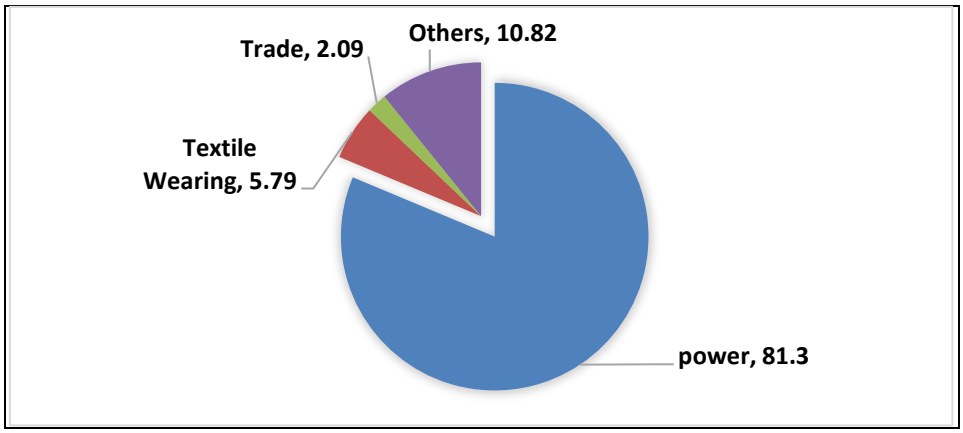


Figure 11: China's Major Investment in Bangladesh in FY 2018

Note. Data from Bangladesh Bank, FDI in Bangladesh, Survey report July-December 2018

Political Impact of BCIM Economic Corridor on Bangladesh

In recent years China has accelerated its economic cooperation with other parts of the world. Once they started the Belt and Road Initiative (BRI) project, they are focusing on economic cooperation with all over the world. He, H., Nie, J., & Wang, Y. (June 2018), wrote an article on China's cooperation for Chittagong port development and found that China's project of Gwadar port in Pakistan, Hambantota port in Srilanka and Chittagong port in Bangladesh is the part of Chinas string of pearl strategy in the Indian Ocean. They claimed that China's investment in Chittagong port and strong ties with Bangladesh under the project of BCIM-EC is the part of China's long term strategy in the Indian Ocean Region(IOR). China is continuing its cooperation with Bangladesh to make safe maritime access in the India Ocean. Under the project of the BCIM economic corridor, both China and India are making a deep relationship with Bangladesh. (Bodetti, 2019) Wrote an article on "Bangladesh's China-India balance" and explained that Bangladesh is creating two types of risks by making strong ties with China. First one is the economic crisis, and the second one is a geopolitical impact. In his article, he mentioned that "By making deep relation with China, Bangladesh can attain more foreign direct investment and cheap energy. However, this may affect the relationship between Bangladesh and India. At the same time, India may anger the relationship with China. As India is surrounding three parts of Bangladesh, it has a great influence on Bangladesh and will always want to keep it away from China.

Gulf Times magazine (2019) mentioned that Bangladesh is going to sign an agreement with one Chinese company for Payra deep-sea port construction for deepening trade relation with China. They try to control maritime energy channels in the Indian Ocean through this deep seaport. Holmes (2013) considered China's naval road building process as a string of pearls strategy in the Indian Ocean Region (IOR). The Daily Star reports about China's cooperation for Chittagong port claims China's huge aid for Chittagong Port development indicates Beijing's special intention

Since Chittagong port and Agartala port has a link road under the BCIM economic corridor, Chittagong port could act as a hub of business network. In 2018 Chinese government propose making special economic zone in Chittagong beside Chittagong port and Karnafuli River. Bangladesh government planned to construct 3.4 kilometers long-four lane tunnel under the river Karnafuli in Chittagong to ease communication. It needs US$700 million to construct this tunnel. China is ready to make this tunnel, but before this, they want the permission of making special economic zone inside of the Karnafuli River (Kabir, 2019). He, H., Nie, J., & Wang, Y. (June 2018), mentioned one BBC report on the issue of Chittagong port and China,s string of pearls in the IOR and found that China has profound intention on the cooperation of building capacity of Chittagong port. China has proposed to make a deep seaport near Chittagong seaport, but on the opposition of India, Bangladesh rejects China's proposal.

Political reality in Bangladesh has been changing since the 2014 national elections. The ruling party won 232 seats out of 300 seat in the parliament. This election was marred by street fighting, low turnout and a boycott by the opposition which made the result questionable. Dhaka's Daily Star newspaper considered the elections as the deadliest in the country's history and said in an editorial that the ruling party (Awami League) won a foreseeable and meaningless victory, which gives it neither a mandate nor an ethical

standing to govern effectively(Independent newspaper, 2014). Limaye (2018) shows the 11th parliamentary election was a farcical election and claimed for vote-rigging and BBC reporter find filled ballot boxes at a polling center before polls open. Despite this irregularity in a national election, the government of India and China congratulate the ruling party due to a strong relationship with India and China, whereas the USA still criticizing the legitimacy of Bangladesh government due to gross irregularities in a national election. On the eve of BCIM-EC, Bangladesh is following look east policy, which is designed for a more open relationship with China, the Bangladesh government is getting support from the Chinese government. Bangladesh government is focusing on development rather than democracy.

Findings and Policy Recommendations

Major Findings

Both India and China have an enormous influence in Bangladesh and both are in a competition of a tug of war to increase their impact under the project of BCIM-EC. The trend of foreign direct investment and trade deficit with China and India indicate their growing presence in Bangladesh. This project is also using as a major mechanism to expand trade and economic cooperation between member states. As a great power, China is getting more benefit from the BCIM economic corridor. As a rising power, India is also getting the advantage of this corridor. Trade deficit with China was US $ 6733.79 thousand in 2013 and after agreement of BCIM forum in 2013, it goes US$ 14293.87 in the FY 2017.

Since the agreement of the BCIM forum in 2013, Bangladesh is following strategic partnership with China and it has been growing the presence of China in Bangladesh. China's investment trend indicates that now Bangladesh is becoming more dependent to China than India for the development of infrastructure and energy sector.

Bangladesh can't increase its export to India due to lack of service sector industries in Bangladesh. As a result, trade volume with India is increasing. At the same time, the trade deficit with India is also increasing very rapidly. Figure 5 shows the trade gap increased more rapidly after the BCIM forum agreement. Bangladesh export also increases but it was not increased with the same pace of import from India.

Since the agreement of BCIM forum, the growing strategic partnership with China is focusing on economic and security cooperation. As a part of economic cooperation, Bangladesh trade amount with China is increasing. Bangladesh import from China is increasing more rapidly than the export amount. As a result, the trade deficit is increasing, and after the BCIM forum agreement, the trade gap increased more rapidly. In comparison to China, the trade gap with India is not increasing at the same pace. India is reducing its trade gap with China by increasing its export to China.

China was the highest import partner of Bangladesh in 2012, account for 17.82% of Bangladesh import share, and in 2015 it goes up to 21.53%. At the same time, Bangladesh import portion from India was increased by 12.02% in 2012 to 12.24% in 2015. The data indicates that Bangladesh import from china is increasing more rapidly.

Foreign direct investment has been increasing since the BCIM forum agreement. Major portion of the foreign investment goes to the power and energy sector. Figure 10 and 11

implies that the major foreign direct investment in 2018 goes to the power sector, and China was the highest FDI countries in Bangladesh. This FDI is playing a pivotal role in the development of Bangladesh. At the same time, Bangladesh is becoming more dependent on China for infrastructural development. As a result, China is getting a profound influence on Bangladesh.

Policy Recommendation

As the trade imbalance between Bangladesh and China and Bangladesh and India have been increasing more rapidly since 2013 than the last couple of years; Bangladesh government focus on the diversification of export products to lessen the trade deficit. Moreover, Bangladesh government should patronize the entrepreneurs to establish more export oriented industries to get the full benefit of the BCIM-EC project. In addition, Bangladesh government should negotiate with China and India to get duty free market access under the scheme of BCIM-EC and for increasing export products, which will contribute to lessen the trade deficit. All of the member countries should arrange a ministerial meeting in each year to expand the trade cooperation and people to people linkage under the project of BCIM-EC.

Since the BCIM forum agreement, Bangladesh is deepening its strategic partnership with China and lessening its dependence on India. Though Bangladesh is surrounded by three parts of India; it is difficult for Bangladesh to deny India's interest in this region. Even, Most of the neighboring countries of China are maintaining a balanced foreign policy with China and USA for getting more benefits (Cuiping, 2017). In this case, Bangladesh government should maintain a balance relationship with them to get the full benefit of BCIM-EC. Moreover, Bangladesh government should ensure the transparency of using China's investment to continue the strategic partnership with China.

As the BCIM-EC covers South Asia and Southeast Asian countries and most of the Asian countries have disputes among themselves, China is supporting Pakistan for growing military deployment. Moreover, China hasagreed with Pakistan to make the China-Pakistan Economic Corridor (CPEC) on the opposition of India (Mishra, 2017).As China and India are two powerful member states in the project of BCIM-EC, China and Pakistan strategic relationship may affect on the greater benefit of the project of BCIM-EC. So, China should clear its intention to make relation with Pakistan. Moreover, all of the member states should separate different disputed issues and work on building mutual trust.

Though, Bangladesh is getting the benefit of this project by receiving huge investment from China and India, it is an alarming situation for Bangladesh to continue a balanced relationship with both countries. It seems that Both India and China are investing a huge amount in Bangladesh, but in practice they are using foreign aid as economic statecraft to make long term influence over Bangladesh. In this case, Bangladesh should be more concern about the conditions of investment by China and India. Moreover, Bangladesh government should be more concern about the political intention of China and India.

Conclusion

The BCIM-EC was initiated to foster trade and people to people linkage among Bangladesh, China, India, and Myanmar. In the name of cooperation, both China and

India involved in a tug of war in making an influence on Bangladesh. As South Asian politics is India centric and the region is fragmented, it will be complicated for China to make economic integration in this region. Both China and India can separate conflicting issues of them and then can work together to implement the project. All of the member states will get an idea on the issue of geopolitical complications for greater economic cooperation. This research will also create a new dimension for policymakers to think, building mutual trust among the member states. China's government can understand the challenges to precede the project for making economic integration. Policymakers of Bangladesh will get ideas on the intention of China and India.

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Instrumental Effectiveness and Challenges of Eco-Tax Implementation at the Readymade Garments (RMG) Sectors in Bangladesh

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Abstract: The development of Bangladeshi economy growth such as employment generation, income and foreign earning has become possible due to the effective contribution of RMG sector. Though this sector is highly responsible for polluting environment in many ways. This study was carried out to focus on the eco-tax implementation challenges of RMG sector in Bangladesh and overpowering way to implement eco-tax. Besides the actual prospect of eco-tax and worldwide eco-tax practices have been focused in this study. For study assessment primary data were earned from the interview of 90 high officials from Ashulia 10, Savar 10 and Gazipur zone 10 in total 30 prominent garment companies situated in Ashulia, Savar and Gazipur zones. To earn data 18 items was used in a precise questionnaire. Many journal articles, annual reports of BGMEA, BKME, BGMEA websites, research monographs and periodicals were collected from many published and unpublished secondary sources for this study. Simple Random Sampling method was followed to select sample respondents. The study results reveal that the percentage of willingness to pay such as carbon emission, CFC tax and waste tax etc. are very low. Therefore, eco-tax implementation could be a key part of a tool kit to come them under the taxation process. However, some challenges like political variability, absence of formal structure, ignorance of multi-stakeholder etc. are the main challenges of eco-tax implementation. The government is under pressure for increasing those obstacles and try to mitigate environmental damage. Besides, the effectiveness of eco-tax implementation are also assessed in this study. Govt. income rise, promote a green economy, proper waste management etc. are the possible effect of eco-tax implementation at the RMG sector in Bangladesh. Also, a possible recommendation is given for overcoming the challenges to implement eco-tax in RMG sector in Bangladesh. In the end, it is a case study that highlight the current state of eco-tax, its obstacles and possible recommendation to implementation at the RMG sector in Bangladesh.

Keywords: Eco-Tax; Carbon Emission; Global Issues; Waste Management; RMG Sector; Bangladesh

Introduction

In the late 1970s the journey of readymade garment (RMG) sector was started. After the commenced of this sector, within a short period of time it has become the main player of Bangladeshi economy in terms of employment generation, export income, poverty mitigation, women empowerment etc. (Zohir, 2001; Clark and Kanter, 2011; Chowdhury et al., 2014). Ready-made garment (RMG)contributes a large portion of gross domestic product and also a resource-hungry and pollution intensive sector (Abdin, 2008; Clark and Kanter, 2011).As this sector make increasing environmental impact, government

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have to keep an eye on this issues (Chowdhury et al., 2005; McKinsey and Company, 2011). Huge amount of fresh water needs for washing, dyeing and finishing of textiles, and can be range from 250 to more than 540 cubic meters per ton of textiles (Mazedul et al., 2013). It is stated that, annual textile production of five million tons, and calculated that every factory use almost 380 liters of water every day in Bangladesh (Quddus and Rashid, 1999; Ahmed et al., 2013; Silva et al. 2014). This amount of usage replicate in thousands of factories in Bangladesh and give idea of scale of using water. The sources of this water is from ground water or surface water such as ponds, lakes, Local River etc. (Robbani, 2000; Massoud et al., 2009; Hasan, 2013). The RMG sector remove the burden of unemployment from other sector such as agriculture, transport, trade and industry sector and providing the largest employment (Rehman and Khundker ed., 2001; McKinsey and Company, 2011).This sector contributes to come neglected people into the main streams by radical transforming of socio-economic condition of the country. Both employment and empowerment increased awareness of health, education, food, population control, disaster management and so on (Mainuddin, 000; Clark and Kanter, 2011; Rakib and Adnan, 2015). This sector comes as a historic event of Bangladesh. But this sector is recently creating many greenhouses gases, waste and waste water pollution in the agricultural sector and depletion of water resources in the country (Massoud et al., 2009).

In 2013, Rana Plaza building collapsed has taken thousands of worker lives at a glance. This tragedy has gained attention in all over the world, where many world's famous brands produced their cloths (Hossan, 2011; Peter, 2017). This incident led to many attempt to increase awareness and mark challenges such as poor work environment, labor rights violation, corruption and public and environmental health damage (Morshed, 2007: McKinsey and Company, 2011). Due to strong political unwillingness to make strict action and punishment for environmental violence is quite difficult to establish (Haque, 2002; Rakib and Adnan, 2015). The violators is so politically active that they can give strong political pressures over the regulatory body. In this context, the government has tried to impose "green tax" in 2014-2015 budget against factories that increase high level of pollution (Islam, 2015:13 April).Finance honorable minister Mr. Muhith proposed a 1% tax entitled the "*Environment Protection Surcharge".* In this study, the indicated tax which would be targeted from industrial units that they have not appropriate waste treatment facilities. Previously, many factories has faced one-off fines for producing hazardous levels of pollution. *"Those who pollute will have to pay taxes as long as they keep on polluting,"* said Honorable Minister Mr. Muhith (Islam, 2015:13 April) New tax will affected in many factories but some other exemption will be find too, including 6,000 brick factories, confirmed that they will build eco-friendly forges (Islam et al., 2014). But his plan has been met with criticism.

Bangladesh has no system or program for Eco-tax. Bangladeshi garment makers have something to cheer for in the proposed budget, as the finance minister has reduced the corporate tax for the sector to 15% from the existing 20% (Massoud et al., 2009).Due to contribute of reduce saving energy, water and environment, 14% of corporate tax has been mitigate for the green garment factories. The much-talked about source tax will be 1% for the next fiscal year(Islam, 2015:13 April).The garments owner will motivated to establish more green garments because of high tax reduction (Crump, 1991). The concept of reduction of corporate tax runs one of the highest rated green garments

factories in Bangladesh (Rakib and Adnan, 2015). Currently, 67 garments factories have achieved the Leadership in Energy and Environmental Design or LEED certificate from the US Green Building Council and another 222 garments factories are waiting for the certified from council (Convery et al., 2013).

Concept of Eco-Tax

The concept of eco-tax has raised to protect environmental health by following tax behavior (Silva et al. 2014; Gao et al., 2019).The approaches based on a simple principle those who pollute the environment must they have to pay. Obviously they are the main polluters and involved with local, regional and global climate change. Here we tell you their advantages, how much they collect and some of the criticisms(Yokessa and Marette, 2019; Chan, 2019). Human beings has faced the environmental threat of climate change in many ways. Eco-Tax is levied on products, practices, or activities which are considered to be harmful to the environment (OECD, 2011; Labeagaan and Labandeira, 2020). An eco-tax is a tax imposed on harmful activities against environment and try to promote environment friendly activities by economic incentives (IEEP, 2014; European Commission, 2014). Such a policy can complement or avert the need for regulatory (command and control) approaches (OECD, 1995; EEA 2016). Often, an eco-tax policy proposal may attempt to maintain overall tax revenue by proportionately reducing other taxes (e.g. taxes on human labor and renewable resources); such proposals are known as a green tax shift towards ecological taxation (Andersen, 1995; McKinsey and Company, 2011). Eco-taxes address the failure of free markets to consider environmental impacts. According to OECD, eco-tax has a physical unit (or a proxy of it) that has opposite impact on environmental health (Ekins, 2009; IEEP, 2014). Four subsets of environmental taxes are distinguished: energy taxes, transport taxes, pollution taxes and resources taxes (Goers et al., 2010; Yokessa and Marette, 2019).Eco-taxes is usage as economic instruments to mark environmental problems. They are designed to internalize environmental costs and provide economic incentives for people and businesses to promote ecologically sustainable activities(Barrios and Saveyn, 2013; Labeagaan and Labandeira, 2020).

As an example, waste minimization is an area where there are many opportunities for an organization to save money (Peet, 1996; Ekins, 2009; IEEP, 2014). Waste requires to be disposed of, and this itself costs money (Huong, 2014). For instance, companies are charged for disposing of waste into licensed landfill facilities, or it may be necessary to pay for special treatment of a chemical before disposal (European Commission, 2014). Reducing the amount of waste produced can therefore lead to savings, as the organization has to dispose of a smaller quantity (Bräutigam, 2008; Liu, 2013). An obvious way of minimizing the amount of waste generated is to minimize inputs. Adopting a more efficient process could mean that fewer raw materials are required, and that the overall cost of raw materials is therefore reduced (Yokessa and Marette, 2019). Reductions in the amount of water required can also lead to savings, as organizations are almost always charged for their water usage (Clark and Kanter, 2011; Parnell, 2013). On the basis of address of environmental damage, the eco-tax scope is determine. This has implications for the level of the political jurisdiction that imposes the tax (Peet, 1996; Labeagaan and Labandeira, 2020). For some damages such as soil contamination has small area impact. Therefore, a tax or charge on waste disposal or harmful garden chemicals might effectively be imposed at the level of a municipality or township (Bode and Grünebaum, 2000; Yokessa and Marette, 2019).

Global Scenarios of Eco-Tax Implementation

The IMF has proposed that the countries that emit the most greenhouse gases establish a tax on CO_2 emissions. According to this organization, this rate would have to be USD 75/ 68 Euros per ton in 2030 (Gee, 1994; Yokessa and Marette, 2019). Mainly the agency impose this rate on the use of coal for generate electricity. This kind of taxes motivate to shift less polluting energy, such as renewables. The ideal situation for environmental taxation is what is known as the *double dividend hypothesis* (Labeagaan and Labandeira, 2020). Contrary to the prejudice that environmental taxes burden the economy, a scenario in which the rise in these taxes would be compensated by a reduction in taxes on labor, capital or consumption would result in a double benefit: an improvement in the environmental quality and efficiency of the economic system (Labeagaan and Labandeira, 2020)**.** Denmark had already introduced a CO_2 tax in 1992, also on industries, and with effect from 1996 this tax is increased considerably. Sweden was the first country to implement a tax shift from income taxes to taxes on energy and pollution (Atkinson, 1999). Although an energy tax had been imposed since 1974, a new CO_2 tax was introduced in 1991 together with the imposition of VAT on energy. In addition environmental taxes on NOx and SO_2 were introduced (Sterner, 1994, OECD 2011). The Netherlands' Green Commission recommends deductions for environmentally friendly investments (Truger and Jacoby, 2002; Gallego et al., 2018). In this recent report, it was evaluated that the CO_2-tax, in existence since 1980 in several forms, reduced the national level of CO_2-emissions by 1% in 1994 (Dutch Commission 1996; Wagenhals, 2000).Norway Green Tax Commission has applied a broad approach, and analyzed distortions of present taxes as well as 'green' taxes proper (Silva et al. 2014; Johansen et al., 2018).

Aims and Objectives of the Study

This paper has tried to examine the possibility potential environmental tax policy introducing in the RMG sector in Bangladesh. It focuses primarily on environmental waste management systems in RMG, which would be the largest and most important potential new environmental tax policy in Bangladesh. It also discuss briefly the other possible reforms. The main purposes of this research to find out the possibility of willingness to pay eco-tax by the RMG sector in Bangladesh. The major objectives are:

1) To review a comprehensive scenarios of eco-tax implementation of national and global framework,
2) To find out the challenges of eco tax implementation at the RMG sector in Bangladesh;
3) To recommend some guidelines for overcoming those challenges to implementation eco-tax system at RMG sector in Bangladesh.

Data Sources and Methods

The time was not adequate for the comprehensive study of the selected topic and the eco-tax concept is comparatively new for Bangladesh RMG sector. Primary data were collected from the interview of 90 high officials from Ashulia 10, Savar 10 and Gazipur zone 10 in total 30 leading garment companies located in Ashulia, Savar and

Gazipurzones. A structured questionnaire with 18 items was used to collect data. The secondary data were also collected from the journals, periodicals, annual reports of BGMEA, BKME, research papers, BGMEA website, etc. The sample respondents were selected by using systematic sampling method. After collection of data, incomplete, and biased, and or abnormally answered data were discarded through a thorough examining process. The reliability of 15 items in the questionnaire has been tested by using SPSS software and multi-criteria analysis.

The nature of the present study is completely a case study which roughly works under the exploratory study. Both qualitative and quantities data were used in this study. Personal opinion and observation has taken under the sampling survey. The sampling technique among the 1250 officials of the surveyed from selected 30 RMG companies of the total surveyed population 150 were selected randomly as the sample size, where 2 high official, 2 manager, 3 Quality Controlling officer of different floors and departments, 25 were concerned supervisors and another 10 were related to Health and Safety Environment persons of Readymade Garment Industry in Bangladesh.

The present focus of government policy to reduce industrial pollution through adaptation of better technology, wash management, sustainable energy implementation, etc. Though the eco-tax is not an alternative to manage pollution or policy for adaptation of better technology, they are complementary and should tend to reinforce each other. Such as, tax set appropriately would provide a strong incentive to adopt proper measures to reduce pollution rate to escape paying the tax. The government can impose a tax directly on output based on estimate emission. Required knowledge about the amount of emission, setting minimum permissible emission standard, and the ability to monitor compliance in order to collect penalties could be maintained strictly. Addressing the financial and institutional constraints to better environmental management will take time and requires concerted efforts to reduce pollution (Sadiq, 2018).

Results and Discussion

The Ready Made Garments (RMG) in Bangladesh has created revolution by gross contribution of employment making and income generation of millions of poor people. More than five million workers directly and twelve million poor people indirectly depended to earn their livelihood by working this sector. More than 3.2 million poor women has become self-dependent only for the expansion of RMG industries. There has no doubt, The RMG sector has become the lifelines of Bangladesh's economy, by contributing exporting earning, employment generation, empowering women, etc. Bangladesh received more than three fourth (about 81.7%) of total export earnings from Readymade garments (Woven, 2016).However, the circuit was spreading day by day while the industrial pollution was enhancing with no bound.

There is now a growing recognition of the environmental damage of continuing with the business-as-usual development strategy and the risks it poses to the sustainability of development. In response, the government has adopted a large array of strategies, laws, rules and regulations, and adaptation and mitigation programs and projects. However, the field result provide that these policies has been weak in ground level implementation. Lack of strategic thinking and financial and institutional impediment has create limitation on government’s environmental protection strategy.

From the below Table 1 we can see that if we are able to implement the eco-tax in the RMG sector than our environmental pollution level will be reduce (BIM, 1999). As we see that if there is no eco-tax than pollution level is maximum but when we imposed minimum level of eco-tax pollution level little bit decrease and if we increase the level of eco-tax percentage pollution level become minimum and less.

Table 1: Possible Indicators for Eco-Tax according to 5th EAP (Environmental Action Program) themes

5th EAP Themes	Carbon/ Energy tax		CFC reducing tax		NOx reducing tax		SO_2 reducing tax		Waste reducing tax		Waste water charge tax	
	Global	BD	Global	BD	Global	BD	Global	BD	Global	BD	Global	BD
Global &Climate change	√√	√√√	√√	√	√√	√	√√		√√	√√	√	√√√
Ozone depletion issue			√√									
Acidification	√√				√√		√√					
Air pollution status/quality	√√		√√		√√		√√		√√	√√	√√	√√
Issues of waste management		√√							√√		√	√√√
Urban issues (noise/traffic)	√√		√√									√√
Inland waters	√	√√			√√		√√		√√		√	√√
Coastal/ marine waters	√		√√		√				√		√	√

Legend:√√√The main target of the environmental or Eco- tax (Source: 5th EAP-Environmental Action Program)

√Other environmental themes where the tax will have secondary benefits

Willingness to Pay Eco-Tax by Ashulia RMG Sectors

From figure 1 we see respondents are highly willing to pay for carbon/energy/fuel tax than other tax. Almost 20.34% to 25.24% respondents of RMG sectors in Ashulia zone are interested to pay tax willingly for those purposes. This percentage proves that RMG sector are more responsible for carbon emission than other gases. On the other hand, only 1.34% to 2.34% of respondents are interested to pay willingly in CFC tax. Similarly, 0.79% to 2.34% and 3.56% to 7.56% respondents are willing to pay for SO2 tax and NOx tax respectively.

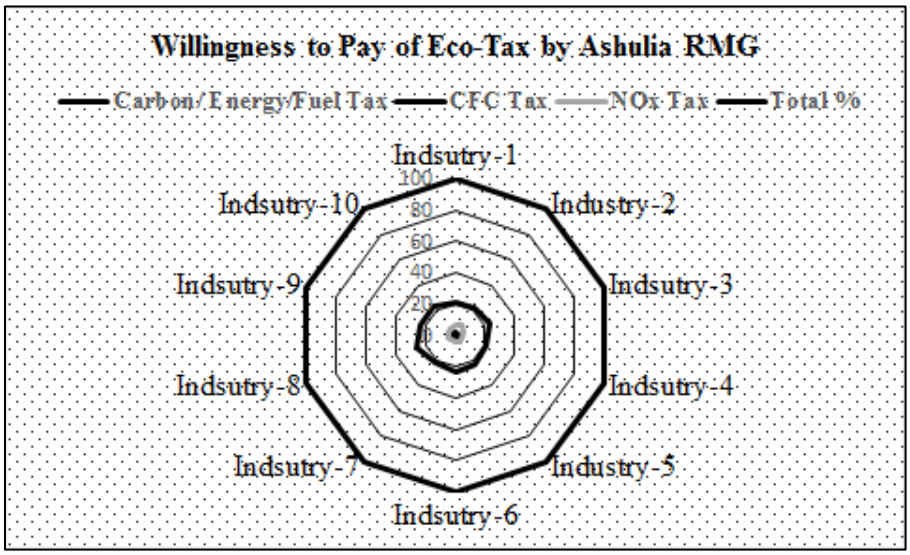

Figure 1: Percentage of Willingness to Pay of Eco-Tax for Carbon emission/energy/fuel tax, CFC tax and NOx tax by high official respondents of selected 10 (ten) RMG sectors in Ashulia zone

Here figure 2 express the rate of willingness to pay of waste tax and wastewater tax in Ashulia RMG sector. 39.2% to 43.32% of respondents agree to give wastewater tax for polluting water. This percentage gives the idea that most of the Garments waste are throwing into the water. That's why Garments waste are more responsible for water pollution. As opposed to, other waste is also accountable to increasing pollution. 25.03% to 30.65% respondents are also agreeing to give waste tax for increasing pollution.

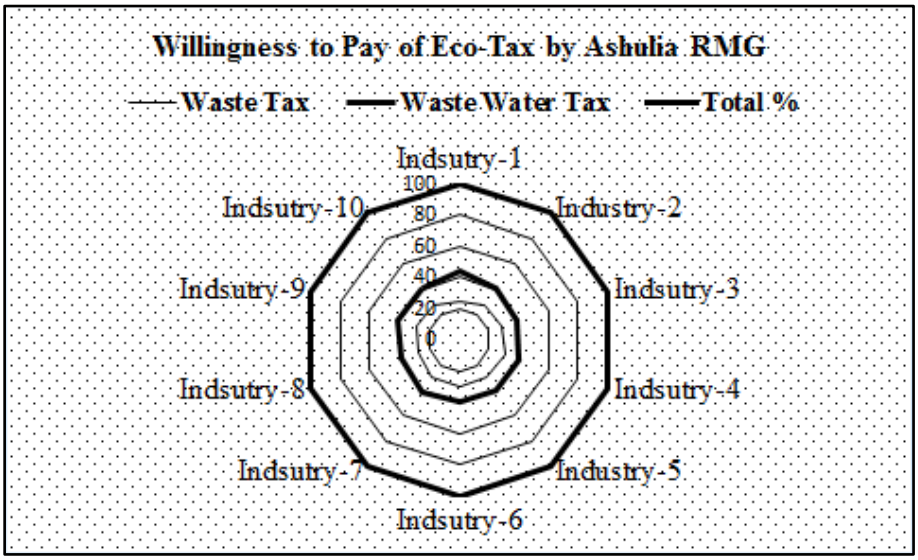

Figure 2: Percentage of Willingness to Pay of Eco-Tax for Waste Tax and Waste Water Management Tax by high official respondents of selected 10 (ten) RMG sectors in Ashulia zone

Willingness to Pay Eco-Tax by Savar RMG Sectors

The percentage of willingness to pay in Savar RMG sector of eco-tax for Carbon emission/energy/fuel tax, CFC tax and NOx tax are comparatively low than Ashulia RMG sector. From figure 3, 17.83 to 23.45% of respondents agree to give willingly Carbon emission/energy/fuel tax, where only 1.21% to 3.94% of respondents want to give CFC tax. Similarly, only 0.79% to 2.98% respondents agree to give SO2 tax for environmental pollution. In the same way, respondents agree to give 3.04% to 7.56% percentage NOx tax for occurring pollution.

RMG sector contribute 80% of export earnings and it will be play pivotal role after reach green industrial growth in the country. A number of initiative have already started including green building, eco-friendly technology, harvesting rainwater, installing effluent treatment plant (ETP), installing solar power plant, and servo motor for power generation, managing hazardous chemical properly and many other sustainable measures.

Though so many initiatives have already been taken the government of Bangladesh with regard to textile and RMG sectors to introduce some green factories which are ensuring workers health and safety through better working environment, manufacturing productivity and protecting their surrounding environment from being polluted environment. Spillover effect has already been observed in the garment sector of Bangladesh as a growing number of factory owners are now willing to convert their existing factories into green building and go for eco-friendly production techniques.

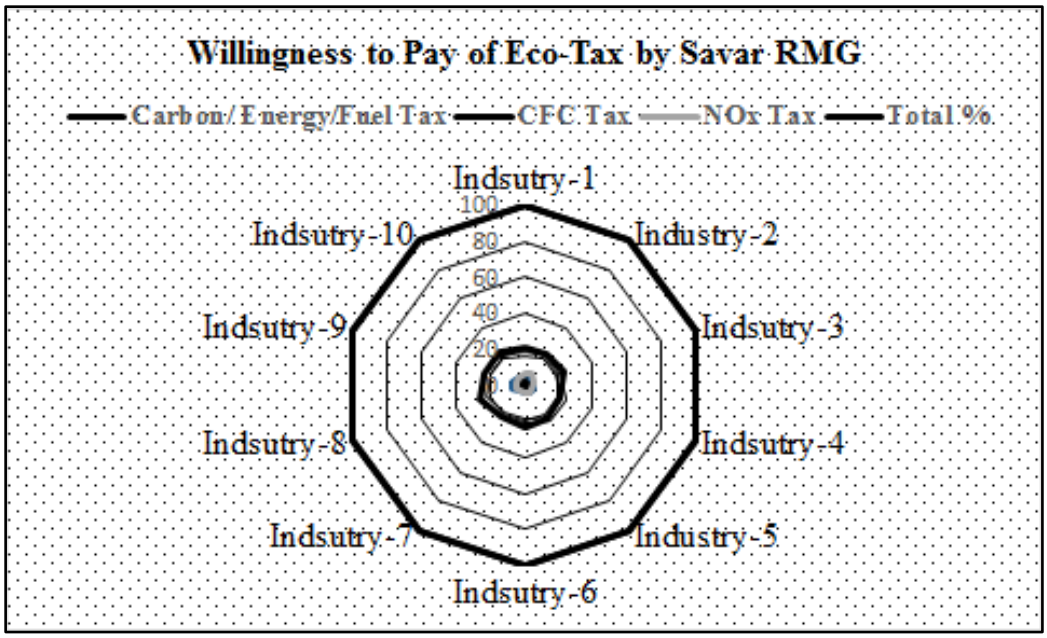

Figure 3: Percentage of Willingness to Pay of Eco-Tax for Carbon emission/energy/fuel tax, CFC tax and NOx tax by high official respondents of selected 10 (ten) RMG sectors in Savar zone.

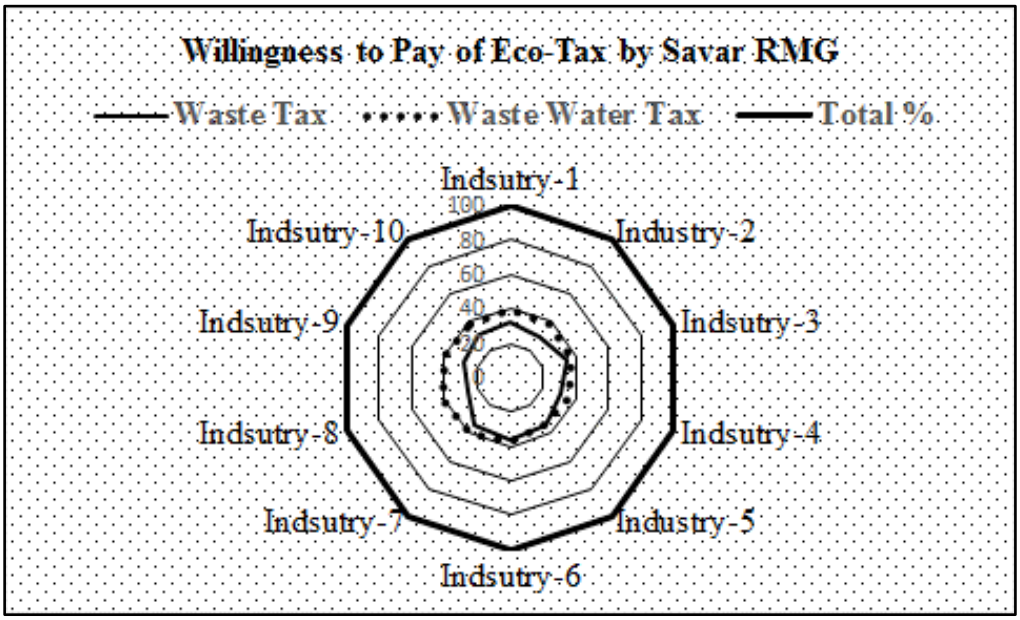

Figure 4: Percentage of Willingness to Pay of Eco-Tax for Waste Tax and Waste Water Management Tax by high official respondents of selected 10 (ten) RMG sectors in Savar zone.

Besides, figure 4 express the percentage of Willingness to Pay of Eco-Tax for Waste Tax and Waste Water Management Tax. Here we see the percentage of willingness to pay for Waste Tax and Waste Water Management Tax in Savar RMG sector are a little bit high than Ashulia RMG sector. 25.99% to 35.63% of respondents interested to give waste tax, where 33.91% to 41.23% of respondents are agreeing to give eco-tax for wastewater tax. There are similarities in Ashulia and Savar RMG sector that the percentage of respondents of wastewater tax are almost same, which indicate they are responsible for water pollution.

Willingness to Pay Eco-Tax by Gazipur RMG Sectors

Figure 5 express the percentage of willingness to pay of eco-tax in Gazipur RMG sector. This figure represents 16.55% to 23.99% of respondents agree to give a carbon tax which is the highest rate among the three RMG sector. Similarly, only 1.02% to 2.87% of respondents agree for giving CFC tax. But the percentage of respondents for NOx tax is a little bit high than CFC tax. 3.56% to 5.67% percent respondents agree give NOx tax. In addition, 0.79% to 2.67% of respondents want to give SO2 tax.

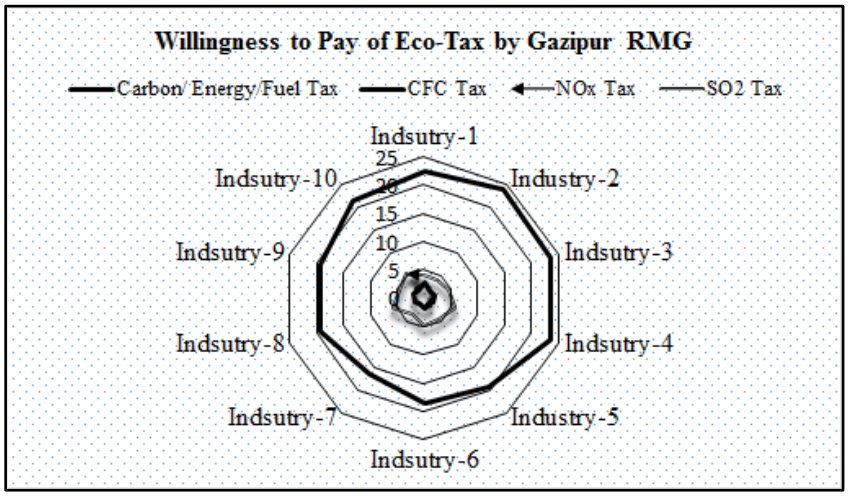

Figure 5: Percentage of Willingness to Pay of Eco-Tax for Carbon emission/energy/fuel tax, CFC tax and NOx tax by high official respondents of selected 10 (ten) RMG sectors in Gazipur zone

Again we see figure 6 express respondents' percentage of waste tax and wastewater tax in Gazipur RMG sector. The percentage of respondents of waste tax is almost the same with the other two sectors. 26.78% to 35.32% of respondents agree to give waste tax as well as 37.79% to 42.21% of respondents interested to give wastewater tax.

In 2011, according to Bangladesh Garment Manufacturers and Exporters Association (BGMEA), a total of 67 Bangladeshi RMG factories have received Leadership in Energy and Environmental Design (LEED) certification from the US Green Building Council (USGBC). The USGBC is one of the highest ecofriendly industries rating systems in the world. Besides, In Bangladesh 222 more factories have been registered with the USGBC for the LEED certification.

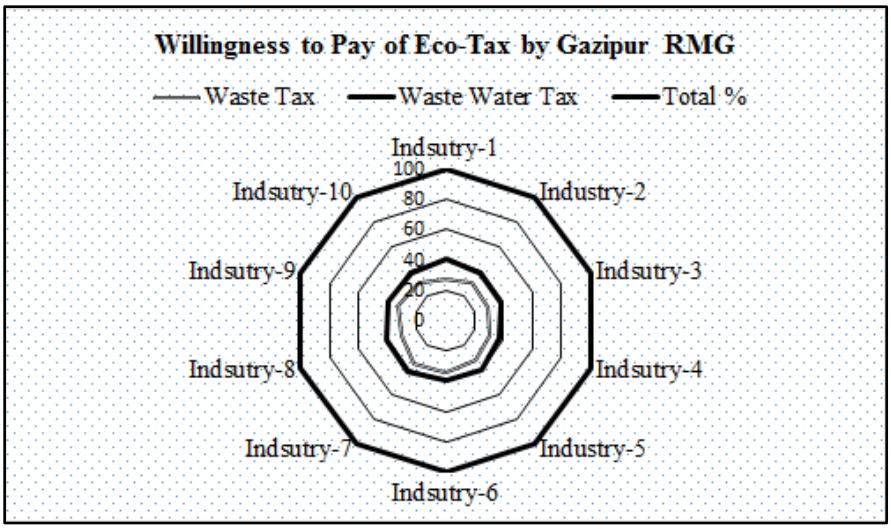

Figure 6: Percentage of Willingness to Pay of Eco-Tax for Waste Tax and Waste Water Management Tax by high official respondents of selected 10 (ten) RMG sectors in Gazipur zone

From this above discussions, we can say that, the percentage of respondents of the RMG sector more interested to give wastewater tax than other polluted tax. It proves that the RMG sector polluted water by throwing waste into the water body. Secondly, they give concern on carbon emission tax and waste tax after wastewater tax. But the percentage showing, they are not so much agreed to give CFC tax, NOx tax and SO2 tax. Finally, the percentage of willingness to pay for eco-tax of RMG sector gives us a clear idea of respondent perception on eco-tax implementation in Bangladesh.

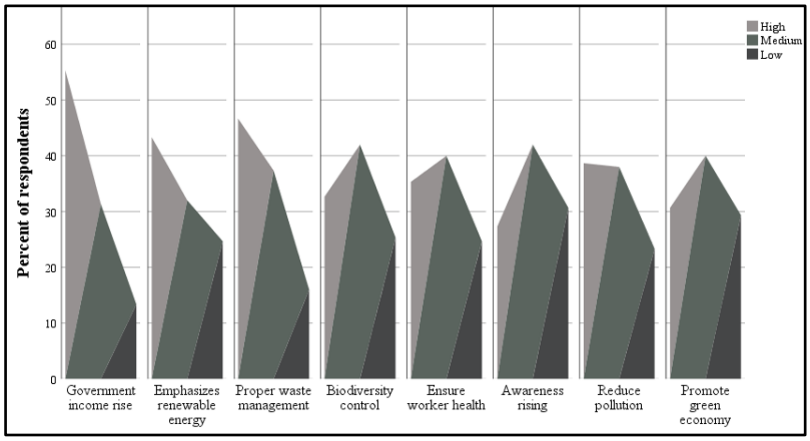

Figure 7: Effectiveness of eco-tax implementation at RMG sector in Bangladesh

Impediment of eco-tax implementation at RMG sector in Bangladesh

There are many obstacles to implement eco-tax at RMG sector in Bangladesh. Figure 8 gives us a conceptual idea about the impediment rate of different stakeholder. Almost 60% and 40% of respondents think owner unwillingness is the obstacle for taxation. They also remark political unwillingness and absence of formal structure for the barrier of eco-tax implementation. Similarly, respondents also mark lack of training, research and insufficient implementation cost are cresting obstacle at eco-taxation.

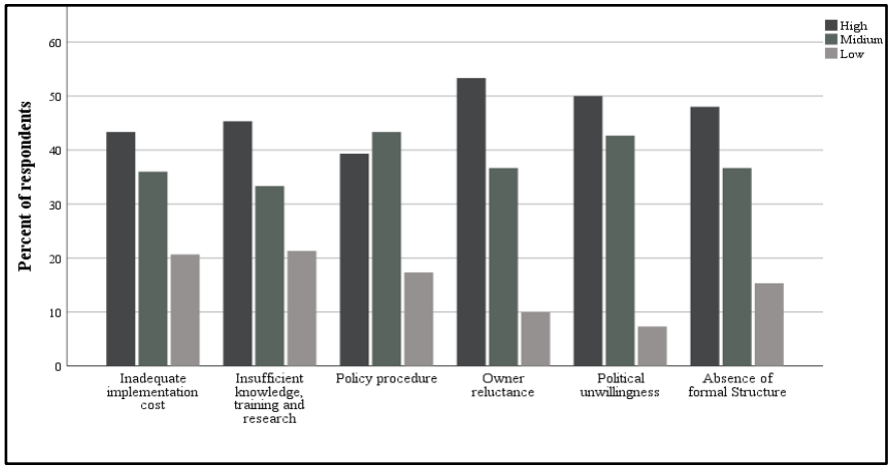

Figure 8: Impediment of eco-tax implementation at RMG sector in Bangladesh

As a establish sector, it can be influence for improving other industrialization of the country. In contrary, this sector currently depends on other countries for raw materials, fabrics, machineries etc. To mitigate this impediment, new initiative, idea, trade policies, and law must be taken quickly. The recommendation is nothing but to give some suggestions for improving the prevailing situations. After reviewing the different journals and documents on eco-tax here given few opinions for eco-tax implementation in Bangladesh especially in RMG sector, which may help or will lead the easy implementation eco-tax system in RMG sector.

Table 2: RMG sector of Bangladesh can consider eco-taxes for following purposes/activities

Activities	Example	Global	Bangladesh
Waste Management	Tax for landfill; waste dumping; pollutants Incineration taxes	Implemented	Proposed but criticized
Wastewater treatment	Charges and taxes on water misuse Waste water treatment charges for company	Implemented	Proposed but criticized
Energy Consumption	Consume transport fuels taxes Heating fuels, e.g. oil, gas If over then pay tax Taxes on power generation	Implemented widely	Not proposed
Carbon Emission	Taxes on CO_2-content in energy sources CO_2 emissions Emission Trading/Taxes	Implemented widely	Not proposed
Air Pollution	Air pollution charges, e.g. on SO_2, VOC, NOx, PM, NH_2, heavy metals, CO, NH_3, etc. Fines for failure to meet air quality standards	Implemented	Not proposed
Biodiversity Degradation	Payment for environmental services Conservation/preservation fees Land tax, e.g. taxes on land use change Extraction taxes/Degradation charge Fishery management charges Non-compliance fees	Implemented	Primarily started to practice in some cases

Source: Modified and adopted from European Commission (2014) Tax reforms in EU

Implementation Challenges of Eco-Tax from RMG Sector in Bangladesh

Eco-Tax is a completely new concept for Bangladesh and RMG sector, still most of the people do not know the concept and its positive impact hence this stage if we want to implement the eco-tax in Bangladesh RMG sector this is going to be very difficult to implement and certainly has to face different challenges and obstacles (Figure 9): As examples:

i) **Absence of Formal Structure to Implement Eco-Tax:** Till now in Bangladesh there is no formal system and structure, design to implement Eco-tax in RMG Sector. As neither government nor any private entities has come out to implement these strategies to ensure compliance of the regulations of RMG sector as the same time revenue of the government.

ii) **Ignorance of Multi Stake Holder:** It was found that in the RMG sector different stake holder are involved with environmental pollution and respective all stake holder can role play to minimize environmental negative impact like Buyer, Factory, Government, NGO, Mass people and third party. And from all of the part there have ignorance and its big challenges to implement Eco-tax without all stakeholder co-operation and support.

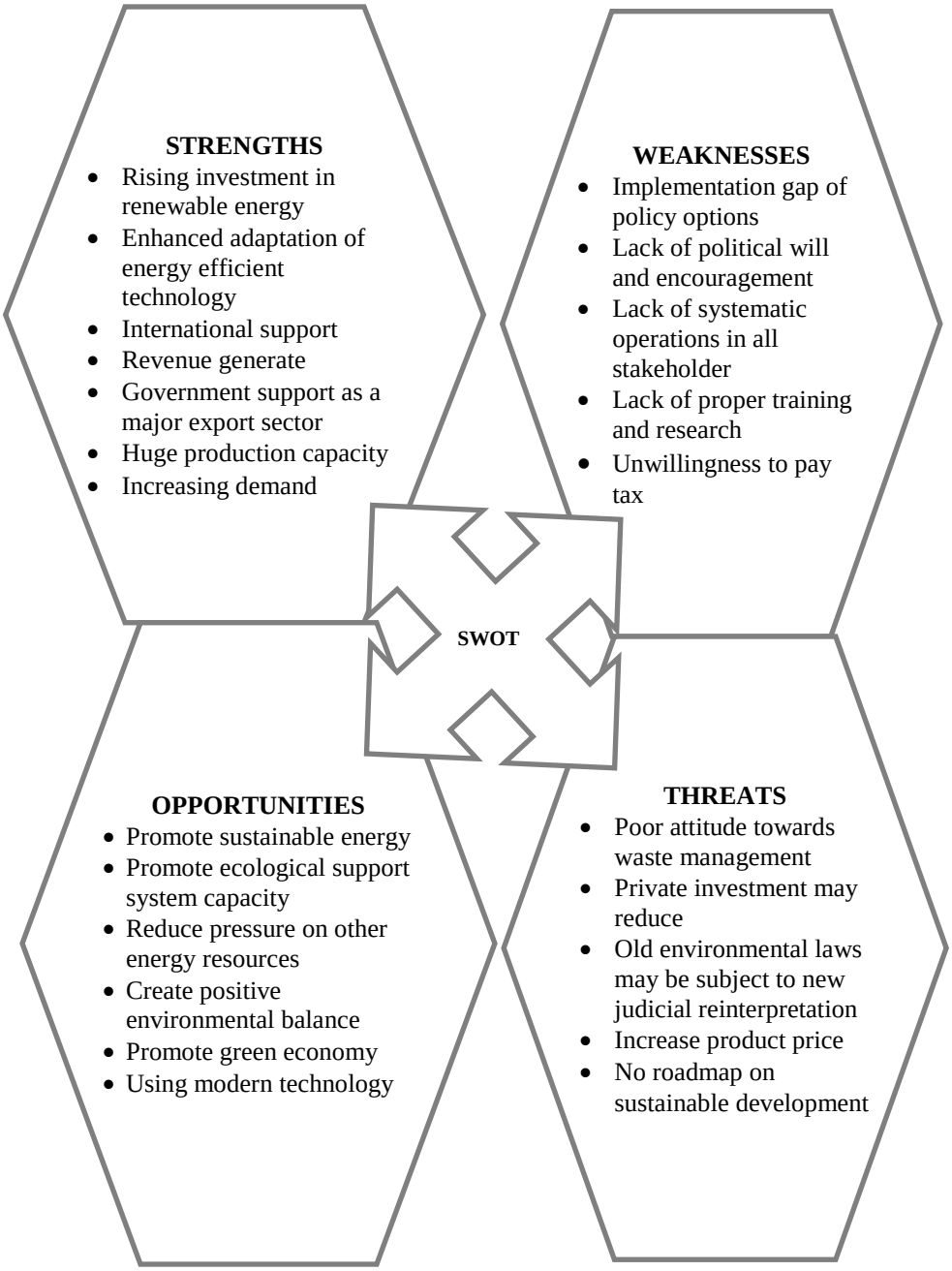

Figure 9: The SWOT Model analysis for eco-tax implementation at the RMG sector in Bangladesh.

iii**) Legal, Institutional and Administrative Aspects:** To established and implement any program and scheme need legal aspect and Bangladesh is a country where people obey the law and regulation when that imposed by legal authority. So far Bangladesh has no legal institutional and administrative system to implement Eco-tax.

iv) **No Initiative to Form the Structure:** Though some developed countries have initiated eco tax implementation but they have succeeded on the implementation due to positive intention along with a formal structure. But unfortunately, till now no formal structure has been formed to initiate and implement and monitor the eco tax implementation on RMG sector of Bangladesh.

v) **Administration and Implementation Cost:** There is no fund for administration activities for implementation of the eco-tax and it's really difficult to be successful without ensuring sufficient implementation cost for this.

vi) **No Institutional Education and Research:** Considering the current situation of Bangladesh on Eco Tax, extensive education and research is highly required to get the final benefit for Eco Tax implementation.

vii) **Willingness to Pay:** Most of the RMG sector owner has no willingness to pay eco-tax as they are not fully satisfying with the role on support to smooth business operation. Besides, still most of the people and organization are intend to reduce the income tax through different ways and in this situation Eco Tax would be burden for the owners.

viii) **Lack of Awareness:** No initiative and awareness program taken to create awareness on eco-tax among general people and RMG owner. Because if the people don't know the positive outcomes of any initiative that will be difficult implement.

ix) **Political Variability:** Bangladesh is a country where we observe political crisis among different parties. If any initiative established by any parties again due to change of the power the system become loss. Due to political inconsistence it was observed that such type of system will be fall because people will try to impose their power.

x) **Environmentally Perverse Subsidies and Tax Allowances:** If any tax imposed to any particular area need to show the outcomes and its positive impact and development and facilities for that specifics area. Yet Bangladesh has no such kind of subsidies and tax allowances upon which factory owner may agree with the implementation of Eco Tax.

xi) **Lack of Policy Procedure:** Still Bangladesh has no policy, process and evaluation procedure to implement the eco-tax which would be definitely a great challenge on implementation of Eco Tax.

xii) **Lack of Skilled Personnel on Eco Tax Implementation:** As of now, none of the industry has faced the Eco Tax implementation. Besides, no formal education and research system has not been also developed till now. Therefore, it would be a severe problem initially to ensure sufficient skilled person to implement Eco Tax on Bangladesh RMG sector.

Recommendations and Way Forward

Bangladesh is an emerging country of earning the remittance from the readymade garments industries. There is no doubt, after twenty years Bangladeshi economy will depend on international trade and RMG sector will become the pioneer in economic development. In GDP, RMG industries will contributes healthy share of exports. Therefore, it is emergency to reforms and modernize the trade policy to ensure the highest profit from garments industries. Besides, it should be mandatory to ensure the infrastructural development, labor security, labor right etc. in every garments. To gain sustainable outcome from RMG industries, it must be incorporating RMG issues in every development planning cycle. It is obvious to include every stakeholders such as, consumers groups, owners, buyers, government etc. to underpin the whole development planning of RMG sector. Specially, government and owners of garments have to give more concern to ensure sustainability of development because this sector make us economically strong foothold, employment of poor people and women.

Finally, this study findings remind that, the most important thing is to ensure political commitment with impartial behavior of the government is a necessity for a sustainable RMG sector in Bangladesh. Good governance is the key factor for the improvement of the economic activities of the country. Government is to take the major responsibility to establish good governance in the state and related stake holders should join hand in hand with it.

Conclusion

From this above results and discussions it is found that the environmental taxation has a significant role to play in addressing and mitigating the environmental problems and challenges. Many readymade garments industries of Bangladesh have such indicators asweak infrastructure, lack of energy and supportive regime and policies, inefficient management, lack of industrial integration etc. make barrier to find out the potentiality to develop of RMG sector. Eco-tax implementation at RMG sector can be extremely effective when they are properly designed, are levied as close to the environmentally damaging pollutant or activity as possible, and are set at an adequate rate.

On the other hand, the study state that the effectiveness of carbon emission/energy/fuel tax, CFC tax, NOx tax or waste tax implementation make a significant contribution to address environmental challenges. Environmental taxes give rise to distributional or competitiveness concerns, but these are usually best addressed through other policies tools. Eco-taxes, it is needed to be combined with other mechanisms to achieve the maximum competent and effective environmental policy package, but maintenance should be taken to evaluate the impact of overlapping tools. Finally, this study recommended that changing existing practices and current policies for imposing eco-tax could be long term impact for sustainable development and enhance the standard of living and approach towards a middle-income economy.

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Informal Economic Activities in Residential Areas of Dhaka City: Empirical Evidence from Mirpur Area

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Abstract: Informal activities are regular companion of rapid urban growth in the Global South. The informal economy represents a major share of the GDP in many countries. The main purpose of this paper is to discuss about informal economic activities in the residential area of a megacity and analyze their spatial characteristics and socio-economic dimensions. A case study was conducted in Mirpur Area of Dhaka City. The number and types of existing neighborhood retailing and their spatial location and size were identified by observation survey. There are 139 immobile neighborhood retailers or street vendors and hourly average 87 mobile street vendors observed. Fifty of those different neighborhood retailers or street vendors were randomly selected using stratified sampling technique for detailed questionnaire survey for socio-economic analysis. The existing neighborhood retailing activities in the study area are of diverse nature and type with different size, employ many people and regularly serving a large number of people in the study location. Based on the results, some suggestions - policy guidelines and measures related to informal economic activities within the residential areas in Dhaka city – are provided. Findings of this paper would be helpful for similar areas of the city or similar other cities.

Keywords: Informal, economy, eviction, megacity, urban, retail, street vendor.

1. Introduction

Much of the urban growth in the twentieth-century is taking place in the Global South (Sandoval, et al. 2019). However, the rapid urbanization is not supported by economic growth in many countries (Changqing, et al. 2007).Therefore, 'informality' - once associated with poor squatter settlements - is now seen as a generalized mode of urbanization in the Global South (Roy, 2005). Often, the informal activities are very common across different sectors in the major urban areas. "The history of modern urbanisation illustrates that informality was and is a regular companion of rapid urban growth" (Changqing, et al. 2007, p. 23).

The term 'informal' usually refers to the activity which is not organized or without having any formal registration or legal basis. For instance, the informal sector is described as "all economic activities by workers and economic units that are –in law or in practice– not covered or insufficiently covered by formal arrangements" (ILO, 2002,

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p.5). The term ‘informal sector’ - a sector which provides a wide range of low-cost, labour-intensive, competitive goods and services – was first defined by Kith Hart in 1973 (Alam, 2012). Roy defines ‘urban informality’ as “a state of exception from the formal order of urbanization” (Sandoval, et al. 2019). The term ‘informal’ is not new in the field of development study as well as planning. Generally, urban development that comes within the purview of a state land administration system and complies with its legal and regulatory requirements is labeled ‘formal’ and all development that does not comply with one or another requirement is considered ‘informal’ (UN-Habitat, 2009). There are also some other factors that largely characterize informality; for instance, lack of state-provided safety net, competitive pressure arising from economic crisis, privatization, economic liberalization and global competition (UN-Habitat, 2009). Perhaps the most studied dimension of informality is the informal economy or informal sector, which includes all forms of informal employment (Sandoval, et al. 2019).

‘Informality’ is one of the major issues the present world is facing in the process of its development. Though informality in the development process exists in every part of the world, it is evident that it mostly exists in the developing countries and where there is transitional economy (UN-Habitat, 2009).The surplus urban population in the Global South are usually engaged in informal economy because neo-liberalization is occurring (Hussain, 2013). ‘Informality’ in the stagnant economies ofa megacity is no longer a residual category, rather the dominant mode of access to urban shelter or mobility or other service delivery (Changqing, et al. 2007). Thus, informal activities and solutions seem to be a new element of a flexible urban production-consumption system, thereby contributing substantially to the functioning of the socioeconomic system of a megacity. Recent studies show that intensive linkages and diversified networks exist between both formal and informal arenas (Hossain, 2012). Even in the present world, the proportion of ‘informal sector’ is so significant that this cannot be ignored anymore. Therefore, a new concept of 'informal economy' was used instead of ‘informal sector’ in the 90th Session of the International Labour Conference held in 2002 (Chowdhury, 2005).

The informal sector has grown and expanded rapidly, and now the majority of the world’s population produces and trades in this sector (ILO, 2013).The informal economy represents more than a third of global output of developing countries (Schneider, et al. 2010). For instance, informal economy accounts for 50 to 80 percent of GDP in Africa, 40 percent in the Latin American and Caribbean (LAC) region, and 34 percent in Asia (Benjamin, et al. 2014; Sandoval, et al. 2019). Considering the significance, several recent studies argue that ‘demolition’ of informal sector is the least deserved solution, rather legalization of these kind through new and flexible planning and design guidelines proved as more sustainable solution (UN-Habitat, 2010). Many authors (e.g. Changqing, et al. 2007; Hossain, 2012; Halder, 2019; Hussain, 2013; Nahrin, 2017; Pramanik and Rahman, 2019; Roy, 2005; Rahman and Ley, 2020; Rahman, 2013; Rahman, et al. 2013; Rahman, 2007) argue that informal sector need to be integrated with formal sector and need to be accommodated in urban system or planning. Roy (2005) further argues that the informal sector should not be excluded while planning for the city and this would be useful not only for "Third World" cities but also more generally for urban planning concerned with distributive justice.

In Bangladesh, a significant portion of the economy (estimated as 38%) is said to be 'informal' or shadow economy (Hasan, 2011). The informal sector of the country is dominant and employs a large number of people which is difficult to ignore in the development process. For example, 51.7 million (85.1%) people of the country and if considered only the urban areas it is 13.1 million (77.3%) whilst in Dhaka city 78.2% are engaged in informal employment (BBS, 2018). Therefore, similar to other developing countries, Bangladesh also recognizes the significance of informal sector as an expanding source of employment (ILO, 1994). Political and administrative services in Bangladesh are very complex and highly saturated with informal/unlawful monetary dealing, which is commonly defined as corruption (Khan, 2001). Urban informal sector provides several significant urban services in Bangladesh and the sector is playing an important role in the economic growth of the country (Halder, 2019).

Dhaka, the capital city of Bangladesh, is now the 11th largest megacities of the planet. Dhaka is one of the most densely populated cities where there are many informal sectors, services and activities. This paper is to explain the physical and spatial characteristics of the informal economic activities in the residential area and the influencing socio-economic factors related to the informal activities. The main purpose of this paper is to assess the existing situation of neighborhood retailing, particularly the street vending activities, and their spatial pattern in the residential area of Dhaka city. This paper also tried to explore the socio-economic factors affiliated with the street vending in the residential area for understanding their importance and dynamics in urban society.

Section 2 provides the summary of relevant literature; Methodology of the research are discussed in Section 3 and the profile of case study are is given in Section 4; Section 5 reports the results derived from the case study area; and Section 6 provides a discussion and the conclusions.

2. Review of Relevant Literature

The informal sector plays an important role in the economy, employment generation, and in providing utility services in cities of the Global South. More than 61% of the workers globally employed in informal economy; if considered only the developing countries it is 90% whilst in the South Asia it is 88% (WIEGO, 2020). Among the South-Asian countries, Bangladesh has the highest percentages of employment engaged in informal sector (ILO, 2017). However, informal urban sectors often do not receive due attention or acknowledgement from typical or conventional city planning and policy makers. Moreover, in many cities the regulatory authorities have placed a variety of restrictions and barriers on informal sector (Rahman, 2013). Roy (2005) argued that often the formal and so-called mainstream thinkers of city planning do not count the very important and significant informal sector in their thinking and planning process. They usually act as if the informal sector does not exist, and the policies pretend that excluding this sector is normal. However, the issue of informality is very relevant to the developing country cities where informal part is very significant or almost equal (or more) to the formal part.

The informal sector is getting more and more significance in South Asian countries. For example, as in many other developing countries, almost 80 percent of urban workers in India are employed informally and the economy of the country is 'hybrid' of 'modern-traditional' and 'formal-informal' activities. Similar situation also for the employment sector of Dhaka City. More than 60 percent of all employment in metropolitan Dhaka is in the informal sector (Chowdhury, 2005). However, the existing planning policies such as

National Urban Sector Policy of Bangladesh do not have any insight on this issue, though it discusses on facilitation of the small and medium entrepreneurship's but so far nothing is mentioned in particular to informal sector (National Urban Sector Policy, 2011).

There is a good number of scholarly research publications available in existing literature on the topic informal economy or informal sector. For example, several to mention are: Hart (1973), Roy (2005), Potsiou (2010), Sandoval et al. (2019), Schindler (2013), Changqing, et al. 2007; Chowdhury (2005), Rahman and Ley (2020), Hossain (2012), Halder (2019), Hussain (2013), Nahrin (2017), Rahman (2013), Rahman et al (2013), Rahman (2007). A large portion of the existing literature are on housing or related to slums; for example, Changqing et al. (2007), Nahrin (2017), Potsiou (2010), Rahman and Ley (2020). However, a diverse area of informal sector are also found in existing literature, such as, economy or employment (e.g. Hart, 1973; Halder, 2019); neighborhood or traditional retailing and trading (e.g. Schindler, 2013, Hussain, 2013); urban water supply (e.g. Hossain, 2012); urban solid waste management (e.g. Halder, 2019); and urban transport (e.g. Pramanik and Rahman, 2019; Rahman, 2013; Rahman et al. 2013; Rahman, 2007). Nahrin (2017) claimed that formalization of informal housing could improve the overall environment in fast growing cities. Hossain (2012) reveals an informal sphere of regulations that considers a careful calculation of inhabitants' individual locations in the prevailing power relations matrix and thus continuously (re)defines their differential access to urban utilities. Rahman and Ley (2000) argue that community-based organizations in poor settlements in Bangladesh represent informal networks of the urban poor and emphasized on bridging formal and informal processes through institutionalization under a wider urban governance framework. Informal waste sector has positive contribution in the environment and economy of the city and therefore need for interlinking the formal and informal sectors of waste management (Halder, 2019). The residents of the informal housing and street vendors are constant fear of eviction due to illegal possession (Nahrin, 2017; Hussain, 2013). Hussain (2013) claims that without finding any other sources of subsistence, street vendors have to go through the process of vulnerabilities and sometimes they have to negotiate with the problem creator by providing speed money. Hussain (2013) found that 80% of the respondents (street vendors) in Dhaka wish to have the security of their business – a fixed place for business so that no more harassment or eviction - and capital support from the government.

Existing literature show that there are two different school of thoughts regarding the urban informal activities: (i) the negative thoughts or factors (therefore, advocate to restrict or prohibit and eviction); and (ii) the positive thoughts or factors (therefore, advocate to support and integrate with formal sector) of informal economic activities. Figure 1 shows the major factors of two different thoughts. However, a very few authors argue for restricting or abolishing informal sectors. Schindler (2013) suggested for regulating and negotiating the informal sector. Street vendors and hawkers illegally occupy space of footpaths and/or roads in Dhaka and thus causing obstructions for pedestrians' movement and unpleasant urban landscape (Dool, 2005). Therefore, there is a conflict between street vendors and the city authority or law enforcing agency (Bhowmik, 2010). Considering the pedestrians' problems due to street, Ahmed (2009) suggested to evict the informal activities from footpaths in Dhaka to improve continuity and accessibility for walking. Recently, eviction of street vendors in Dhaka happened numerous times (Etzold, 2013).

In developing country citiesthe major portion of city dwellers now-a-days lives in informal dwellings and employed in the informal economy. Replacing these settlements and economic activities may trigger economic disorder and social unrest, therefore, planners usually prefer to ignore such areas and leave them to remain inside the city. However, this tendency can neither ensure the security of informal economic activities nor the control on shadow economy of the country, which leaves a dangerous grey area where corruption and crime can thrive in an alarming rate (Changqing, et al. 2007). Hossain (2008) revealed that in the Global South the informal dwellers as well as the poor migrants are often used as the component of the political development procedure, however, they are literally excluded from the urban policy.

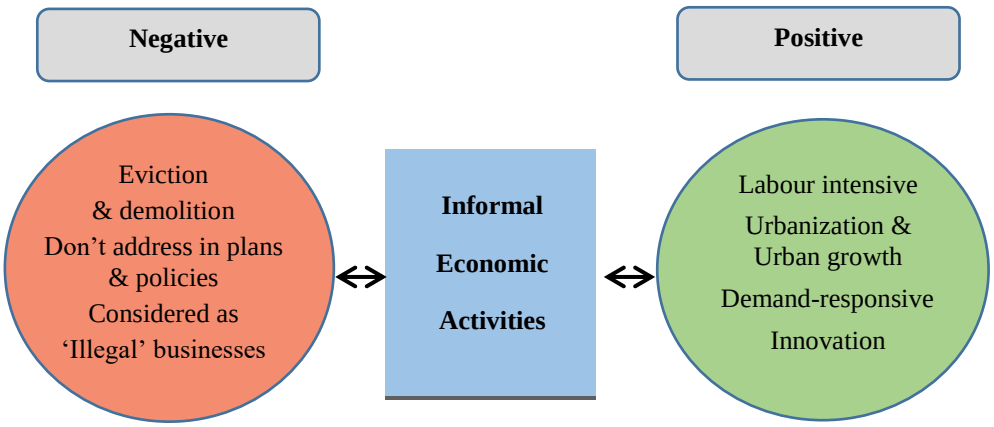

Figure 1: Conceptual framework of informal sector – neighborhood retailing
Source: Developed by authors.

Considering the role and contribution of informal sector in urban economy and in urban structure, it is necessary to plan for the informal economic activities by incorporating them with the formal sector or with the structure of city to mainstream in planning process. Potsiou (2010) noted that the Albanian government used to deal with the informal development as a problem, however, later a law was enacted and passed by the parliament to support the legalization process of informal (illegal settlements and construction) developments. This was done to come up with a solution, which is similar to the suggestions of the report 'Urban Planning for City Leaders' by UN-Habitat (2013), suggested to facilitate the urban informal sector. Similarly, several other research (e.g. Nahrin, 2017; Rahman and Ley, 2020; Halder, 2019; Hussain, 2013; Hossain, 2012; Rahman, 2013; Rahman et al. 2013; Rahman, 2007)suggested for integrating informal sector with the formal sector and the city system or structure. In short, the importance of informal economy is clearly mentioned and the innovation for the sector is suggested.

3. Methodology

A case study approach and qualitative methods were followed for this research. A detailed case study was done in the Ward 7 of Dhaka North City Corporation (DNCC), located in the Mirpur Section 2 area. As the main focus of this research is to study the informal economic activities and particularly the neighborhood trading (or street vending) within a residential area, the Ward 7 which is a highly populated residential area with a variety of urban informal activities is an ideal location for this study.

Required data were collected from both the primary and secondary sources. Relevant books, published journal papers and online resources as well as unpublished documents were studied and reviewed. However, secondary data and resources on this topic for Dhaka city are very limited. Moreover, most of the published documents discus only about the informal economy or informal housing such as slums and squatters whilst street vending is very few.

For the primary data collection, both the observation and detailed interview of the persons who are engaged in informal economic activities (e.g. neighborhood retailing or street vending) were conducted. The neighborhood retailers (street vendors)both mobile and immobile were considered. Observation of the street vendors was done with a specific checklist to identify their types or category, location and seating place (e.g. on road or footpath or in vacant plot) and pattern. Whilst observing, a sketch or map of the neighborhood retailing was drawn and also their GPS coordinates have been recorded. Then the base map of the neighborhood retailing activities for the study area location was prepared superimposing the coordinates with the map from Google Earth.

For questionnaire survey, stratified sampling method was followed to identify the sample respondents. All the neighborhood retailers were grouped under different types or categories and the proportionate sample was drawn randomly from each group. A total 50 street vendor so neighborhood retailers were identified, proportionate from each of the category, as shown in Table 1.A questionnaire was prepared and followed during the interview to facilitate/guide the discussion. The questionnaire interview was mainly to collect information related to the socio-economic conditions such as income and expenditure, establishment cost and age of the business, respondent's migration details (e.g. living place, birth place, migration year, reason of migration), overall number of people served by the business, monthly income-expenditure-profit from the business, eviction history and the reasons of eviction.

Table 1: Sample size from different categories of neighborhood economic activities

Categories of Informal Economic Activities (Street Vending)	Sample Size
Meat Shop	3
Fish Shop	3
Vegetable	8
Tea Stall	8
Saloon	1
Cobbler	2
Street Food	8
Chotpati	5
Fruit	5
Flexiload and Bkash	1
Toys & Cosmetics	2
Home Appliances	2
Papers & Broken Accessories	2
Total	50

The primary data were collected in January 2019. Both the week-days and weekends were considered, two slots of one hour (e.g. morning 10 am to 11 am and evening 6 pm to 7 pm) in each day, for observation and interview surveys. Data were collected during the normal sunny days. Collected numerical data were analyzed using MS Excel to understand the income and expenditure etc. Content analysis was done for analyzing qualitative data derived from the respondents. ArcGIS was applied to prepare the spatial pattern and locational map of roadside informal commercial activities.

4. Profile of the Case Study Area

The study area is located in Ward 7 of DNCC. The Ward 7 is situated partly in Pallabithana and Mirpurthana. Total area of the Ward 7 is around 1.88 sq. km where about 113,750 people (or 26,844 households) live in a total 2,981 holdings (BBS, 2011; DNCC, 2014; RAJUK, 2016). Thus, the population density of the area is 60,666 persons per sq. km. Existing land use pattern of the area is dominated by residential development; almost 63% of the area is for residential use (DNCC, 2014; RAJUK, 2016) whilst the remaining are for roads, shopping, institutions and open spaces. Important landmark features in this area are: National Cricket Stadium, Commerce College, Directorate of Primary Education, Prashika, Gramen Bank, etc.

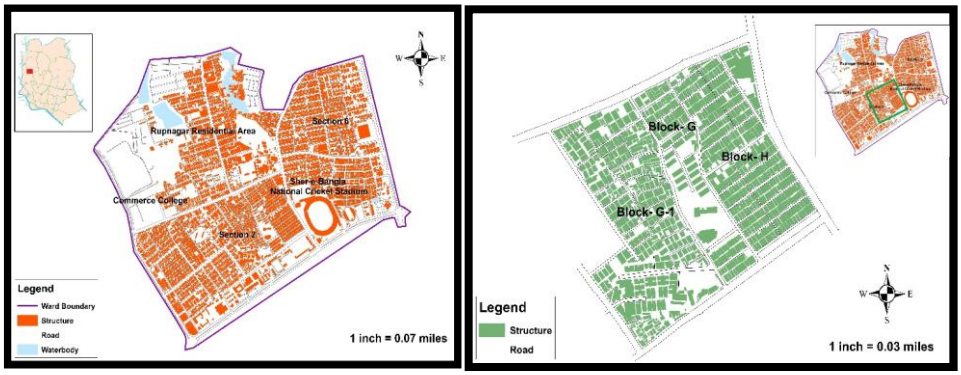

Figure 2: Ward 7 of DNCC (left) and the location of case study area in Ward 7 (right)

Source: Prepared by Authors, 2019.

The survey for case study was done in Ward 7, the Block G, Block G1 and H in Mirpur Section 2 (as shown in Figure 2). The total area of surveyed or case study location is a portion of the Ward 7, only about 0.20 sq. km area.

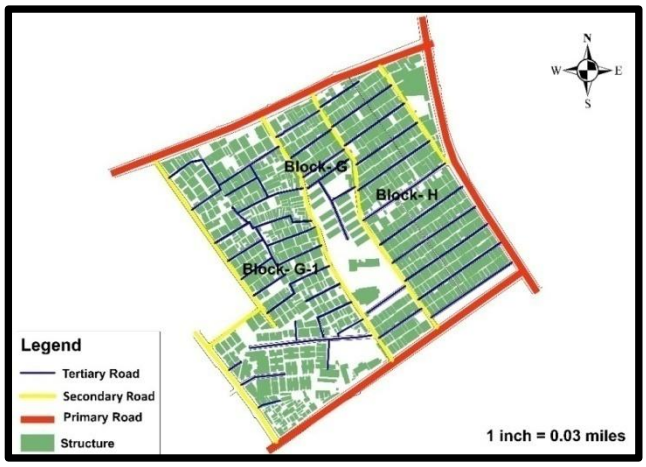

Figure 3: Hierarchy of the roads in the study area

Source: Prepared by Authors, 2019.

Informal commercial activities are often performed on or beside roads. Therefore, a clear idea about the types of roads and their width and characteristics is needed. Three different types of roads are available in the study area. As shown in Figure 3, these are: primary roads, secondary roads, and tertiary roads. Primary roads are very wide where public buses are operating, tertiary roads are the narrow allay streets that connects the

residential buildings, and secondary roads are between primary and tertiary roads which divides between two housing blocks.

5. Results from the Case Study

This section reports on the results derived from the case study; particularly on the category or types of informal economic activities(e.g. neighborhood retailing or street vending) and their spatial distribution pattern as well as the number of people served by those activities.

5.1 Categories of Neighborhood Informal Retail Activities

The informal economic activities or neighborhood retailing found from the observation survey can be categorized in two broader groups: mobileretailing activities and immobileretailing activities. Immobile retailing activities have a specified or fixed place for the vendors to sit, usually on footpaths or carriage way of road and beside the roads, every day and perform their business. On the other hand, the mobile retailing activities do not have any fixed place for the vendors to sit; the hawkers' huckster on roads from here to there using the rickshaw-vans.

Table 2 shows the existing number of immobile and mobile neighborhood retailing activities of different types. For the mobile retailing activities, the numbers are the hourly average of traders observed. A total 87 mobile retailers of nine different types were found in a given hour and the majority of them are for selling vegetables, fruits, street foods, toys and cosmetics. On the other hand, there are a total 139 immobile neighborhood retailers of 12 different types; of which the majority (40) are tea-stalls and 34 are selling street foods. Selling vegetables or fruits are also significant in numbers, 11 and 17 respectively, of immobile retailing activities. Figure 4 shows the location of different immobile informal retailing activities and Figure 5 shows the photographs of their current situation.

Table 2: Types and numbers of immobile and mobile neighborhood retailing

Category or Types of Activities	Immobile Retailers (Total Number)	Mobile Retailers (Avg. per hour observed)
Selling vegetables	11	28
Meat selling	4	2
Fish selling	7	5
Fruits selling	17	11
Street food	34	19
Chotpati	9	00
Tea-stall	40	00
Home appliances	4	6
Toys & cosmetics	3	11
Saloon	2	00
Cobbler	5	00
Flexiload and Bkash	3	00
Papers & broken accessories	00	5
Total	**139**	**87**

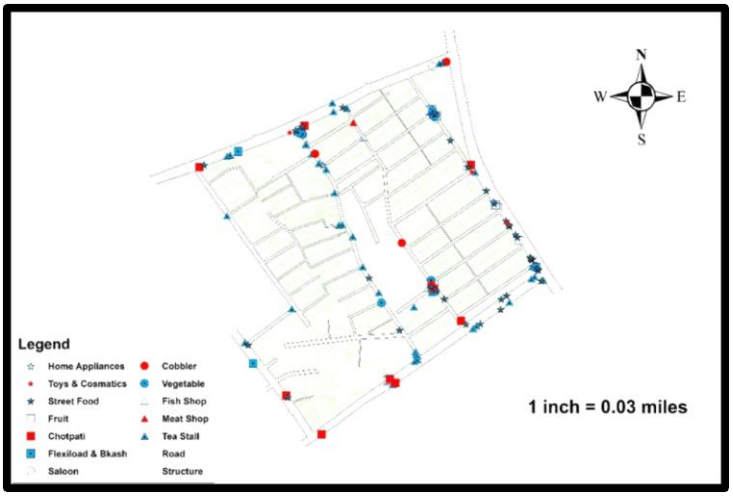

Figure 4: Location of different immobile neighborhood retailing

Chotpati

Tea-stall

Fruit shop

Cobbler

Figure 5: Photographs of immobile neighborhood retailing activities

5.2 The Number of Years in Neighborhood Retailing and People Served

Of the 50 sample respondents of street vendors, 25 of them (50%) mentioned that they are in the respective business (neighborhood retailing or street vending activities) for a period of 1 to 5 years. About 17 respondents (34%) are involved in the respective businesses for 6 to 10 years whist only 8 respondents (16%)are for more than 10 years.

The total number of people usually served by a neighborhood retailer in a day actually vary on the nature or type of the businesses and the size (investment or land area). A total 18 respondents (36%) mentioned that in a typical day each of them serveson average around less than 50 people. Whatever, almost 45 respondents (90%)reported that each of them usually serves around 1 to 200 people every day. Nevertheless, the street vendors selling street-food mentioned that they usually serve comparatively a larger amount of people.

5.3 Seating Place and Spatial Pattern of Immobile Neighborhood Retailing Activities

The location or seating place for the immobile neighborhood retailing activities are: on roads, on footpaths, empty place beside the roads or footpaths, vacant plot or space adjacent to the roads. Of the 139 immobile neighborhood retailers in the study area, almost 49% are seating on the roads whilst 43% are on footpaths and the remaining 8% are in the vacant places (as shown in Figure 6).

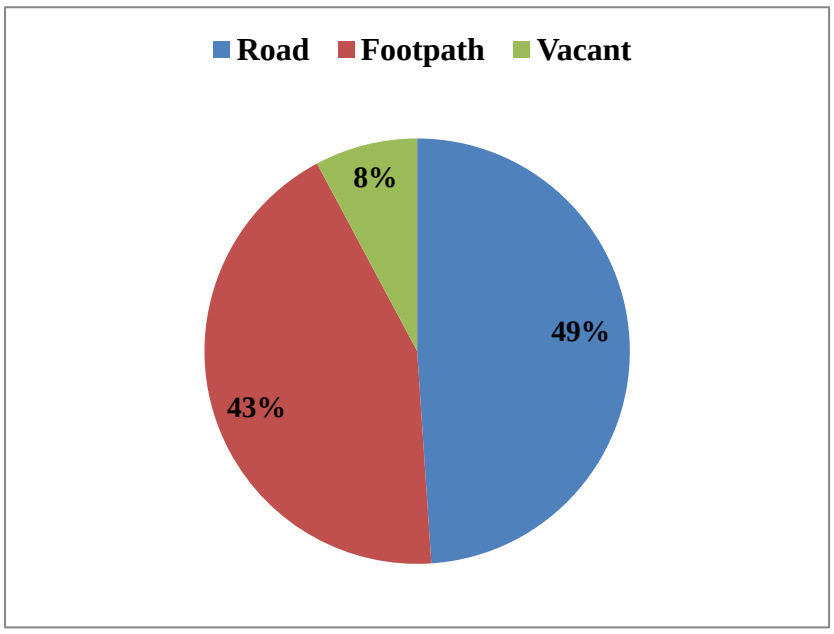

Figure 6: Seating place of the immobile neighborhood retailing activities

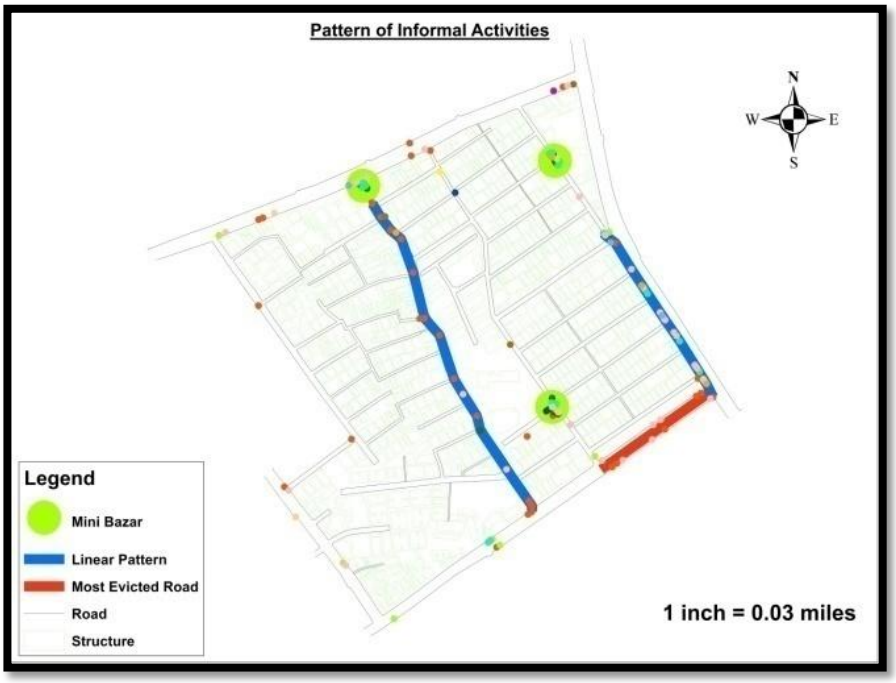

Figure 7: Spatial pattern of the immobile neighborhood retailing activities

Figure 7 shows the spatial pattern of the immobile neighborhood retailing activities. Two linear patterns of the immobile neighborhood retailing activities or street vendors are found; in the left blue line there are a large number of tea-stalls whilst in the right blue line there are a large number of shops for street-foods. Three different mini-bazar (or small market like) are formed whilst the red line depicts the road or zone where street-vendors experienced highest number of evictions.

5.4. Socio-economic Condition of Neighborhood Informal Retailers

This section reports the social aspects of neighborhood retailers; particularly the migration history of retailers or street vendors, the amount of money they invested in retail business and their income/expenditure, and their eviction history.

The respondents are migrated from 18 different districts; mainly from Brahmanbaria, Kishorgonj, Barishal, Sirajgonj, and Kurigram. Of the 50 respondents, the highest 7 of them (14%) were born in Brahmanbaria district. The respondents were asked when or how many years ago they moved in Dhaka. Figure 8 shows that the majority, 17 (34%) of them, mentioned between 2006 and 2010 whilst 14 (28%) are between 2001 and 2005, and only 3 (6%) of them migrated very recently (between 2016 and 2018). The main reasons for their migration in Dhaka and involving in neighborhood retailing activities are shown in Figure 9. The majority of them (41%) mainly migrated due to poverty in the village.

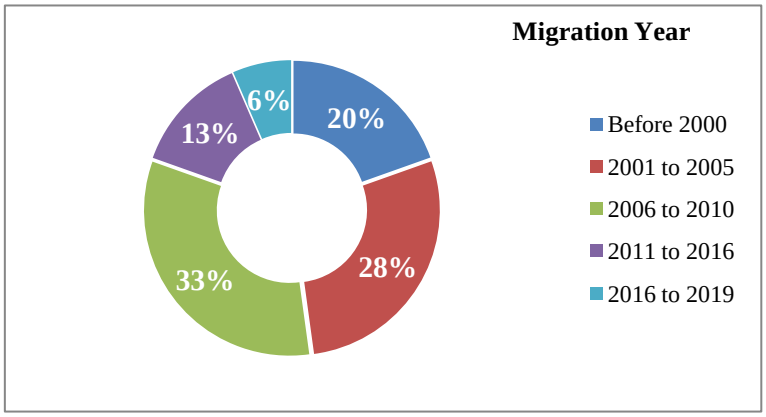

Figure 8: Proportion of the respondents and the year when they migrated in Dhaka

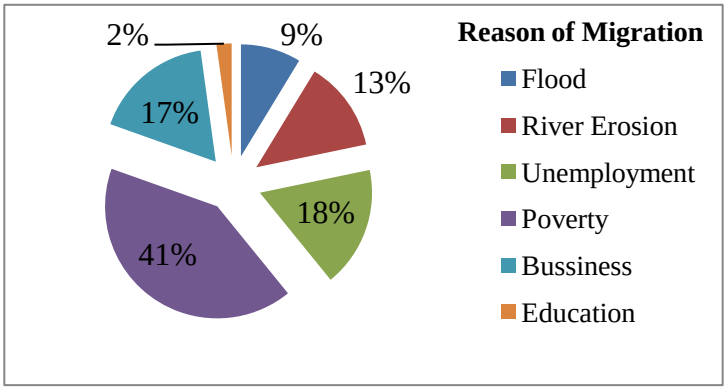

Figure 9: Major causes of migration in Dhaka for neighborhood retailers

The types of dwelling units or living places of the neighborhood retailers (business-owners and workers) were analyzed. of the 50 sample, as see in Figure 10, only 2 (4%) of them live in buildings whilst 27 (54%) of them live in tin-shed house, only 4 (8%) of them live in slums and the remaining 17 (34%) of them live in a shared home as a sub-let tenant.

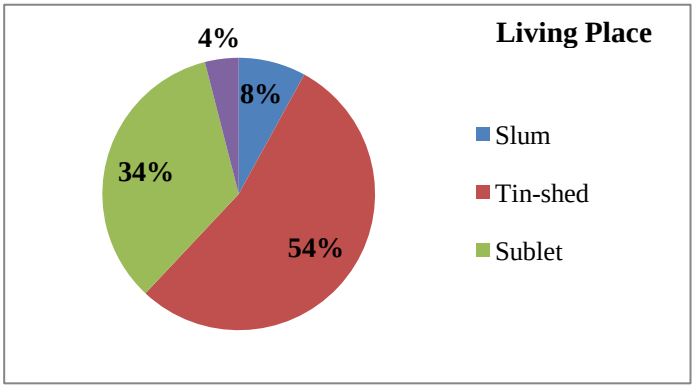

Figure 10: Living places of people engaged in neighborhood retailing

The average establishment cost of different neighborhood informal retailersand their monthly average income, expenditure and savings are shown in Table 3. The highest investment cost is for the tea-stalls (average BDT 33,512) and the lowest is for Cobbler (average BDT 4,000).

Table 3: Average establishment cost of neighborhood retailers and their monthly average income, expenditure and savings (BD Tk)

Categories of Neighborh ood Retailing Activities	Establishment Cost (Tk)	Income (Tk/month)	Expenditure (Tk/month)	Savings(Tk/month)
Meat shop	12,200	37,800	31,500	6,300
Fish shop	9,733	23,000	20,000	3,000
Vegetable	21,175	24,700	22,100	2,600
Tea-stall	33,512	40,100	37,400	2,700
Saloon	4,900	7,800	7,000	800
Cobbler	4,000	17,500	16,800	700
Street food	24,900	37,800	35,000	2,800
Chotpati	28,080	42,000	41,000	1,000
Fruits	24,680	24,200	22,100	2,100
Flexiload and Bkash	16,000	25,900	19,500	6,400
Toys & cosmetics	12,300	16,700	16,000	700
Home appliances	28,450	23,600	22,500	1,100
Papers &broken accessories	20,650	17,300	16,600	700

5.5. Evictions of the Neighborhood Informal Retail Activities

Of the 50 respondents, only 9 of them (18%) mentioned that they have not yet experienced or faced any eviction. A total 22 (44%) of the respondents have experienced eviction for 4 to 6 times whilst 2 (4%) of them faced more than 10 times (as seen in Figure 11).

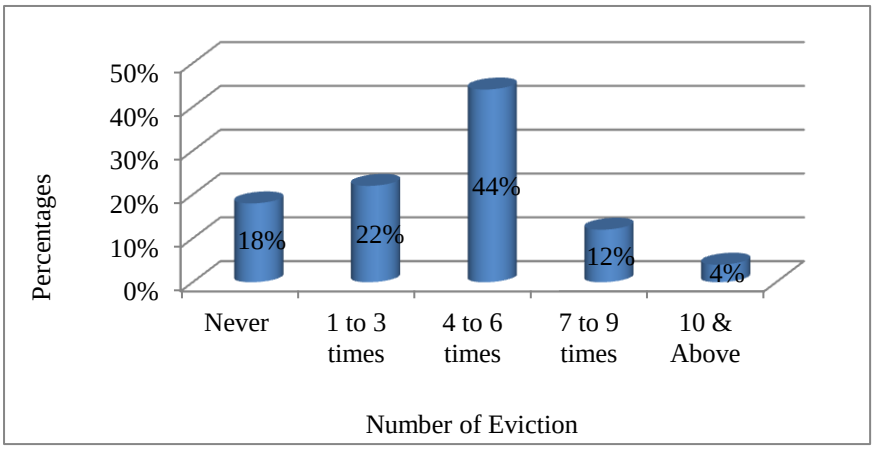

Figure 11: Number of evictions experienced by the neighborhood informal retailers

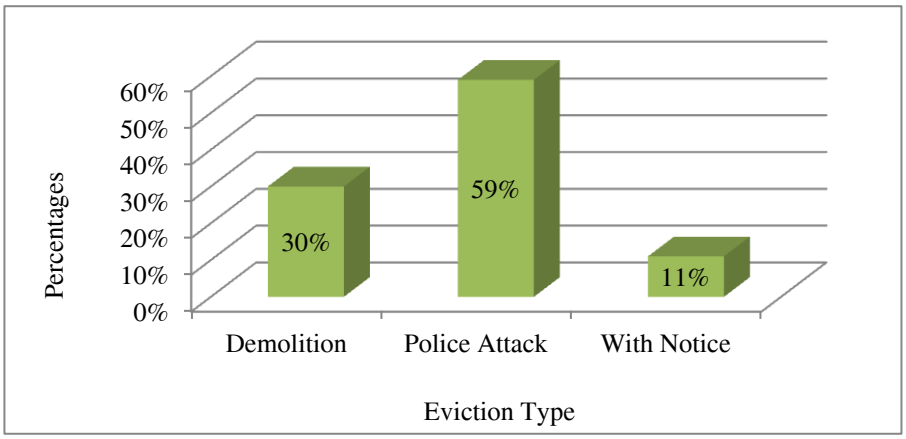

Figure 12: Types of the evictions

The evictions faced by the neighborhood informal retailers or street vendors can be categorized in following three groups: getting notice from the relevant agency, police attack[1] without prior informing, and complete demolition of the retail shop. Figure 12 shows the percentage of the respondents have experienced different types of evections; almost 30 (60%) had police attack and only 5 (11%) of them had evection with a prior notice or information whilst 15 (30%) had a complete demolition. The respondents were asked the main reasons for the evections. The major causes of the evections were reported by the respondents are:

- Extortion from political or local goons and police;
- Reconstruction or widening of the roads or footpaths;
- Regular or periodic actions of relevant law enforcing authority;
- Pressure from the local residents; and
- Sports or matches in Sher-E-Bangla National Cricket Stadium.

Whatever, the respondents seem to have two different views regarding legalizing of informal retail activities. The main reason why they think some sort of legalizing or permitting of informal retail activities are: they already become quasi-formal and thus security in business (no more fear of eviction) is required and thus possible higher profits. In contrast, those who consider not having legalized or permitted (continue as informal) is good for them mainly because: they are poor and would not able to pay additional taxes (they perceive that having a legal entity may impose them burden of additional fees or taxes), and potentially a higher cost of initial investment or higher rent for shops or additional increase of utility or maintenance costs.

6. Discussion and Conclusions

A variety of diverse informal economic activities or neighborhood retailing activities are available in the residential areas and neighborhoods of Dhaka city. The retailing or street vending activities in the residential areas or neighborhood of Dhaka is not new.

[1] As the informal retail activities are performed on roads or footpaths and they do not have permission for doing so, police try to evict them.

However, recently this become one of the very common features of this city. The neighborhood retailing or street-vending activities in the residential areas are two different types: mobile retailing and immobile retailing. Among the immobile retailing activities, the tea-stalls and selling street foods are the dominant. In contrasts, selling vegetables and fruits or street food are the dominant among the mobile retailing activities. The street vendors are found both on the footpaths and in the carriage ways of roads. A linear pattern is formed by the neighborhood retailers along the major roads but few concentrations, similar to a small bazar, are found beside the school and mosque. These neighborhood retailing activities are regularly serving a significant portion of people.

The majority of the neighborhood retailers are migrated from other districts and they are engaged in the irrespective business for a longer period, for instance, for the last 10 years. The majority of them migrated between 2001 and 2010 and mostly due to their poverty in respective village. However, they reported that yet their income or economic condition is not good enough for living a decent urban life. Therefore, the majority of them live in a tin-shed house or in a sub-let similar to slum or squatter situation.

The initial investment cost is not same for different types or size of neighborhood informal retailing activities. Usually the immobile retailing requires more investment than the mobile retailing. The tea-stalls and selling chotpoti or street foods require comparatively higher investment cost as well as generate more profits compared with others. Whatever, the city authority often seems very hostile towards these neighborhood retailing. With a few exceptions, almost all the neighborhood retailers have experienced the evictions. Attack by police or different law enforcement agencies are very common and many of the respondents mentioned that they were evicted for almost to 6 times. However, since there is an effective demand of neighborhood retailing, particularly among the low-income people of the city, eviction seems to be a wrong strategy. Moreover, the neighborhood retailing activities are now become an important and integral part of socio-economic and cultural aspects of the city. This sector provides employment and earnings for many unemployed poor migrants from rural areas and also serving many people of the society. The economy of neighborhood retailing is also large. Therefore, it might be better if neighborhood retailing activities are incorporated in urban planning practice and also in urban sector policy. The linear pattern of neighborhood retailing along the major roads is probably because of the demand, therefore, allocating dedicated space for retailing along those roads in a systematic way could have better results.

Recently, India provided a policy that specifically addresses street vendors and provided guidelines for managing them. Other country, such as Peru, Kenya, China, Albania also had similar issue related to street vendors and they have come up with their own innovative solutions. Renowned economist Hernando De Soto suggested that instead of condemning the onslaught of informality, the government should recognize informality, by loosening restrictions and cutting bureaucracy, informal trade and informal markets will expand, and their incorporation into the formal economy will benefit both sectors of the economy (Marquez, 1990). Therefore, the similar initiative could be taken for the neighborhood retailing or street vending activities within the residential areas in urban Bangladesh.

The street vendors could be allocated a designed space (beside the road or on public land) for performing their business and the city authority could collect a minimal token money from vendors for the possession. This may also help creating a good public space with shops and cultural-festive mode. A policy concerning informal activities, particularly neighborhood retailing or street vendor activities should be initiated. The local government authority such as Dhaka North City Corporation (DNCC) or Dhaka South City Corporation (DSCC) could have a dedicated wing for managing the informal sector and particularly the neighborhood retailing or street vending. A financial scheme under the social safety-net program could be introduced for a specific time frame with a view to assist the street vendors who are below the poverty line. Such scheme should allow the borrowers to repay the loan in several installments.

The results of this paper will be helpful for the policy makers and for the city authority to deal with informal activities. The findings would be helpful for similar other areas of Dhaka city or for other cities similar to Dhaka. This paper provides an avenue for further research on: analyzing how the socioeconomic conditions of the informal sector activities influence the city or city environment; providing specific solutions for informal retail activities to incorporate in planning/developing practice; detailed layout plan and urban design along the roads incorporating informal activities; detailed financial analysis of such plan; how the urban and the local political bodies interact with the informal activities such as street vending, and extortion or power relation (political dynamics) related to the informal activities or neighborhood retailing.

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Monitoring the Service Facilities: A GIS-Based Approach for Khulna City Corporation Area

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Abstract: Affordable and adequate service facilities for a community is considered as a prerequisite for development. This study determined the service area and service gap of different facilities for an urban area in the GIS environment. To fulfill the objective of this study, secondary data were utilized. Using Network Analyst Tool in ArcGIS, the served, unserved, and over served areas for existing primary schools, hospitals, and police stations were calculated based on the existing road network in the study area, Khulna City Corporation (KCC).The analysis shows that still after the four years of Sustainable Development Goals (SDGs) declaration, the unserved area for primary school, hospital, and police station were respectively 23.92%, 63.26%, and 16.60% of the total area. There are extra hospitals in some words, where no health service facilities in some places, especially in ward no 12 and 31. The illustration of service coverage areas of each service facility shows that service facilities are not properly distributed and concentrated in the center of the study area. The overall analysis demonstrated the need for service facilities in the northern and southern portion of the study area. Providing sufficient service facilities in the unserved areas to ensure quality education, health, security, and protection for all the people of the study area will help fulfill the targets of SDGs.

Keywords: Khulna City Corporation; Network Analysis, Service facilities.

1. Introduction

There has been rapid population growth and urbanization in the Asia-Pacific region (Alam & Mondal, 2018). Countries across the world are experiencing similar trends in the access of service facilities with an increase in the demand for services, especially in the urban areas due to enormous population growth, population aging, and the market revolution(Shohet & Lavy, 2017). As the most important need in the 21st century in the world, providing quality education and good health to every person is prioritized(World Bank, 2016). Moreover, all countries over the world have been emphasizing more on these sectors to achieve all the targets of the sustainable development goals (SDGs) within 2030. The Asia-Pacific region is rapidly urbanizing, and the growth and concentration of urban areas have led to increased demand for better urban service facilities(Morshed, et al., 2020). In this regard, assessment of existing service facilities, their area coverage, and how much these existing facilities are satisfying the local people became more important.

The UN adopted the Global Goals as a global appeal in 2015 to combat poverty, protect the environment, and ensure stability and prosperity for all by 2030 (UNDP, 2020).To achieve SDG 3: Ensure healthy lives and promote wellbeing for all at all ages, the

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improvement of the existing hospital and clinical service facilities should be improved. Moreover, due to rapid urbanization, the environment so as the climate has been changing for which the continuing burden of HIV and other diseases, and emerging challenges such as non-communicable diseases are spreading. While some countries have made impressive progress in the health sector, developing countries, especially countries in the Asia-Pacific region such as Bangladesh couldn't improve that much. The same progression scenario has also been observed in the case of SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. To make a city sustainable and for smooth progress towards achieving SDGs, ensuring good health and quality education sector for all including spreading peace, justice (SDG 16) is the most important task to do for the government and responsible authorities.

The way the infrastructure needs are defined and planed and how they are then created, based on organizational expenditure irrespective of the sector, and are delivered. In this respect, the integration of GIS can help predict potential parcel needs by parcel basis (Garner et al., 1993). Infrastructure interventions were known as the first large-scale city planning. Sustainable cities greatly depend on Infrastructure, where sustainable structures depend on proper planning(Alam & Haque, 2018). The threshold method in this case will assist in the advancement of a service's ultimate ability to ensure a better future. As a developing country, Bangladesh is not, as it should be, happy with its utility services and facilities. While Dhaka is the capital city of the country with many different services and facilities, the current services in Khulna are entirely incompatible with the capital(Alam & Mondal, 2018). Corruption, inadequate government income is a particular explanation behind the situation because of a lack of contact and road networks. Due to the poor road network system, the people of the remote corner of the city fail to get the service facilities in accordance with their needs. Some of the areas remain under the area with unserved zone and service facilities remained inaccessible to the people of a little portion of the city. The proper identification of these areas for providing service facilities in these areas is essential to achieve all the targets of SDGs. The network analysis tool in ArcGIS has been widely used for identifying the served, unserved, and over served areas of any service facilities, based on the existing road network (Tabassum et al., 2018; Arora & Pandey, 2011). This tool is used to spatially represent the influential area of any facilities or services in the GIS environment (Depren & Yavuz, 2018).

Most of the previous studies have focused on assessing the status of water supply and sanitation conditions in the urban areas or urban slums (Alam & Haque, 2018; Alam & Mondal, 2018; Wankhade, 2015). These studies were focused on field survey data collected from the respondents of a community. Services such as hospitals and police stations usually serve a comparatively large area and depend on the road network. In these cases, Network Analysis is the best option to determine the service coverage area of any service facilities (Hevey, 2018). Though some of the previous studies have assessed the status of health service facilities in the urban areas (Brún & McAuliffe, 2018; Cunningham et al., 2012; Butt & Run, 2010), assessment of primary school and police station service facility coverage area was not getting proper attention. Moreover, the Network Analyst Tool in ArcGIS was not utilized in any previous studies to determine the area coverage of police stations. This study utilized the Network Analyst Tool in ArcGIS to determine the area coverage of primary school, hospital, and police

station service facilities in the Khulna City Corporation (KCC) area and identified the served, unserved and over served zones of the facilities. Such an assessment process will motivate the policymakers and responsible authorities to give attention to identifying the unserved areas for all-important service facilities, service gaps for ensuring minimum service facilities to all people across the city. This will accelerate the process of achieving all the targets of SDGs within a limited period.

2. Methods and Materials

2.1 Study Area

Khulna city is situated at the bank of the Bhairab-Rupsha River, Khulna District, Figure 1 (officially known as the Khulna City Corporation- KCC) (Haque et al., 2020; Fattah et al., 2019). KCC is well connected by a multimodal transport system with the capital city of Dhaka and other nearby cities with different mediums like rail, highway, river, and air transport. With a well-integrated urban transit network, the City has a large influx of people from surrounding towns and regions. This city provides all types of urban facilities and services. In the KCC there live an estimated 45.65 sq km of approximately 1.5 million people(Fattah et al., 2020;Haque et al., 2020).

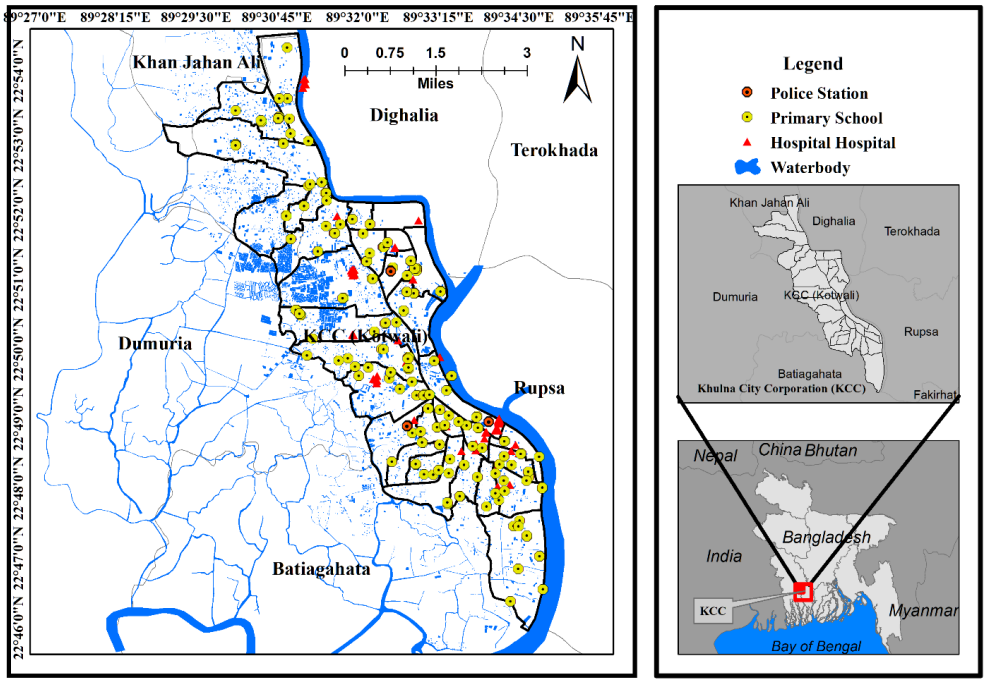

Figure 1: Study area map (Khulna City Corporation).

The concept of the linear city is directly linked with the Khulna City Corporation area which is also known as a low-lying city in southwestern Bangladesh. Khulna holds the third position based on the area in Bangladesh and can be identified as an trade city with a port. The candidate area is very near to the mean sea level (Haque et al., 2019). Among the major cities of Bangladesh, Dhaka and Chattogram are comparatively developed than Khulna. Most of the service facilities are not provided adequately as needed. Again, due

to urbanization and other development projects taken by the government of Bangladesh, population growth and urban expansion have been observed at a higher rate in KCC than in the districts of the southwestern portion of the country. For ensuring sustainability and achieving the targets of sustainable development goals (SDGs), the proper distribution of service facilities is a must. That's why the assessment of existing service facilities in the KCC area is becomingan important issue to take into consideration.

Table 2: Study area details at a glance.

Criteria	Status
Area	45.65 Km2
Population	15,00,689
Population density	32874
Thana	5
Ward	31
Road length	356.18 Km
Supermarket	4
Government hospital	2
Number of parks	6
Primary School (KCC)	51
Moktob	383
Secondary School (KCC)	3

Source: BBS, 2015; KCC, 2019

2.2 Data Collection

This study used secondary data sources to fulfill the objective of the study. Secondary data such as the location of primary school, police stations, hospitals, and existing road network data were collected from KCC and Khulna Development Authority (KDA). Different information about the study area was collected from the city corporation website.

2.3 Threshold Calculation

Based on the presence of service facilities, at first, ward wise population data was collected. Then the value without facilities was determined at this & higher level (Ag), and with this & smaller level (Ps). The PRLDR-2004 is presented in Table was used 2 to calculate the deficiency from the standard service facilities value. From the local standard, there is no provision for the required space for a police station.

Table 2: Space Standards for Urban Community Facilities in acres by population size

Community facilities	**Education**									Facility per 1000 Population
	Population size									
	2500	5000	10000	15000	20000	25000	50000	100000	150000	
Primary School	0.3	0.6	1.0	1.2	1.6	2.0	4.0	8.0	12.0	0.08
	Health									
Small Clinic*				0.6	0.8	1.0	2.0			0.04
Hospital*								4.0	6.0	0.04

Source: Islam, 2009

$$\text{Threshold population} = (100 \times Ps)/(Ag + Ps)$$

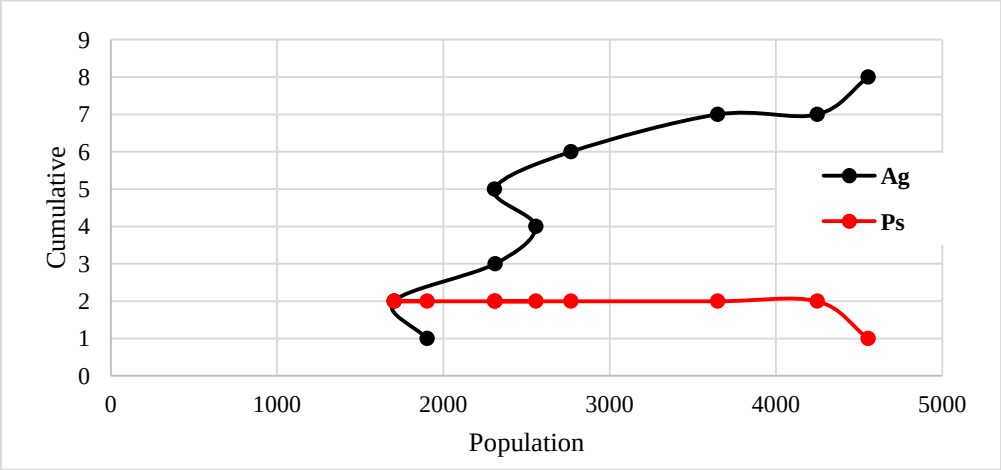

Figure 2: Threshold population calculation.

The population threshold for each facility was shown on the diagram and the required number of each type of service facility was determined. The difference between existing facilities and required facilities was sorted for a recommendation. The crossing point reveals the population threshold.

2.4 Network Analysis

The Network Analysis tool is used to determine the shortest distance between two places (Luke 2009) and to identify the network coverage of any service facilities (Rekha et al. 2017;Haque et al., 2020). For finding the service area entity, the Network Analysis Tool of geo-spatial environment are extensively used in health facilities mapping, (Thannoun, Ali and Mustafa 2014, Hevey 2018, Brún and McAuliffe 2018),transportation facility planning (Elsheikh et al. 2016, Arora and Pandey 2011, Kharel et al. 2019), valuation of ecosystem service (Cooper 2010),and city provision facility valuation (Lawal and Anyiam 2019, Rekha et al. 2017, Modinpuroju et al., 2016). This tool was used in this study to calculate the served, unserved, and over served area for service facilities such as primary schools, hospitals, and police stations at Khulna City Corporation based on the existing road networks in the study area. The served area for a hospital, primary school, and police station were considered respectively 5 Km, 1 Km, and 5 Km distance from the location of each facility.

3. Analysis and Interpretation

3.1 Education Facilities (Primary School)

Since 2000, there has been observed enormous progress in achieving the goal of universal primary education. In SDGs, primary education has found extra focus. The government of Bangladesh also trying to ensure primary education for all children across the country. In KCC, there are 51 primary schools. Using Network Analysis Tool in ArcGIS, it is found that these primary school has been serving 10.67% of the KCC area,

where the over served area was found 65.41% and the unserved area was calculated 23.92% of the total KCC area (Table 3, Figure 3). The primary education facilities are within walking distance of most school children. Since the economic situation in this sector is marginally stronger, they are aware of basic education. The distant KCC area is primarily the lower site for the installations. The transport facilities are not good. There is another reason that the applicant area is not in a livable state because most are used to cultivate fish as the Gher. The unshifted area, therefore, does not influence educational facilities in the entire city. Some parts of Ward No. 31,24,4 and 3 in particular provide lower levels of primary school than other regions.

Table 3: Primary school service coverage status of KCC

Status	Area (Km^2)	Percentage
Unserved Area	10.92	23.92%
Served Area	4.87	10.67%
Over Served Area	29.86	65.41%
Total	45.65	100.00%

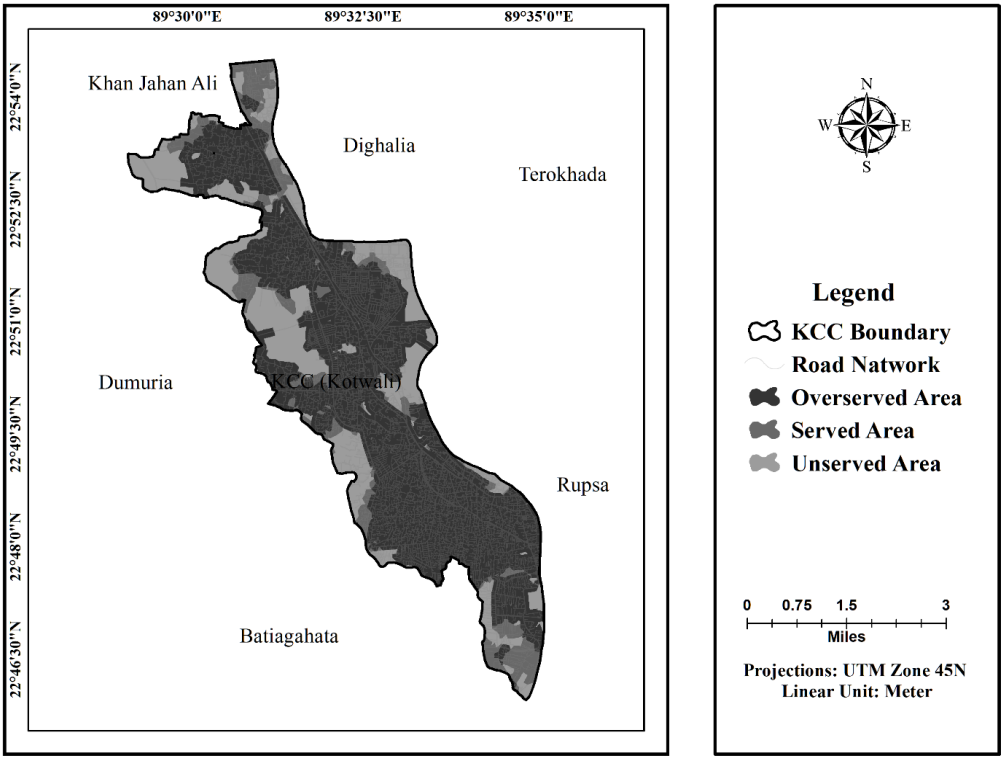

Figure 3: illustration of primary school service area using Network Analysis Tools in GIS.

3.2 Health Facilities (Hospital)

There are 34 hospitals (Two government hospitals) available in the KCC area. Most of the hospitals are located in the south zone of the study area (Figure 3). Using Network Analysis Tool in ArcGIS, the unserved area for hospital service facilities was calculated 63.26% of the total KCC area, where the served area was found 13.36% and the

overserved area was 23.37% of the total KCC area (Table 4). Figure 3 shows that most of the served and overserved areas are in the middle portion (center of the city) of the study area. Most of the northwestern parts of the KCC area are under the unserved area.However, the transport services from the central point of view are simpler for the entire city.There are low-cost ambulance service facilities for the city people.

Table 4: Hospital service coverage status of KCC

Status	Area(Km^2)	Percentage
Unserved Area	28.88	63.26%
Served Area	6.10	13.36%
Over Served Area	10.67	23.37%
Total	45.65	100.00%

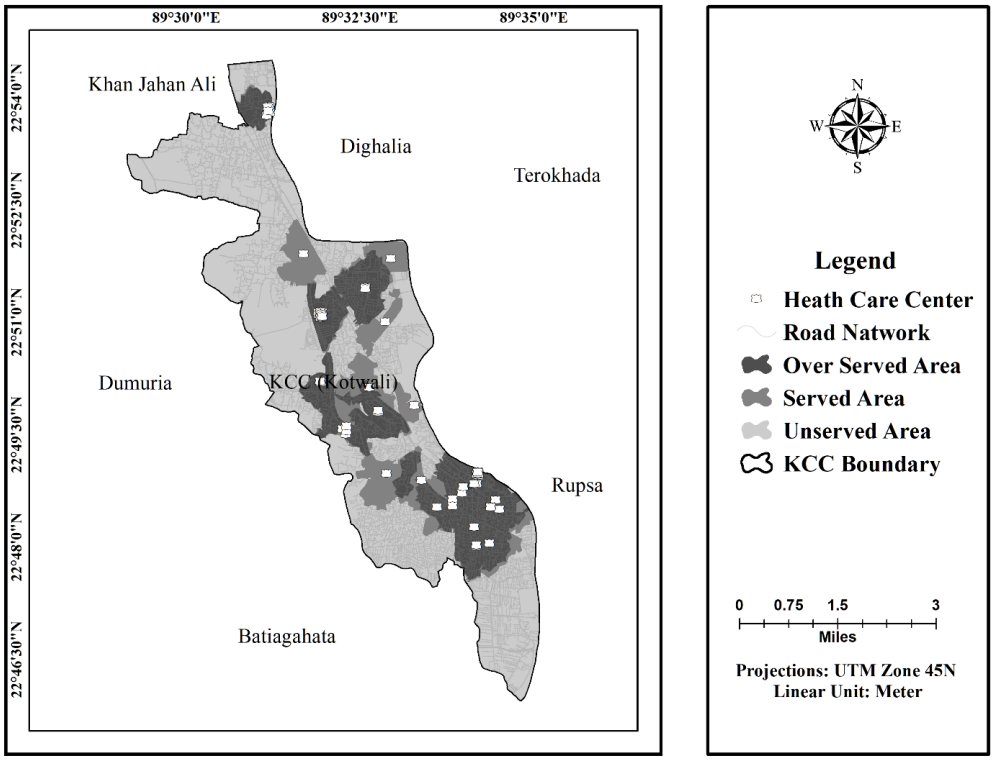

Figure 4: Illustration of hospital service area using Network Analysis Tools in GIS.

In the north portion of the study area, there are no hospitals nearby, especially in the 3, 4, and 5 no ward. So, people face serious problems sometimes. The southern part of the KCC area also under the unserved area, though the population density is high in this portion, especially in ward no 31, and people of low-income level live in there.

3.3 Security Service (Police Station)

There are five police stations under the KCC area and one police station in each thana. Besides these, few police boxes are available around the city. Most of the police station

and police boxes are located in the middle portion of the study area (Figure 5). The GIS-based Network Analysis in Figure 5 and Table 5 shows that 16.60% of the total KCC area is unserved, whereas 22.16% are served and 61.14% of the total area is over served. This shows the good condition of police station service facilities in the study area. The areas far from the city Centre, agricultural land, or bare land are found as unserved areas as there is no access road network.

Table 5: Police station service coverage status of KCC

Status	Area (Km^2)	Percentage
Unserved Area	7.58	16.60%
Served Area	10.16	22.26%
Over Served Area	27.91	61.14%
Total	45.65	100.00%

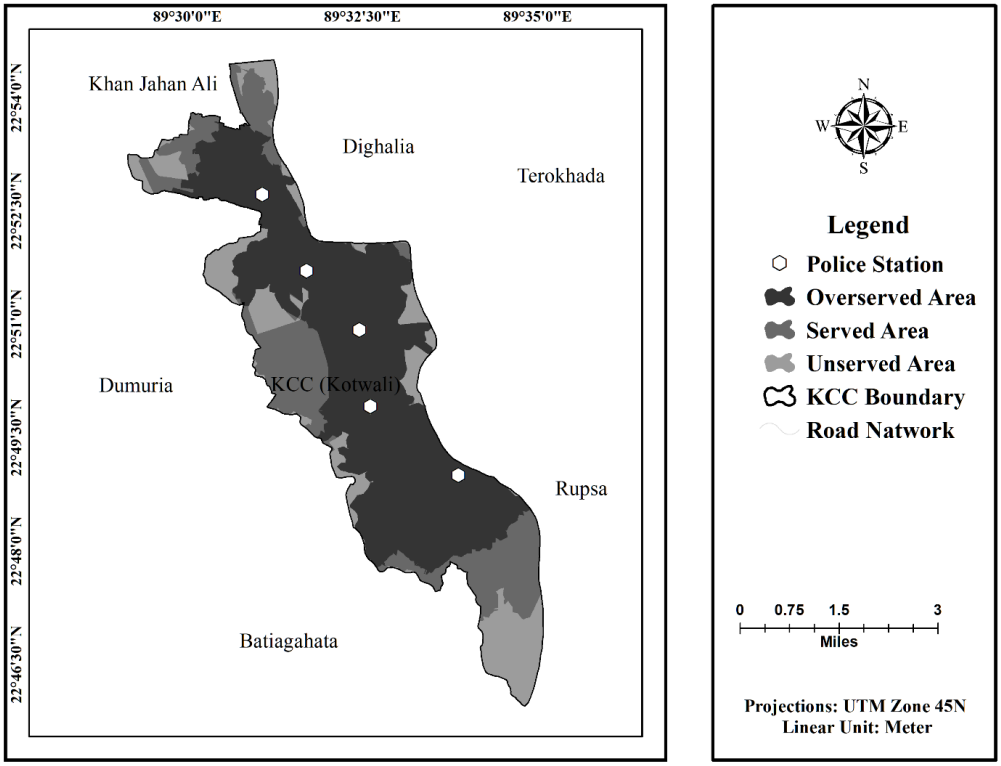

Figure 5: Illustration of police station service area using Network Analysis Tools in GIS.

4. Conclusion

To achieve the goals and targets of SDGs, ensuring all service facilities to all the people of a community is the utmost concern. In this regard, the assessment of the current status of all service facilities including identifying the service area and service gap of all facilities is essential. This study spatiotemporally illustrated the service area of existing primary schools, hospitals, and police stations in the KCC area by using Network Analyst Tools in ArcGIS based on the existing road network of KCC. The served area of primary school, hospital, and the police station was calculated respectively 10.67%,

13.36%, and 22.26% of the total study area. The over served area for these facilities was calculated 65.41%, 23.37%, and 61.14% respectively. Though the status of primary school and police station service facilities is in moderately good condition hospital service facilities pose 63.26% unserved areas. The illustration of service coverage areas of each service facility shows that service facilities are not properly distributed and concentrated in the center of the study area. The overall study demonstrated the need for uniform distribution of service facilities in the study area and improvement of the existing road networks including service facilities. Further study can focus on how much these service facilities are satisfying the local people of the served, unserved, and overserved areas to measure the quality of the services.

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Analysis of the Differentiation of Salinity Levels in Soil and Water and their Impact on Agriculture in the Southwestern Coastal Areas of Bangladesh: A Case Study on Gabura Union of Satkhira District

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Abstract: The coastal zone of Bangladesh is conjured with multiple vulnerabilities due to both natural and manmade natural disasters. Recent evidences and researches showed that among the natural disasters, salinity intrusion is considered as a creeping disaster which is not only creating a major threat for coastal lives but also making a wide area of the coastal agricultural, forest and fresh water availability in critical condition. Keeping such notion in consideration, this study has assessed the extent of salinity intrusion and its impact on agricultural land use in south –west costal area in the country by taking Gabura union of Satkhira district as a case study. Based on primary and secondary data, the study adopted both experimental and non-experimental research approach which included chemical analysis of soil and water of selected samples, mapping extent of salinity intrusion through GIS, exploring farmers' perceptions through interviews and questionnaire survey on the impact of salinity on agriculture land use and practices. Through chemical analysis of soil and water the study revealed that the soils' salinity in shrimp farm areas is comparatively high than other areas in the union. The pH value also found higher than the standard value which indicated that salinity is comparatively high near in Sundarban (Mangrove forest), mostly in south west corner of the study area. The most dominated agriculture land use area which comprises the middle of the Gabura union are consisted with moderate salinity. However, from the farmer perceptional assessment this study revealed that the farmers of the study area are being disproportionately impacted by salinity as some farmers of this union transformed their crop lands into shrimp cultivation and consequently adopted alternative livelihood, whereas some farmers are still practicing the rice cultivation, mostly cultivated the salinity tolerance species.

Keywords: salinity; water logging; shrimp farm; livelihood

Introduction

In worldwide, there is a growing concern on the environmental decline, particularly in the coastal areas of developing countries, which are home to a large and growing proportion of the world's population. In Bangladesh, around 32% of its' total land area comprises costal area where mostly the poorest people live, is conjured with both multiple vulnerabilities and opportunities (Islam, 2004; BBS, 2001). Along with other natural disasters like cyclone, tidal surges and floods, the people of the coastal areas in the country are now suffering from salinity intrusion. It is frequently asserted that upstream freshwater flow is lessen day by day, resulted salinization in the downstream with a huge fluctuation of both soil and water salinity. Moreover, frequent cyclonic

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hazards commenced with tidal surges is accelerating the salinity intrusion towards the inland areas. Saline water penetrated into the inland overflowing of the polders or inside into the leakage during tidal surges. Staying saline water for a long time inside the polders due to weak outflowing mechanism, a huge waterlogging is observed in many parts of the coastal districts in the county which increases salinity level in soil and water (Abedin, 2010). This salinity intrusion in the coastal area is also anticipated to be aggravated by sea level rise in future as an outcome of climate change.

Compare to the other coastal areas of the country, the ecological condition in the southwest coastal part now is in more critical condition in context of the severity of salinity. Data shows that more than 0.37 million hectares (out of 1.14 million hectares) of arable land under different cropping seasons in southwest coastal area, mainly in the greater Khulna regions became affected seriously by salinity (NWMP, 2001). Due to presence of salinity in water and soil, the people living not only near the coast, but also towards the inland have also been facing many problems, starting from drinking water, agriculture, food production to their basic needs like health and shelters. Long ago, Nicholls and Leatherman (1995) identified that about 13 million people and more than 16% of rice production in Bangladesh would be affected if only 1m sea level rises. Other than direct losses, main problems associated with sea-level rises like coastal erosion, coastal infrastructure destruction i.e. road, embankments, irrigation, sewerage of coastal towns, salinization and inundation of wells, loss of ecosystems and loss of biotic resources etc. are also a great concerned for the country. In context of the production vulnerability of staple crop rice due to increase of salinity, the World Bank (2000) reveals two interrelated scenarios: (i) soil quality becomes degrade which inhibit the normal production capacity of rice and (ii) as an outcome, rice fields will be converted into shrimp ponds by the farmers for maximum benefit from their land. Following these mechanism the total rice production will decrease on account of decreases of rice field areas.

IPCC (2005) projected that salinity intrusion due to sea level rise will displace millions of coastal inhabitants of Bangladesh as it will inundate a huge floodplain and low lying areas on which most of the people live and depend on their livelihoods. Similar finding is also found in Finan's (2009) research as it showed that saline water intrusion from the Bay of Bengal could marginalized the livelihoods of the coastal people by not only destroying their farming land, but also those peoples' who are depended on fresh water fishing. Moreover, the world heritage Sudarban could be abolished due to sea level rise.

But it is the fact that likewise in other coastal areas of the country, majority of the people and their livelihoods in the southwest coast are sustained on natural resources, mostly on agriculture and fishery, which contributes the dominant economic sectors. However, recent evidence shows that as an alternative income and livelihood option, aquaculture is gradually being adopted for many rural households (Islam, 2003). According to Baten et al. (2015) more than 83 thousand hectares of land have been affected by salinity with various degrees (CCC, 2007), and most of the land have been converted into shrimp ponds. Though surface and ground water salinity include a complex combination of factors like river flow, tides, rainfall, estuarine circulation, water, land management practices and sea level rise (Khan, et al. 2011), due to various human activities such deforestation, impact of "farakka" barrage as constructed by India, cultivated shrimp by

converting fresh water land into saline water etc. also responsible to increase the salinity in the coastal areas of the southwest region. This is how around 60% land of this area is covered with salinity and the process is going on every day.

Objectives

The study empirically analyzes the impact of salinity on the coastal agricultural land of Gabura union of Shymnagar upazila, Sathkhira District. The specific objectives of this research are: (1) to assess the extent of salinity intrusion level of the study area. In doing so, and investigate the impact of salinity on agriculture.

Study site and Methodology

Gabura union of Shyamnagar upazila at Satkhira district in Khulna division is situated near Sundarban and also in coastal belt of Bangladesh, lies between 22°12´N to 22°17´N latitudes and 89°14´E to 89°20´E longitudes. Study site is comprised of an area of 4,111 hectares of land. Total number of mouza (Smallest unit of administrative boundary of local level) is 4. These are Gabura (1,050 ha.), Khalisabunia (1,105 ha.), Dumuria (729 ha.), Pasheimari (1,227 ha.). Two main rivers (kholpatua and kapatakha) flow two sides of the Gabura union. The total population in this union is 32,417 people. The number of male is 16,271 and female is 16,146 and the dependent populations are more than the active person (BBS, 2013).

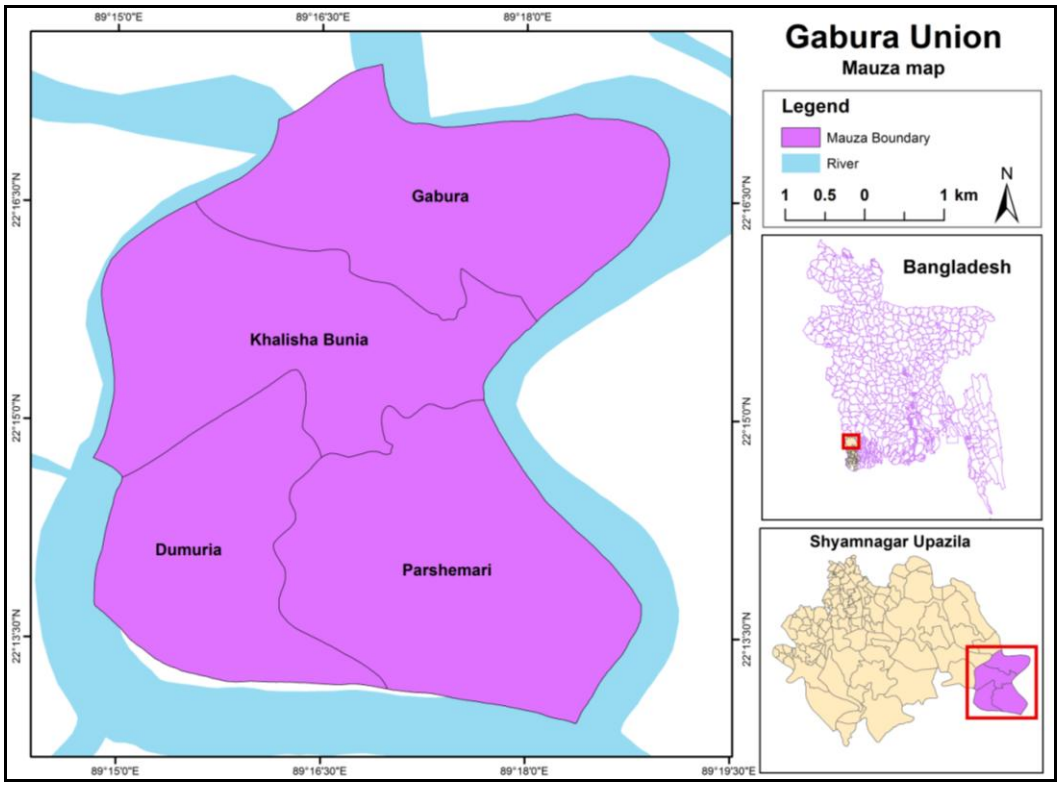


Figure 1: Study Area (Gabura Union)

The Land use pattern of Gabura union mainly is shown in figure 2. After field observation and information from local government office (Gabura Union Land Office, Shyamnagar) this two maps shaped. One is salinity map which mainly divided the whole study area into three categories: high, medium and low salinity zone and the other map mainly shows the land use of the study area. There is a relation between the following two maps, like shrimp farm area is mainly located in the high saline zone, settlement is located in medium saline zone and the paddy field is located in low saline zone.

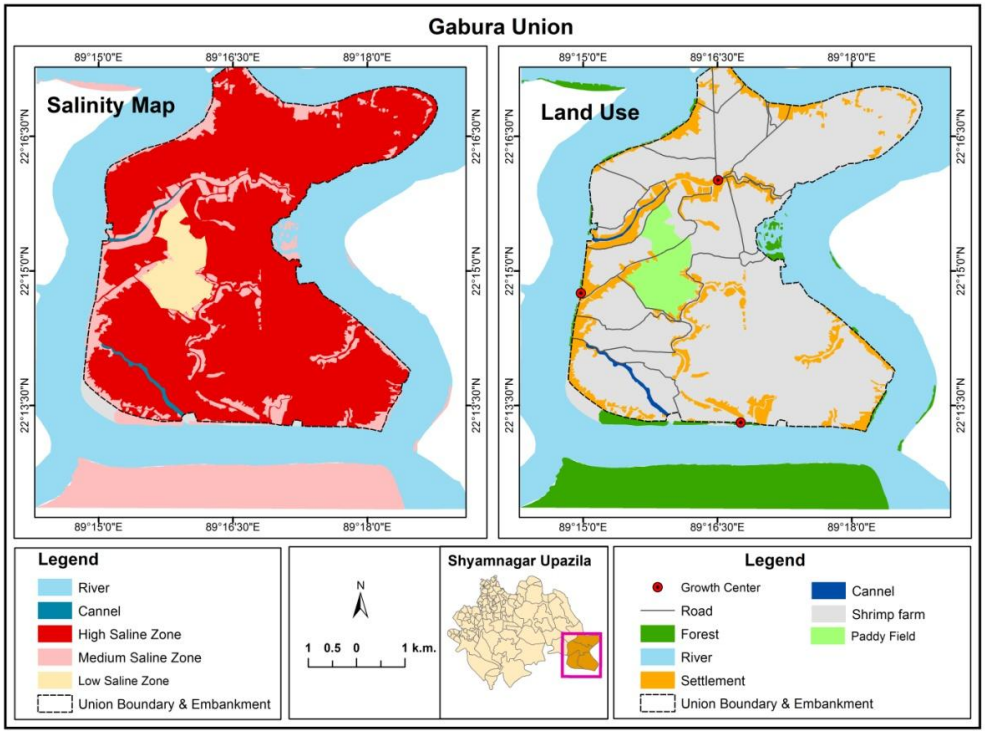


Figure 2: Salinity and Land use map (Gabura Union)

Both primary and secondary data and information were used in this study. However, results and findings were derived from mainly primary data analysis collected by quantitative and qualitative methods. Quantitative methods included the laboratory analysis of soil and water samples of the selected points of the study area, whereas qualitative approach included in-depth interview with farmers in order to explore the impact of salinity on agricultural practices and their livelihood. For collecting data from the study area, three month long field work was administrated from August to October in 2018.

The present study measured the salinity level in Gabura Union from two distinct measures like EC (Electric Conductivity) and PH level, taken samples from both water and soil. The salinity represents the existence of the most important dissolved inorganic solutes (fundamentally Na+ , Mg++ , Ca++, K+ , Cl- , SO4 = , HCO3 - , NO3 -, and CO3 =) in the measurable samples. Thus, salinity measure is quantified the total concentration of those soluble salts, more essentially, the electrical conductivity (EC), because both two are related to each other (US Salinity Laboratory Staff, 1954). Besides,

measuring soil and water EC, which represents the availability of salt or salinity in soil and water respectively, is considered as an important indicator to assess soil health and water quality that might affects the crop yields, suitability and the availability of plant nutrients as excess salts hamper corps and plants growth by destroying the balance between soil-water. However, it is noteworthy to mention here that no direct results of the amount of salt compounds or the presence of specific ions are found through EC analysis, it usually correlate to the concentrations of sodium, potassium, nitrates, chloride, ammonia, sulfate, by which it helps to make convenient and economic planning for crops and plants growth.

To analysis salinity level in water and soil of Gabura Union sample were collected for laboratory analysis following standard procedure. As stated in the study area that the study area Gabura Union comprises four mauza, named Dumuria Mauza, Gabura Mauza, Parshemari Mauza and Khalisha-Bunia Mauza, thus equal emphasis was giving in collecting water sample. However, for collecting water sample another concern of this study was to take water sample from different types of water bodies. Hence four types of water bodies were taking into consideration; these were river, cannel, pond and shrimp farm water. It is noteworthy to mention here that as shrimp production is depend on saline water that's why to know the difference of salinity level compare to other types of water bodies, 2 water samples were collected from shrimp farm water and each one from all other types of water bodies. Thus 5 samples from each mauzas were collected which constituted a total of 20 water samples. Figure 3 (a) shows the location of water sample collection points. All water samples for laboratory analysis were collected from within 1 meter of depth and stored in 500 ml plastic bottles, which were washed beforehand with 20% HNO3 solution and then rinsed thoroughly with de-ionized water.

Soil samples those were tested in the laboratory were collected from two separate depths for each location: one was collected from 0-10 cm depth and second one from 10-20 cm by using Augar spreads. The Soil samples from three distinct land use categories like settlement, shrimp cultivated land and agricultural land were collected in order to compare and understanding of the extent and nature of salinity. However, other intended outcome was to produce isohaline map. From each category of land use in each mauza 2 samples were collected from two depths. As in Parshemari Mauza and Khalisha-Bunia Mauza, no agricultural land found that's why in these two mauzas only shrimp farm land and settlement were considered to collect soil samples. Thus a total of 20 soil samples were collection points which shows in Figure 3 (b). The soil samples were collected in polythene bag and kept in suitable temperature and place.

All soil and water samples were then processed for consequential laboratory analysis done in Upazila Fish Office Laboratory, Debhata. Two parameters: PH and EC (Electric conductivity) of both water and soil were analyzed in the laboratory. PH Metre and Refracto Metre were used to identify PH and EC value respectively where data were represented on the basis of the standard of PH and EC value. For mapping and representing salinity level both in soil and water of study area ArcGIS (10.4 version) and simple descriptive statistics were used respectively.

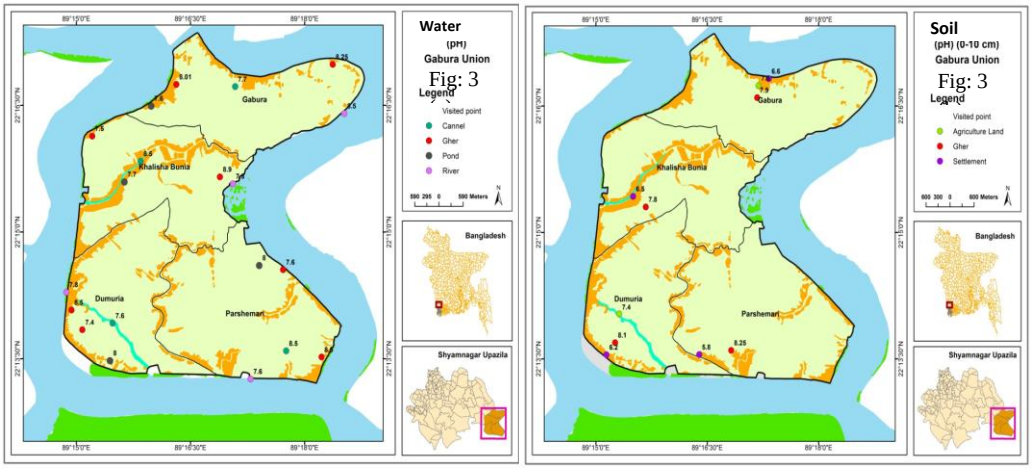


Figure 3 (a, b): Water and Soil samples location with P^H value in Gabura Union

As stated earlier that the methodology also included in-depth interview with the farmers of the study area. For selecting farmers, purposive sampling was used and five farmers from each mauza, thus a total of 20 farmers were interviewed by semi structured guidelines prepared beforehand. However, researchers were so flexible to accommodate new issues if raised. Selection of farmers was based on two separate but interrelated indicators like famers who are permanently living this area since their born and have more than 25 years experiences on agriculture in this area. Thus the age range of interviewed farmers were 45 to 60 years. All collection information through interviews were at first made transcription, then constant comparative method (CCM) following the grounded theory approach (see, Glaser and Strauss, 1967) was adopted. Here comparison between interviews within the same group (i.e. farmers) was followed (Dey, 1993) by keeping each other in equilibrium.

Result and Discussion

Salinity level in water

Table 1 and Table 3 show the P^H and EC value in water and soil respectively by which the salinity levels were measured. Overall the study found that the P^H and EC values were higher in water than soil. At the same time, P^H and EC value of the soil and water samples were varied from place to place. As stated in methodology that the water samples were collected from the cannel, shrimp farm, pond and river, thus such comparison were effective to make a generalized scenario of the salinity condition of both water and soil in the studied Gabura Union.

Among the water samples, the shrimp farm water is more saline than other sources of water.

Table 1: Water P^H and EC value of different point of Gabura union

Sl. No.	Location	Type of water	GPS (co-ordinate)		P^H	EC (dSm^{-1})
			Latitude	Longitude		
1	Dumuria Mouza	Kholpatua R.	89.25	22.23	7.80	25.90
2	Dumuria Mouza	Shrimp farm	89.25	22.23	8.50	16.20
3	Dumuria Mouza	Pond	89.26	22.21	7.40	18.08
4	Dumuria Mouza	Cannel	89.26	22.23	7.60	18.00
5	Dumuria Mouza	Shrimp farm	89.25	22.23	8.00	24.50
6	Parshemari Mouza	Kapathaya R.	89.29	22.22	7.60	17.50
7	Parshemari Mouza	Shrimp farm	89.30	22.24	8.50	16.78
8	Parshemari Mouza	Shrimp farm	89.30	22.23	8.60	32.87
9	Parshemari Mouza	Pond	89.30	22.24	7.60	25.30
10	Parshemari Mouza	Cannel	89.30	22.23	8.00	24.80
11	Gabura Mouza	Kapathaya R.	89.31	22.27	7.80	24.10
12	Gabura Mouza	Shrimp farm	89.31	22.28	8.90	16.96
13	Gabura Mouza	Shrimp farm	89.27	22.28	8.50	18.03
14	Gabura Mouza	Cannel	89.28	22.28	7.70	28.00
15	Gabura Mouza	Pond	89.27	22.27	7.50	21.20
16	Khalisha-Bunia Mouza	Kholpatua R.	89.28	22.26	7.70	25.80
17	Khalisha-Bunia Mouza	Shrimp farm	89.28	22.26	8.25	23.09
18	Khalisha-Bunia Mouza	Cannel	89.26	22.26	8.01	27.29
19	Khalisha-Bunia Mouza	Pond	89.26	22.26	7.60	18.21
20	Khalisha-Bunia Mouza	Shrimp farm	89.25	22.27	8.50	24.80

Source: Laboratory analysis

The electrical conductivity (EC) of water samples was observed a range from 16.20 to 32.87 dSm^{-1} (Table 1). In different types of land use and land cover categories the highest EC value found in the water of shrimp farm of Parshemari mouza which was 32.86 dSm^{-1}.

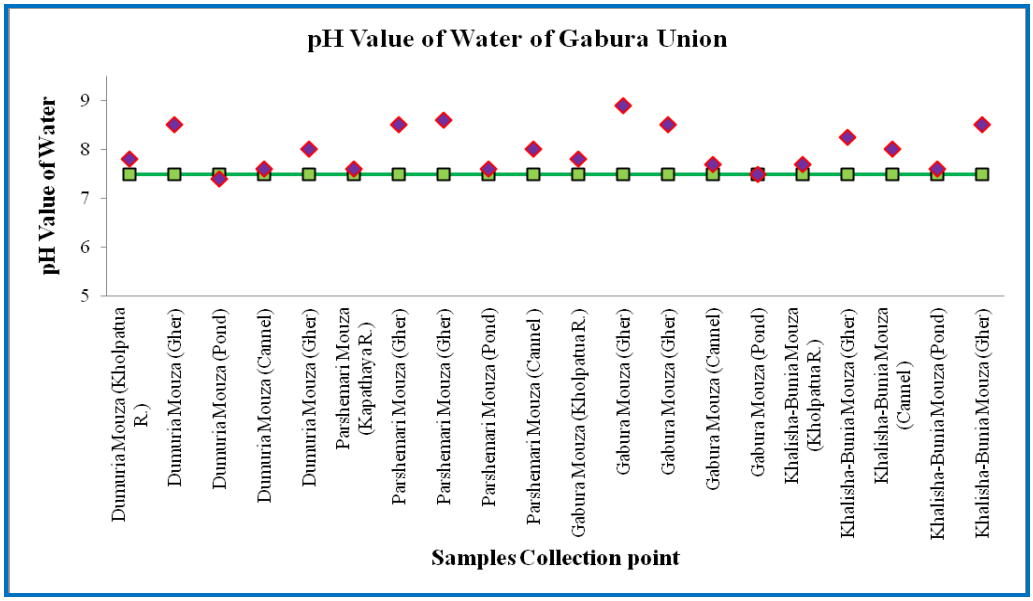


Figure 4: P^H Value of Water of Gabura Union

Source: Laboratory analysis

From figure 4 showed that P^H of all water samples was in the range of 7.4 to 8.9. In the river water P^H value was found little higher than shrimp farm water, while in the shrimp farm water P^H range fluctuated. However P^H level of the pond water was in normal range. The highest P^H is 8.9 found in the shrimp farm of Gabura mouza and the lowest P^H is 7.4 found in the pond water of Dumuria mouza of Gabura union.

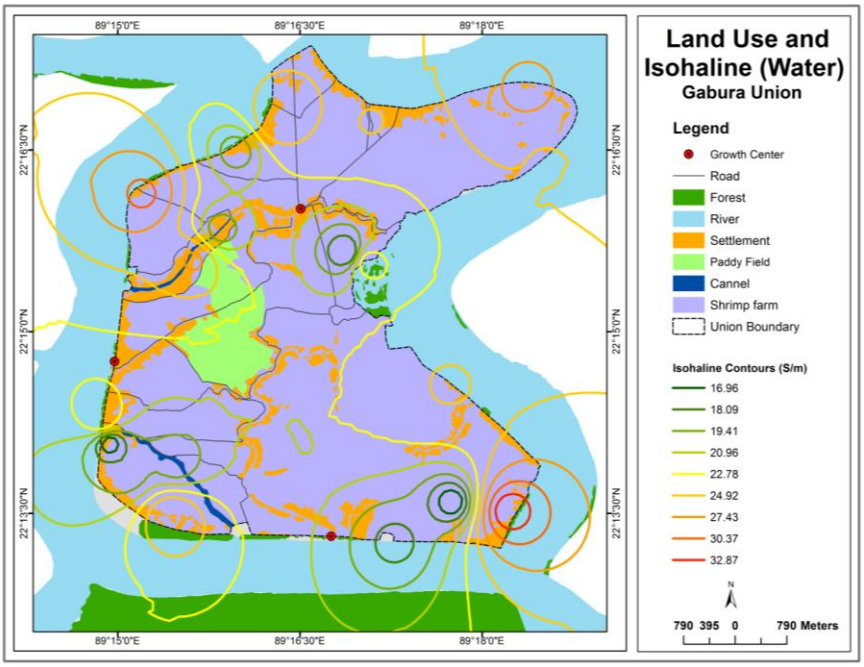


Figure 5: Isohaline map (water) of Gabura Union

From figure 5 established the relationship of land use and isohaline map of water of Gabura union. Here its found that the salinity is gradually high in the south east corner and then north west corner of the study area. Because of two rivers (kholpatua and kapatakha) connected with The Bay of Bengal and saline water easily inter the inland. Most of the large area Shrimp farm situated in this area and the barrier of saline water for shrimp farming increase salinity in water. Again the evaporation process of water raise saline level and its impact on agriculture land. Again from pond beside agriculture land and settlement found moderate saline value.

Salinity level in soil

Table 2: Types of soil salinity

Soil Salinity Class	Conductivity of the Saturation Extract (dSm^{-1})	Effect on Crop Plants
Non saline	0 – 2	Salinity effects negligible
Slightly saline	2 – 4	Yields of sensitive crops may be restricted
Moderately Saline	4 – 8	Yields of many crops are restricted
Strongly Saline	8 – 16	Only tolerant crops yield satisfactorily
Very strongly saline	16	Only a few very tolerant crops yield satisfactorily

Source: Abrol *et al.* (1988)

Soil reaction (P^H) and electrical conductance of saturated soil extract (EC) have been used as parameters for assessing the nature and severity of salinity problem in coastal areas. The following (Table 3) shows the soil P^H and EC value of four mouza of Gabura union.

Soil P^H and EC value of different point of Gabura union

Sl. No.	Location	Type of Land	GPS (co-ordinate)		Depth (cm)	P^H	EC (dS/m)	Comments
			Latitude	Longitude				
1	Dumuria Mouza	Shrimp farm	89.25	22.23	0-10	8.25	18.31	Very Strongly saline
					10-20	8.40	18.27	Very Strongly saline
2	Dumuria Mouza	Agriculture	89.26	22.23	0-10	7.40	16.11	Very Strongly saline
					10-20	7.70	14.25	Strongly saline
3	Dumuria Mouza	Settlement	89.25	22.23	0-10	6.20	11.20	Strongly saline
					10-20	6.80	5.61	Moderately saline
4	Gabura Mouza	Shrimp farm	89.29	22.28	0-10	7.90	13.94	Strongly saline
					10-20	8.20	10.11	Strongly saline
5	Gabura Mouza	Settlement	89.29	22.28	0-10	6.60	16.09	Strongly saline
					10-20	6.90	10.13	Strongly saline
6	Gabura Mouza	Agriculture	89.29	22.28	0-10	7.60	15.18	Strongly saline
					10-20	7.90	14.20	Strongly saline
7	Parshemari Mouza	Shrimp farm	89.27	22.23	0-10	8.10	15.24	Strongly saline
					10-20	8.40	14.81	Strongly saline
8	Parshemari Mouza	Settlement	89.25	22.23	0-10	5.80	12.36	Strongly saline
					10-20	6.10	9.70	Strongly saline
9	Khalisha-Bunia Mouza	Shrimp farm	89.26	22.26	0-10	7.80	16.80	Very Strongly saline
					10-20	8.10	13.09	Strongly saline
10	Khalisha-Bunia Mouza	Settlement	89.26	22.26	0-10	6.50	11.46	Strongly saline
					10-20	6.70	7.90	Moderately saline

Source: Laboratory analysis

From the Table 3, found that P^H and EC value varies according to depth of the soil. P^H and EC value of soil in 10-20 cm depth is higher than the 0-10 cm depth. Among the soil samples, the shrimp farm soils are more saline than other soil.

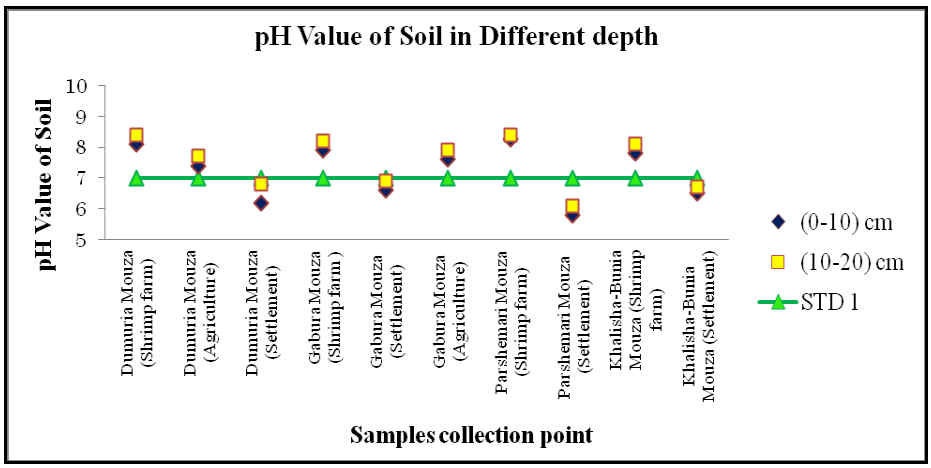


Figure 6: P^H Value of Soil in different depth

Source: Laboratory analysis

From the figure 6 found that in the study area the highest P^H value of the soil depth 0-10 cm is 8.25 in the soil of Dumuria mouza and lowest P^H value of the soil in same depth 5.8, which found in the soil of settlement of Pashemari mouza. Most of the value is higher than the standard value. On the other hand the range of P^H was in between 6.1 to 8.4 in the soil depth of 10-20 cm. However in the shrimp farm samples P^H range was high and the highest P^H was in the shrimp farm of Dumuria and Pashemari mouza which was 8.4 though the settlement soil P^H value is normal. The lowest P^H value was found in the settlement sample at Pashemari mouza.

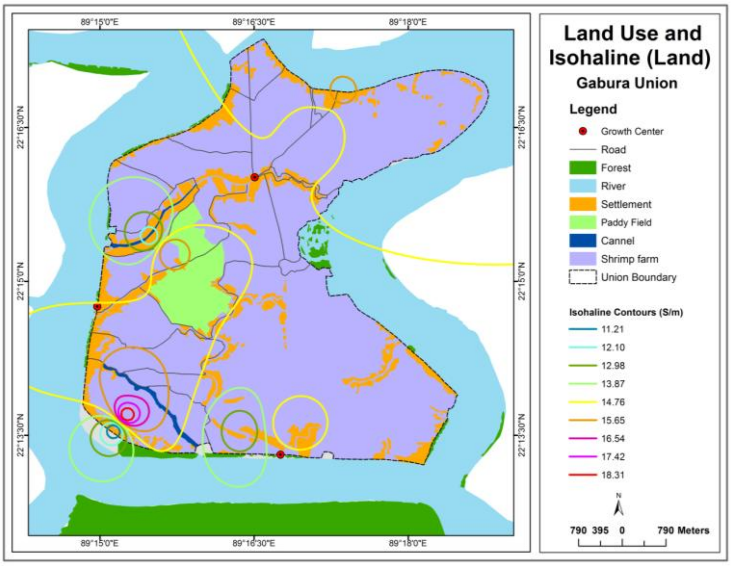


Figure 7: Isohaline map (land) of Gabura Union

By using EC values have drawn an isohaline map of land of Gabura union. The represented values of salinity which is known as electrical conductivity (EC) of the soil samples 0-10 cm depth were in between 11.20 to 18.31 dSm^{-1}. The highest value of EC was found in the soil sample which was collected from the shrimp farm of Dumuria mouza. The lowest EC value was found in the settlement soil of Dumuria mouza. The EC values are high in the surface soil than in the subsurface. From figure 7, the relationship of land use and isohaline map of land of Gabura union. Here its found that the salinity is high in the south west corner of the study area near in Sundarban (Mangrove forest). This occurred because of daily flow of saline water. In wet season (June to October) tidal flooding happened and large area direct inundation by saline or brackish water. In dry season (November to May) upward or lateral movement of saline ground water also causes for high saline value. Again in the middle of the study area which is mainly dominant by agriculture land use, founded as moderate saline zone.

The impacts of Salinity on the transformation of agricultural system

Coastal livelihood changes due to shifting of their agriculture system. The impact of salinity on livelihood changing of Gabura Union is shown in the following (Table 4).

Table 4: The impact of salinity on livelihood changing (Gabura Union)

Livelihood groups	Before 2000	2017	Impacts on Livelihood groups
Agricultural labor	177	59	The number of Agricultural labor gradually decreased by 118 and they shifted their livelihood to day labor, fisher etc.
Forest resources collector	56	70	People engaged more than before in Forest resources collecting. Number increased by14 people than before.
Shrimp fry collector	14	67	Shrimp farming appeared as more suitable livelihood then agriculture. As a result shrimp fry collecting has been the major source of livelihood of maximum people. The number of people increased by 53.
Fisher	28	56	Livelihood shifting to fishing increased by double. But few numbers of people shifted their livelihood to fishing whereas shifting to shrimp farming is huge.
Crab collector	0	14	Crab collection brought a new dimension in livelihood. This is the most popular and profitable. Many people getting engaged with that at present day. 5% of people are involved in crab collection.
Other	6	14	Slight change in other livelihoods such as small farmer, shopkeeper, service, engine van (Nasimon) driver.

Source: Field survey and interview, August 2018

From the Table 4, focused that traditional agricultural system was practiced before 2000 in the study area. The number of agricultural labor gradually decreased and they shifted their livelihood to daily labor, fisher etc. At present shrimp farming appeared as more suitable livelihood than agriculture. As a result shrimp fry collecting has been the major source of livelihood of maximum people. This situation also impact on land use of the

study area. Because of salinity increase both of land and water area, most of land transfer into shrimp farm from agriculture land.

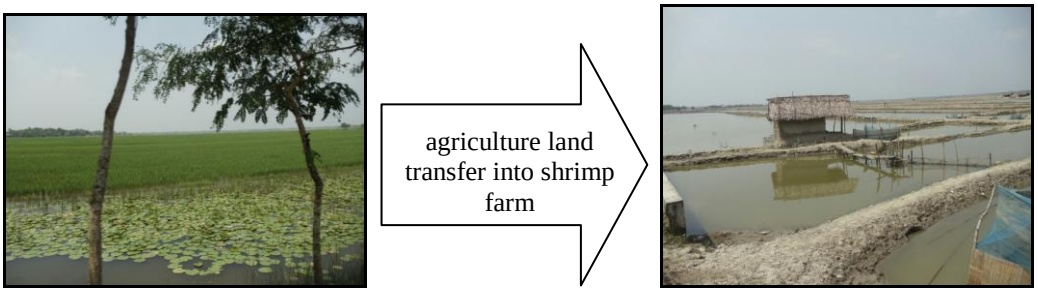
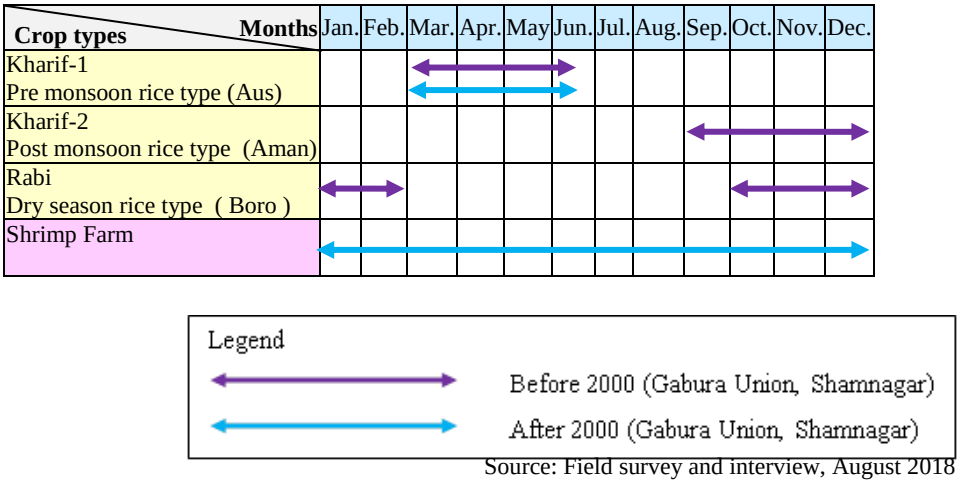


Figure 8: Agriculture Land transfer into Shrimp Farm Taken by authors, August 2018

Before 2000, fisher were considered as a lower class people of the society. But now this is one of the major livelihoods of the study area. Crab collection brought a new dimension in livelihood. This is the most popular and profitable occupation. Many people are getting engaged with that at present day. About 5% of people are involved in crab collection. As a result people's dependency on Sundarban, world's largest mangrove forest is increasing day by day. The over-extraction of resources for livelihood is a major reason for the depletion of biodiversity of the Sundarban reserved forest.

Crop calendar of the study area (Table 5) implies the changing pattern of agricultural system in Gabura union. Before 2000 in Gabura union, most of the lands cultivated in three seasons of a year, however shrimp farming are not found that time. Farmers are satisfied with their traditional agriculture and they had farm animals, fresh water fish, trees and no problem of malnutrition. But after 2000 large farmers started shrimp farming getting more profitable business. For shrimp farming they have to shift their agricultural land into pond or shrimp farm with a closer. This is one of the major causes of water logging problem in this union. The land which are cultivated thrice a year converted into double cropping system some are now only one time cultivated in a year.

Table 5: Crop Calendar of Gabura Union



Source: Field survey and interview, August 2018

Impact of salinity on fisheries and aquaculture

The extreme chloride concentrations are harmful to fish. Most aquatic flora and fauna are adaptable to a wide of salinity. Invertebrates and microbes are more sensitive. Thus with range the increase in salinity invertebrates are more prone to die. If the salt concentration begins to water exceed tolerance levels, aquatic life will be affected and die off rates will increase.

Though shrimp cultivation is done in saline waters, it also has a tolerance level. But now-a-days in the study area Gabura union shrimp cultivation is done in enclosures where the saline water is blocked and not let out. This increases the salinity amount in the water and also in the soil. This increased salinity of the water has caused shrimps to die due to some fungal and viral infections.

Figure 9: Water scarcity for agriculture
Taken by authors, April 2018

Figure 10: Homestead plants of the study area
Taken by authors, June 2018

Effects of Salinity on Plant Growth

In the coastal areas main obstacle to intensification of crop production is seasonally high content of salts in the root zone of the soil. Through rivers and channels, salts enter inland. Moreover, the salts enter the soil by flooding with saline river water or by seepage from the rivers. The salts become concentrated in the surface layers through evaporation. The saline river water may also cause an increase in salinity of the ground water and make it incompatible for irrigation. The increase in water salinity of these areas has created suitable habitat for shrimp cultivation. Accompanied by other factors, shrimp cultivation played a important role to increase salinity, especially in the southwestern coastal regions of Bangladesh.

In the study area, local people get information about salinity in soil and water from governmental non-governmental office and also some international organizations. They help to understand them how they can adapt with this salinity level. They guide them which crops and fishes they can cultivate according to their salinity level. According to SRDI, salinity classes are divided into five groups and based on this groups after field survey preparing a table (Table 6) which shows plant growth condition of the study area and also local fruit of different particular level of salinity classes.

Table 6: Effects of salinity on Plant Growth

Salinity classes	EC (dSm^{-1})	Plant Growth Condition	Plant Cover view	Species Name	Example
S0 (Non Saline)	< 2	– No vegetation looks affected by salinity – A extensive range of plants present. – Salinity effects mostly minor.		***Mangifera indica* (Mango)** *Spondias pinnata* (Hog plums) *Litchi chinenss* (Lychee)	
S1 (Slightly Saline)	2 – 4	– Yield of very sensitive crops may be restricted. – Grasses and shrubs may be prominent in the plant community. – There are no bare saline patches and no salt stain/crystals are evident on bare ground.		***Psidium guajava* (Guava)** *Anthocephalus cadamba* (kadam) *Manilkara sapota* (Sapodilla)	
S2 (Moderately Saline)	4 – 8	– Salt tolerant species start to dominate – The vegetation community and all salt sensitive plants are markedly affected by soil salinity levels. – Yield of many crops are restricted.		***Zizyphus mauritiana* (Ber)** *Annona squamosa* (Sugar-apple) *Garcinia cowa* (Mangosteen)	
S3 (Highly Saline)	8 – 16	– Only salt tolerant plants remain modest – Saline areas may occur showing salt stains or crystals or the top soil may be flowery or puffy with some plants surviving on small pedestals.		***Aegle marmelos* (Bael)** *Swietena mahagoni* (Mahogany) *Borasus flabellifer* (Sugar palm)	
S4 (Extremely Saline)	> 16	– Only highly salt tolerant plants survive – Trees will be dead or dying. – Extensive bare saline areas occur with salt stains and or crystals evident		***Cocos nucifera* (Coconut)** *Sonneratia apetala* (Mangrove apple) *Heritiera foemes* (Sundri)	

Source: SRDI 1997; Field survey and interview, August 2018

Farmer Perception on the Impact of Salinity on Crop Yield

Agriculture was the main source of livelihood for people of Gabura union of Shymnagar upazila. Among the interviewee households, sharecropper appeared as the highest number and most of them grow *Boro* rice in dry season. Wheat, some tuber crops, vegetables, pulses, oil seeds and spices also grow in dry season. According to Local people's perception, salinity intrusion is an increasing hazard to agriculture in dry season. About 72% of the respondents opined that salinity has become the most dominant hazard for their crop production during the dry season. They could test saline in their drinking water collected from shallow tube wells. They claimed that last 5 - 6 years crop production has been declining. Majority of the respondents (78%) agreed that salinity intruded to their land when they used water from their adjacent rivers such as the lower kholpatua River during high tide. Though, 8% respondents believed that manmade hazards like barrage could have significant impacts on the reduction of crop yield in their locality. Water scarcity was identified as hazard by 4% of the respondents and argued that they have been facing fresh water crisis both for drinking and irrigation because of the presence of salinity. The result shows that impact of salinity on crop production is visible in the study area. A small number of respondents reported that they have changed the crop variety to cope up with increasing salinity. Mainly different government and non government organizations help them to cope up the present situation. The most pressing problem faced by the farmers in the study area is yield loss. However, the yield loss is not uniform for all food crops.

Conclusion

The most fertile cultivable lands of Bangladesh are located in the coastal areas. But this land is not being utilized for crop production, mostly due to soil salinity. Soil salinity is now considered a major constraint to food production in coastal areas. Salinity decreases food production causing shortage of food and people try to find alternative livelihood. Due to salt water inundation people lost their housing and traditional sources of drinking water resulting risk of more diseases like cholera. In addition to that salt water caused destruction of infrastructure including educational institution (Sarwar, 2005).

The salinity intrusion level of Gabur union is identified and also in here P^H and EC value of the soil and water samples are varied from place to place. But soil salinity was found to be lower than that of water. Among the soil samples, the shrimp farm soils are more saline than other soil. Again there is an increasing trend of river water salinity. Water-logged areas have significantly increased due to seasonal submergence, tidal surges, drainage congestion, increased roads and embankments, faulty sluice gate, increased shrimp culture under shrimp farm areas and heavy clays in the coastal region. The major livelihood groups of the study area are identified. Between 2000 and 2017 some livelihood groups are existing and some are newly found. For example, shrimp fry collection and crab collector were not existed before 2000 and in the present time agriculture labor shifted their livelihood into day labor and fisher etc. The overall process of saline intrusion is creating dislocation of land parcel and land use changes damage soil fertility, destroy trees and vegetation.

Due to the problem of salinity intrusion and water logging, the people of Gabura union have to change their agricultural land into shrimp cultivation. As a result southern part of Bangladesh which was famous for rich production also hampered and alternative livelihood group developed. The people and resources of Gabura union are under the

threat of salinity due to its geographic and geologic settings. The impact of the salinity intrusion over the local environment in Gabura union has resulted in the decreases in crop production and many environmental problems in the form of a shortage of livestock fodder, fuel scarcity and decrease in traditional labor forces. The change of agricultural land to shrimp farming occurred because of the high economic return. Under the present circumstances, shrimp cultivation is no doubt beneficial for a selected group of people, but it negatively affected the livelihoods of has landless and marginal farmers, making it difficult for them survive in the area. People are excluded from their land by shrimp farming industries and lose their base for self sustaining agriculture that existed before 1990 in the coastal region.

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SWOT Analysis for Local NGOs: A Geo-spatial Analysis Evidence from Rural Bangladesh

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Abstract: The SWOT analysis is an operational tool for detail understanding of NGOs strengths, weaknesses, opportunities and threatsin the rural areas of Bangladesh in terms of savers, borrowers, saving money and total loan outstanding. However, this study used 30 NGOs with 175 branches for SWOT analysis along the Jamuna River. BRAC, Grameen Bank, RDRS Bangladesh and ASA etc. are a few noteworthy micro-credit organizations, who are engaging specifically focusing on the poverty alleviation, empowerment and betterment of living standards of the rural poor. This study is conducted through questionnaire survey, involving 383 respondents using 95% confidence level with margin of error 5%,and Geographical Information System (GIS) to explore the strengths, weaknesses, opportunities and threats of each NGOs. Hereafter, it evaluated the NGOs concentration along with potential areas in need of such programs. Finally, this paper suggested that the SWOT of the NGOs area not similar. It indicates that the number of savers, borrowers, saving money, and total loan outstanding are depending on geographical location, commercial centers, communication and transportation facilities, and the size of the population in the study site.

Keywords: SWOT, Micro-credit, Poverty, Rural area, Bangladesh

1. Introduction

Non-governmental Organization (NGO) activities started in Bangladesh after the war of liberation in 1971 for the purpose of relief and rehabilitation (Hashemi, 1999). It is lawfully founded corporations generated by legal people for the betterment of the rural poor people that functions independently from any procedure of government in Bangladesh (Kamal, 1997). In the top thirteen underprivileged countries, NGOs have been an extensively debated topic right now, although the number of people without food, clothing, education and basic health care has been saved by NGOs. (Chowdhury et al., 2004). It is expected that approximately 13,000 NGOs are engaged in micro-credit operations, whereas nearly about 80% of the villages in Bangladesh are now sheltered under NGOs activities (Develtere and Huybrechts, 2002). The maximum number of NGOs are small and there are a few numbers of large NGOs specially Grameen Bank, RDRS Bangladesh, BRAC and ASA. Self-employment, agricultural training, health, sanitation, vocational training, economic empowerment, education both formal and non-formal, livelihood rehabilitation, women's rights, infrastructure development, disaster

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management, income-generating activities like a business using NGOs credit, rural plantation and other poverty reduction program are the key sectors in which NGOs have made numerous contributions to support remoter of Bangladesh (Hashemi, 1999).

In Bangladesh various formal financial institutions specialized government organizations and non-government financial institutions perform Microcredit programs (MCP) (Mahmud, 1996; Siddiqi, 1985). The majority of the institutions are working on improving the economic situation by building their business of the members (Rahman and Ahmed, 2001). In 2002 around the world, 67.6 million families have been reached with microcredit, whereas in Asia there are 59.6 million clients and Bangladesh covered a number of 13 million (22.6%) clients (Microcredit Summit Campaign Report, 2003). Women are the main focus of the microcredit programs in Bangladesh. NGOs are working to make empowerment of the women in the rural society (Milli, 1995; Rahman et al., 2002). Now they can take a decision on child marriage, buying and selling of properties, family planning and sending daughters to school (Khanam, 2007). Furthermore, in collaboration with savings facilities, non-productive loan facilities, insurance facilities, business growth such as production-oriented and management training as well as marketing support, welfare-related programs such as educational facilities, health facilities, human rights and eventually social consciousness training, NGOs have provided credits (Siddiqui et al., 2002; Roodman and Morduch, 2009; Rogaly, 1996).

In Bangladesh, the ongoing and vital issues are socio-economic development and poverty alleviation through the NGOs' provision in the rural parts of Bangladesh, whereas for poverty alleviation, the micro-credit is thought as one of the important tools along with community and individual development. The NGOs have been working in various sectors like education sectors, providing health and sanitation facilities, agricultural loan and tools, training on environment management, child protection, vocational training, economic empowerment both men and women, livelihood rehabilitation, human rights, NGOs credits combined with savings facilities, enterprise development like production oriented training and management training, marketing support, reduce child marriage, infrastructure development, disaster management, etc. However, the main aim of the study is to know the SWOT of local NGOs in the field of poverty reduction through micro-credit services to the rural poor along the Jamuna River, Bangladesh. To fulfill the aim, specific objectives are being set for this study includes; (1) evaluate the involvement of rural poor to micro credit program; and finally, (2) SWOT analysis for local NGOs using number of borrowers and total outstanding's along the river side of Jamuna, Bangladesh.

2. Relevant literature review

Astatistics of the socio-economic situation of the local poor is provided by Haider (2013)who were engaged in the NGOs microcredit program in his paper titled on the impacts of NGOs on the socio-economic situation of the poor: a case study in Rajshahi city, Bangladesh which was published in the international journal of community development. He used Rajshahi city as a case study. He describes that NGOs are commonly familiar with their unique ability to reach the grassroots poor people and bring sustainable improvement of the lives of the rural poor. The focus of this study had

been on the socio-economic condition of poor people in rural areas formed through local NGO programs. In the journal of information and knowledge management, Hasnain described the knowledge and socio-economic development of the rural poor in 2013. This paper is on the contribution of local NGOs to socio-economic development in Bangladesh. This paper revealed that in Bangladesh about 22,000 NGOs are in operations with a view to developing the living standard of their lifestyle. The NGO facility recipients are the main stakeholders who are involved in receiving the knowledge transferred by the NGOs. In recent years NGOs have put more attention and efforts on income generation that having an involvement with micro-credit program, employment generation in different sectors, giving formal and informal education of rural children and adults, health, nutrition, family planning, establishment of financial services at the grassroots level, environment, water supply and sanitation, women's rights, poultry and livestock, human rights and legal aid.

Microcredit is known as a way of reducing poverty operationally. There are, however, critical debates on the feasibility of the microcredit scheme and the profiles of beneficiaries benefiting from the credit program of local NGOs (Chowdhury et al. 2004). The recent literature has established that microfinance has various impacts on the livelihoods of rural poor people. Microcredit has taken millions of poor people out of poverty and stimulated economic sustainability, particularly women, who are likely to be able to increase their household income, minimize economic insecurity and, in some situations, eradicate poverty altogether (Glazer, 2010; Bansal, 2011).In addition, with the help of microfinance activities, they have experienced improved healthcare, health services, and greater empowerment (Bauer et al. 2008; Swope, 2005).Their arguments are supported by Yunus, 2004 in his paper titled on expanding microcredit outreach to reach the millennium development goals: some issues for attention in the journal of attacking poverty with microcredit. He said microcredit has a lot of positive effects on families earning credit from local NGOs. Murdock and Haley (2002) have performed a widespread study of the effects of microfinance on poverty reduction, and the loan scheme has a sufficient positive impact on rural villagers' poverty reduction as well as millennium development goals. These interpretations were approved by the results of an evaluation study commissioned by the Asian Development Bank (ADB, 2007) on the effect of microcredit programs on rural families and the position of women of Bangladesh, Philippines, and Uzbekistan.

The study showed that the microfinance program had a positive effect on the status of rural poor people through higher volumes of household currency, a formal and non-formal food education program, greater involvement in big purchasing decisions and investments, the potential to gain more money by the use of credit by NGOs, a higher position in business decision-making, gaining new expertise and developing their network of friends and help networks, and gaining more money. In addition, countries such as Bangladesh, Nepal, India, Vietnam, China and the Philippines have appointed for avaluation of MFIs (Microfinance Institutions).These assessments examined the benefits of the NGO micro-credit scheme, such as improved food and nutrition protection, housing and wellbeing, school enrollment for children and adults, higher levels of literacy, food for school-going children, empowerment and mobility for women, focus on higher average household income, building human resources and assets and community engagement, self-employmentand employment of family members (Bedson, 2009).

Panjaitan-Drioadisuryo et al. (1999) had conducted a research titled on Gender, self-employment and microcredit programs and published it in the journal of the Quarterly Review of Economics and Finance. They found that 90% of Bank Rakyat Indonesia (BRI) participants in the study raised their income by entering the credit program of NGOs and these families crossed the poverty line by developing various sources of income. Income of only 10 % participants did not increased because of mishandling the credit by their husbands. Furthermore, Hossain in 2008 had analyzed the community development and livelihood security and in their analysis, this paper presented at the Tokyo Peace Builders' Symposium, 2008 and Ghalib et al. (2011) undertook to analyze whether microcredit minimized poverty and to what degree and to what extent poverty mitigated.. Their study confirmed that microfinance programs improved deliberately in education, agricultural system, household income, improved the facilities on health care, clothing, water supply and sanitation as well as building a quality of dwelling house.

Hossain (2012) studied measuring the impact of BRAC microfinance operations, which had published in the journal of International Business Research. He sought to measure the effect of BRAC's microfinance operations on the livelihoods of rural village borrowers. Since joining the loan scheme of NGOs, the revenue of the Borrower's and their contribution to family spending grew dramatically. Besides that, he also found that the volume of monthly savings was not significant, but the approach of the borrowers towards savings was noticeable. Besides that, Reddy had revealed that microfinance makes the socio-economic conditions better for the rural poor people in 2000. He found that “the credit program of MFIs is highly successful, which is evidenced by the high repayment rate, awareness generated among the target group and beneficial developmental impact created on the receivers of the credit”. However, there are some critics disagreeing because poverty cannot be removed with a small amount of money provided by NGOs. The answer of criticism had found in a statement given by Adam Smith, 2010 and Ahmed, 2004 in their research. They said “when you have got a little, it is often easy to get more. The great difficulty is to get that little”. The economic condition of the needy poor people in the rural areas is so terrible that they do not have enough opportunities to get little amounts. In addition, this tiny sum is the need for the vulnerable to support them in revenue producing operations at the right time. (Ahmed, 2004; Ahsan, 2005).

3. Methodology

3.1 Study area

There are 126 unions in the research area in 5 districts along the river side of Jamuna and 30 NGOs working on the study site with 175 sub-branches. Sirajganj, Bogura, Jamalpur, Gaibandha and the district of Kurigram are part of the study area. The study area covers the Old Brahmaputra, Jamuna (Young Brahmaputra) floodplain and Ganges River floodplain which are highly productive for agricultural activities. Floodplains can facilitate access to fresh water, the fertility of agricultural floodplain land, cheap transportation and the ease of flat land expansion.

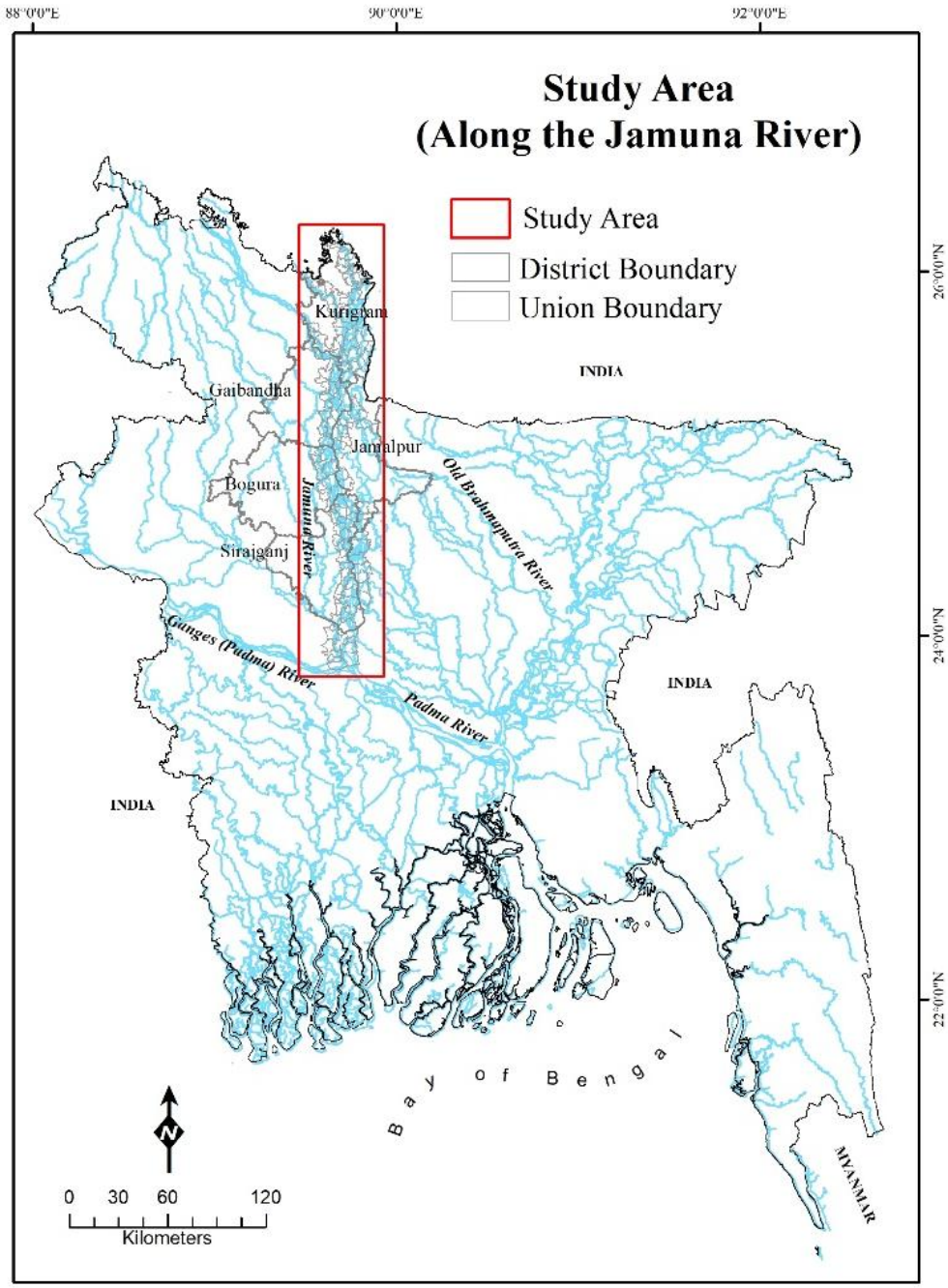

Figure 1: Study area along the river bank of Jamuna, Bangladesh
Source: Made by the authors, 2020

Numerous non-governmental organizations active in almost every field were located in the study area. The purpose and scope of their work differ, along with the type of project they receive funds for. NGOs such as ASA, BRAC, Grameen Bank, RDRS Bangladesh are NGOs at the national level and operate exclusively throughout the region (Mollah,

T.H. et al., 2019). In household surveys and Focused Group Discussions (FGD), as well as in current government studies, a full list of all NGOs currently operating in our research area is listed below in Table 1.

Table 1: List of NGOs in the study area

No	Branch Name	Frequency	No	Branch Name	Frequency
1	AKOTA	2	16	PRODIPON	1
2	ARBAN	1	17	PROGRESS	1
3	ARCHES	3	18	RDRS Bangladesh	22
4	ASA	35	19	RSDA	1
5	Atto Mohila Unnaion Somity	1	20	Sajida Foundation	1
6	Bhomukhi Mohila Unnaion Somity	1	21	SAP	1
7	BRAC	31	22	SATU	1
8	DORP	1	23	SKS	7
9	GKS	1	24	SSS	6
10	Grameen Bank	31	25	Thangara Mara Mohila Sabuj Songo	1
11	GUK	9	26	TMSS (Thakurgan Mohila Sobuj Sango)	4
12	MMS	2	27	UDDIPAN	1
13	NDP	3	28	Uddog	1
14	PDBF	1	29	UDPS	2
15	Porosh	1	30	US	2
				Total	175

Sources: Made by the authors, 2020; data collected from Bangladesh Bureau of Statistics (BBS), Char livelihood Program (CLP), census report 2011 and field survey, 2020

3.2 Data sources and methods

There were relevant maps both hard copy and soft copy of the study sites, information's on micro-credit sectors and data published by the local or national authorities in Bangladesh were collected and photocopied. For instance, the researchers intended to conduct a detailed survey on 126 unions of 5 districts during the field work. The union maps were available in the DLRS (Directorate of Land Records and Surveying) of Bangladesh. These maps were purchased at that time. The data and information were collected using questionnaires and interviewing of the selected focus group (e.g. elderly local people, local community, members of the union parishad, employers and manager of each NGOs, borrowers and savers of the NGOs), observation and other related methods. A standard land use map and current crop calendar were prepared of the areas with the help of local people's perceptions.

There were 383 questionnaires survey (95% confidence level and 5% margin of error) conducted randomly and 10 focus group discussions at different levels. Therefore, this paper makes one common questionnaire sheet, which includes all information's of micro-credit sectors. The research interviewed certain groups who participated

a. Local community and individuals (total 383 questionnaire statistically and 10 FGDs- each group consists 7-8 persons where 5/6 are males and 3/2 are female,

and information gathered includes; strengths, weaknesses, opportunities and threats of the local NGOs, monthly income of them before and after joining to local NGOs credit program, distance from the NGOs to the respondents and facilities had provided by local NGOs).

b. Employees of local NGOs who invest in the credit facilities of 126 unions (focused group discussions and interviews with 175 branches of 30 NGOs and provided services to rural poor people).

This study also analyzed the correlation among savers, borrowers, saving deposits and total loan outstanding. Furthermore, the causes of strength and weakness of each NGOs were explained by geographical factors as the responsible indicator for the change of up and downward economic condition.

4. Major findings of SWOT analysis for local NGOs

4.1 Evaluate the involvement of rural poor to micro credit program

Four noteworthy NGOs are working along the river bank of Jamuna like Bangladesh Rural Advancement Committee (BRAC), Association for Social Advancement (ASA), Grameen Bankand RDRS Bangladesh (Rangpur Dinajpur Rural Service). Each branch of local NGOs run by six people: a branch manager, an assistant branch manager, and four loan officers. The branch manager is specified with the right to accept all transactions within the branch. Each branch is a profit center and is estimated to fully recoverable costs between 9 and 12 months. There were total three NGOs information's like a number of savers, borrowers, total savings and total outstanding missing because the branch manager had no information on it and only local NGOs had no borrowers and outstanding information. In the association for social advancement (ASA), there are 57,085 savers and 56,531 borrowers involve with NGOs credit program and the total saving deposits and total out standing's were 30,561,697 BDT and 353,805,656 BDT accordingly (1 USD = 78.7353 BDT). It means that the digits of savers and borrowers are almost equal and the total outstanding is bigger than the total saving deposits. Therefore, rural poor people had got more loans and in various income-generating activities such as business, agricultural sectors, kitchen gardening and poultry farming, they capitalized money and improved their economic situation and standard of living. On the other hand, Grameen Bank is facilitating the rural poor with the loan to alleviate the poverty of individual or group of rural poor people. There are 96,516 savers and 84,5931 borrowers involve with Grameen Banks credit program and the total saving deposits and total outstanding's were 269,509,755 BDT and 484,849,111 BDT accordingly (1 USD = 78.7353 BDT). However, BRAC encourages rural poor people to involve in microcredit programs. There are 103,647 savers and 89,050 borrowers involve with BRACs credit program and the total saving deposits and total outstanding's were 104,759,268 BDT and 284,864,091 BDT accordingly (1 USD = 78.7353 BDT).

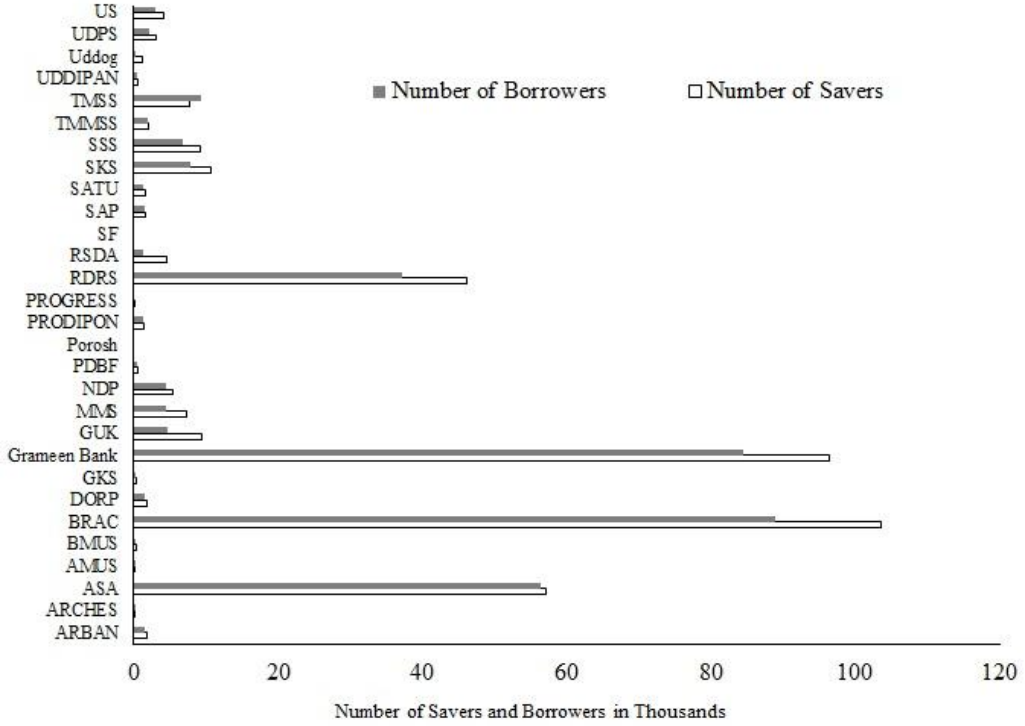

Figure 2: Total number of savers and borrowers along the river side of Jamuna, Bangladesh, 2020

Sources: Made by the authors, 2020; data collected from Bangladesh Bureau of Statistics (BBS), Char livelihood Program (CLP), census report 2011 and field survey, 2020

It means that the number of savers and borrowers are almost equal and the total outstanding is bigger than the total saving deposit that is same as Grameen Bank. BRAC is investing more money in the socio-economic improvement of the rural poor people along the riverside of Jamuna, Bangladesh. Therefore, rural poor people had got more opportunities to capitalize money in various income yielding activities like the business and other purposes as well as improved their economic condition and standard of living.

RDRS Bangladesh (Rangpur Dinajpur Rural Service) is working for poverty reduction and empowerment with rural poor's economic development by the NGOs credit program in northern areas of Bangladesh. There are 46,130 savers and 37,115 borrowers involve with RDRS Bangladesh credit program and the total saving deposits and total outstanding's were 53,851,944 BDT and 109,182,834 BDT accordingly (1 USD = 78.7353 BDT).

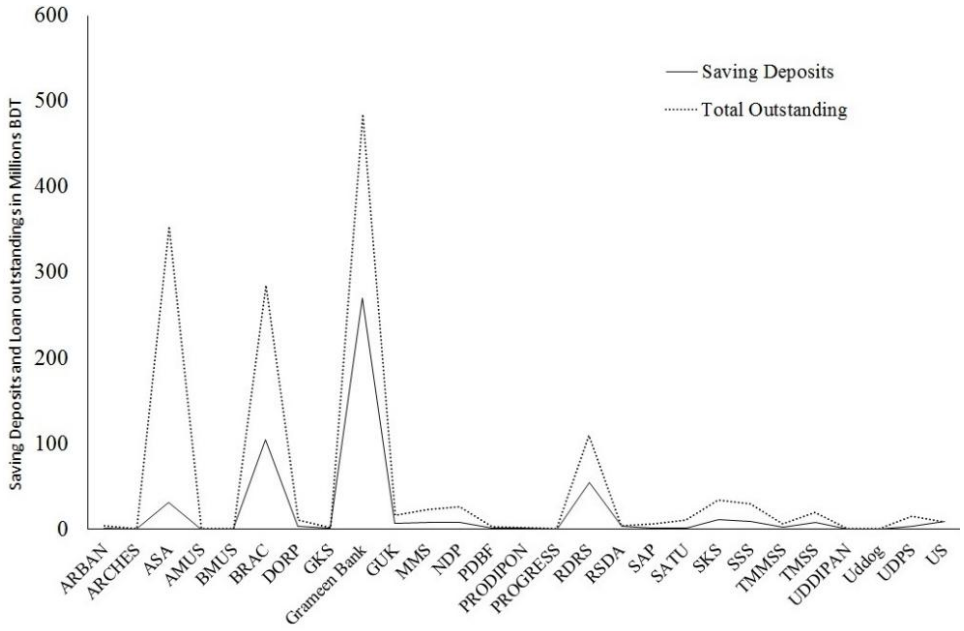

Figure 3: Total savings and outstanding of all NGOs along the river side of Jamuna, Bangladesh, 2020

Sources: Made by the authors, 2020; data collected from Bangladesh Bureau of Statistics (BBS), Char livelihood Program (CLP), census report 2011 and field survey, 2020

It indicates that the number of savers and borrowers are almost equal whereas the total outstanding is bigger than the total saving deposit, which is same as Grameen Bank, ASA, and BRAC. RDRS Bangladesh is also investing more money in the socio-economic growth of rural poor people, especially in the northern regions of Bangladesh.

4.2 SWOT analysis for local NGOs using number of borrowers and total outstanding's

This section shows the member coverage using bubble maps. The MFIs are classified here into 3 categories (i.e. 3 sizes of Bubbles) based on their total outstanding loans. The large bubble illustrates the value of outstanding loans more than 10 million taka while middle and small MFIs represent groups between 5-10 and less than TK 5 million respectively. Therefore, each bubble also indicates the strength or weakness of the respective MFIs in terms of borrowed money.

ASA (Association for Social Advancement) is one of the prominent NGO in Bangladesh. Among the 30 NGOs, ASA is working for social and economic development by providing credit facilities amid rural poor. For detail understanding of ASA's strength in terms of loan outstanding and the number of borrowers in the study sites; the loan outstanding is categorized into three classes such as less than TK 5 million / MFI, between TK 5 and 10 million / MFI and the last one is more than Tk 10 million. Besides that, the total number of borrowers is also sorted into three major groups like (400 to 1,281), (1,282 to 1,789) and last is (1,790 to 2,379). Among 126 unions, a total number of savers, borrowers, savings deposits and loan outstanding are 57,085, 56,531, 30,561,697 and 353,805,656 respectively. There are 35 branches of ASA are working

along the river Jamuna. Association for Social Advancement (ASA) is covering 15.07% savers and 17.53% borrowers respectively among the 30 NGOs in the study sites. The capacity of ASA along the Jamuna River is not same in terms of providing loans and their number borrowers. The distribution pattern of loan outstanding is different from district to district. ASA predominantly provides a loan in the district of Kurigram than the other districts of the study sites. The loan distribution pattern of ASA is some sort of uneven in Kurigram district. The loan outstanding of the three branches is more than Tk 10 million, whereas the number of borrowers is only 1,282 to 1,789. Besides that, in the northern part of Kurigram, the number of borrowers is higher, but the loan amount is lower that shows inequality in loan distribution. It indicates that once the less number of borrowers takes a high amount of loan from NGOs, they might drive for bigger investment in business sectors where economic opportunities are higher than other study sites. In the middle part of Jamuna River, the number of the borrower is 400 to 1,281 where the loan outstanding is less than Tk 5 Million / MFI. This might happen because, in the middle part of Jamuna, population density is lower than upper and lower part of Jamuna River. As a result, the number of NGOs and NGOs activities in credit sectors also lower. Furthermore, in the lower part of Sirajganj district, the amount of the loan (more than Tk 10 million) and the number of borrowers (1,790 to 2,379) is higher. It also shows that the numbers of borrowers are strongly linked with the loan outstanding in the study sites. In Gaibandha and Jamalpur district, there is some branches borrower number is higher (1,790 to 2,379), but the loan amount is lower (between TK 5 and 10 million per MFI) in comparison to the other branches of ASA. Finally, it can be said that higher number of borrower and outstanding indicates a very high frequency of growth/commercial centers are situated in the sites where the rate of money transaction is higher. There is also a risk of returning the allocated loan to the borrowers as the amount loan per borrowers is very high in comparison to other NGOs (Figure 4a).

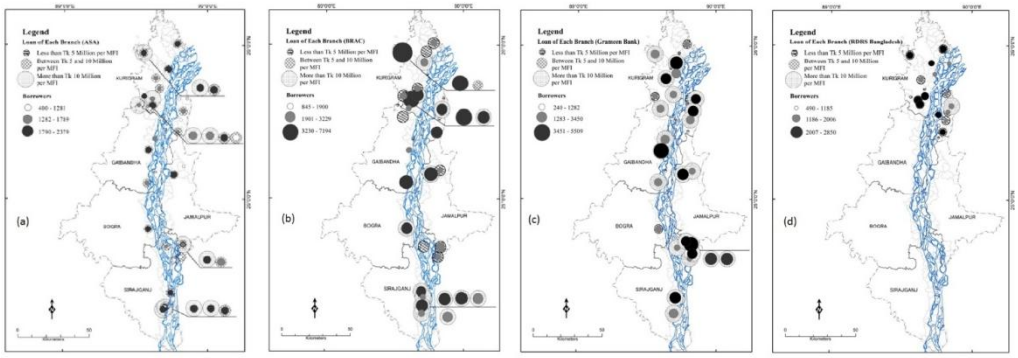

Figure 4 (a-d): Comparison between total outstanding and borrowers (ASA, BRAC, Grameen Bank and RDRS Bangladesh) along the river bank of Jamuna, Bangladesh

Sources: Made by the authors, 2020; data collected from Bangladesh Bureau of Statistics (BBS), Char Livelihood Program (CLP), census report 2011 and field survey, 2020

Figure 4b demonstrates the BRACs (Bangladesh Rural Advancement Committee) capacity in terms of loan outstanding and the number of borrowers in the study sites. The BRAC (Bangladesh Rural Advancement Committee) is one of the prominent and the famous NGO in Bangladesh that made an enormous contribution to the social and

economic development by providing credit facilities amid rural poor. The loan outstanding is categorized into three classes such as less than TK 5 million / MFI, between TK 5 and 10 million / MFI and the last one is more than Tk 10 million. Besides that, the total number of borrowers is also sorted into three major groups like (845 to 1,900), (1,901 to 3,229) and last is (3,230 to 7,194). There are 31 branches of BRAC are working along the river Jamuna. BRAC is covering 27.38% savers and 27.61% borrowers respectively, among the 30 NGOs in the study sites. It indicates that along the river Jamuna, BRAC reaches to the higher number of rural poor who are willing to join in the BRACs credit program. BRACs credit service from the upper to lower stream is almost equal, except for the district of Kurigram. In Kurigram there are a large number of branches of BRAC, which provides a loan to the rural people for their economic purposes. There are only three branches that have a higher loan outstanding (more than Tk 10 million) along with the higher number of borrowers (3.230 to 7,194). On the other hand, in between Gaibandha and Kurigram district, there are some branches where higher concentrations of borrowers (3,230 to 7,194) are located but the loan outstanding is comparatively poor (less than TK 5 million / MFI). Besides that, in the middle of Kurigram district where the loan outstanding is higher, but the number of borrowers is less (1,901 to 3,229). It indicates that, in Kurigram district, there is no proper relation to loan outstanding and borrowers. In the middle stream of Jamuna, where part of Gaibandha, Bogura, and Jamalpur districts are located, the number of BRAC branches is very limited. This might be because here population density is a bit lower with a lack of transportation and communication facilities. The scenario changes drastically when it comes to Sirajganj district where the number of borrowers and the loan outstanding are higher. In some cases, the number of borrowers is medium (1,901 to 3,229) but the loan amount is higher. There are some areas (middle part of Sirajganj district) that have a minimum number of the borrower, but the outstanding level belongs in between Tk 5 and 10 million / MFI. The number of branches for BRAC is some sort of satisfactory, but their spatial distributions are not equal. Finally, it indicates that in Kurigram and Sirajganj district where the numbers of growth centers are higher, the concentration of NGOs' is higher in term of their loan distribution. This step will help to establish new branches of NGOs in the unserved areas to serve rural poor people who are suffering from poverty and daily basic needs.

Figure 4c illustrates that the Grameen Banks capacity also in terms of the loan outstanding and the number of borrowers in the study sites. The loan outstanding of Grameen Bank is categorized into three classes such as less than TK 5 million / MFI, between TK 5 and 10 million / MFI and the last one is more than Tk 10 million. Besides that, the total number of borrowers is also sorted into three major groups like (240 to 1,282), (1,283 to 3,450) and last is (3,451 to 5,509). There are 31 branches of Grameen Bank are working along the river Jamuna. It covers 25.49% savers and 26.24% borrowers respectively, among the 30 NGOs in the study sites. In the upper, middle and lower part of Jamuna River, the number of branches (Grameen Bank) is 15, 6 and 10 respectively. It indicates that in the middle part of Jamuna, Grameen Banks concentration is less than upper and lower parts. However, in the upper part, the concentration of Grameen Banks is higher where they disburse loans among borrowers (1,283 to 3,450) is more than Tk 10 million within 9 branches. Other rest of 6 branches, the amount of the loan outstanding is between TK 5 and 10 million / MFI and the borrowers are varied 1,283 to 3,450 in the study sites. This is because a higher number of population and commercial centers are situated in the upper part of Jamuna River especially in the Kurigram district. On the other hand, in the part of the Jamuna, the

number of branches of GB is lower (6 branches in total) but in the 5 branches, the loan outstanding is more than Tk 10 million where the number of borrowers is also higher (3,451 to 5,509). There is only one branch loan outstanding and borrowers are between TK 5 and 10 million / MFI and 1,283 to 3,450 distinctly. Furthermore, in the lower part of Jamuna (upper and lower part of Sirajganj district), the services of GB seem to be very operational and effective as well. Among the 10 branches of GB in the upper and lower part of Sirajganj district, all branches have better strength in terms of their borrower (3,451 to 5,509) number and total loan outstanding (more than Tk 10 million).

Figure 4d shows that the RDRSs capacity also in terms of its loan outstanding and the total number of borrowers in the study sites. The loan outstanding of RDRS is categorized into three major classes such as (1) less than TK 5 million / MFI, (2) between TK 5 and 10 million / MFI and the last one is (3) more than Tk 10 million / MFI. Besides that, the total number of borrowers is also categorized into three major classes like (490 to 1,185), (1,186 to 2,006) and last is (2,007 to 2,850). There are 22 branches of RDRS are working along the river Jamuna. It covers 12.18% savers and 11.51% borrowers respectively, among the 30 NGOs in the study sites. In the lower portion of Kurigram district, the number of borrowers is higher ranging in between 2,007 to 2,850 per MFI. In several branches of RDRS in Kurigram district, the loan outstanding is not very high in comparison to other NGOs as it has been mentioned earlier. The loan outstanding in several branches is lower (less than TK 5 million / MFI) than the number of borrowers (2,007 to 2,850). In terms of outstanding, there is only one branch that was located in the southern part of Kurigram where loan outstanding is higher (more than Tk 10 million / MFI), but the borrower's number is medium (1,186 to 2,006). It indicates that once a huge amount of loan taken by the borrower for bigger investment is a sign of great progress for the economic development of individuals. But at the same time, it is also considered a higher risk for both the NGO and the borrower, if there have a chance to fails to return the loan.

Apart from the four major NGOs, there are 26 NGOs along with 56 branches were located who are working for the economic improvement of the poor by providing credit services to the poor in the study sites. They cover 19.86% savers and 17.10% borrowers in the study sites respectively. It indicates that the major four NGOs (Grameen Bank, ASA, BRAC and RDRS Bangladesh) are covering 80.14% of the savers and 82.90% of the borrowers in the study sites. In Kurigram, there are five NGOs that have a borrower in between 859 to 2,258, whereas the concentration of NGOs is lower, apart from major four NGOs. It has been also noticed that very limited number of branches are working in the middle stream of the Jamuna. In the lower part of Sirajganj district, there are very few numbers of NGOs are working with the lower number of borrowers and loan outstanding.

4.3 Correlation analysis and the geographical factors of SWOT analysis

This paper presents a correlation analysis among savers, borrowers, savings deposits, total loan outstanding (dependent variables) and the remoter's annual income (independent variables) to show the relationship between the variables. The analysis of the correlation shows that the coefficient correlation for savers (r) is equal to 0.731, indicating a significant relationship between savers and their income ($r = 0.731$, $p < 0.001$).This may be because higher-income persons tend to save money with high interest for the future crisis mainly for the disaster mitigation period. Besides that,

geographical location is also another reason for saving money and to improve their social status among the rural community. The correlation coefficient is for borrowers (r)equals to 0.534 ($r = 0.534$, $p < 0.001$) indicating a cabalistic relationship between borrowers and increase of income. Along the Jamuna, savers are mainly borrowers. As a result of joining the credit program of NGOs, they borrowed money for the business purpose where geographical location of the commercial/ growth centers are contributing a lot to encourage local people to borrow money from the local NGOs. On the contrary, the correlation coefficient is for saving deposits and total loan outstanding(r) equals to 0.119 and 0.182 accordingly. This results indicate that the relationship between saving deposits and total loan outstanding with remoter annual income is slightly significant. Finally, the overall result reveals that geographical location, demographic characteristics of the local people, spatial distribution of local NGOs and establishment of commercial/ growth centers are playing acabalistic role to make a better lifestyle of the remoter.

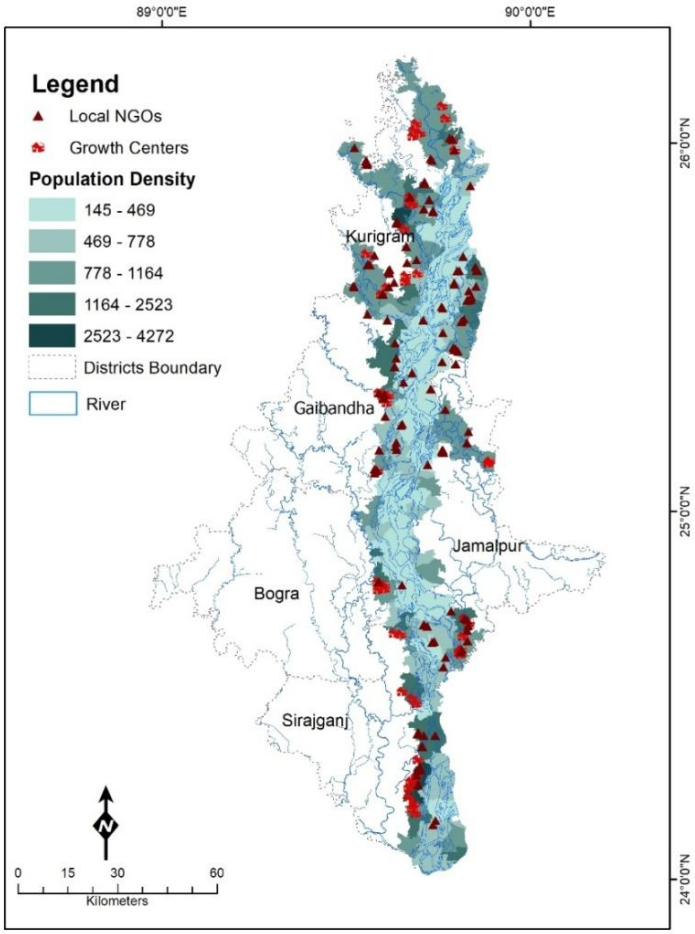

Figure 5: Geographical and anthropogenic factors for the distribution of local NGOs and their strength and weakness in terms of savers, borrowers, saving deposits and total loan outstanding'salong the river bank of Jamuna, Bangladesh.

Sources: Made by the authors, 2020; data collected from Bangladesh Bureau of Statistics (BBS), Char Livelihood Program (CLP), census report 2011 and field survey, 2020

5. Conclusion

The discussions lead us to a conclusion that amount of NGOs is not sufficient to serve a large number of populations in the study sites. In the study sites, it takes proper management along with equal distribution of local NGOs according to the population density. Besides that, a total number of borrowers and loan outstanding illustrate the strength and weakness of the NGOs capacity. Apart from major four NGOs, rest of 26 NGOs of 56 branches need to increase their capacity by involving more savers and borrowers in the study sites. A number of growth centers are also a backdrop for the development of the rural economy in the study sites. NGOs are providing more loans to borrowers habituated close to the near growth centers. But the people habituated far away from the growth centers are missing from the services of NGOs. If these organizations establish new growth/commercial centers by providing loans to the poor people in the remote areas, then the integrated development will have resulted.

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From Rhetoric to Reality: Theories and Practices of TOD in Contextual Inherent

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Abstract: Transit Oriented Development (TOD) is a popular and most applied urban development technique among city planners. Development around mass transit station is a widely promoted strategy of which the basic idea is to develop relatively high-density development around the transit stations with mixed urban function. Towards ensuring a sustainable transportation system, the core principles of TOD are gaining immense appreciation. However, the theoretical concept and practice of implementation varies context to context. This study is a systematic review about the TOD theories and implementation practices to compare the contextual form of TOD structured to answer the research question: what is the contextual practice of TOD from theoretical concept to implementation course? The prime objective of the study is exploring the TOD concept theoretically and the contextual practices from the review of boarder TOD literature. The findings reveal that different countries adopted TOD concept to challenge different urban problems, like combat sprawl, nebulous city, land pressure, traffic demand management, etc. As a result, TOD implementation practice differs from country to country although the basic idea of TOD planning is same.

Keywords: Transit Oriented Development (TOD), Theorizing, Implementation.

1. Introduction

Transit Oriented Development (TOD) approach has been appreciated by most of the planners from all over the world as a great way for ensuring sustainable urban growth. (Croses. S, 2016). As a planning tool, TOD integrates land use with transit system and build up a livable, sustainable, pedestrian and cycling friendly areas with the means of high density, mixed and diverse land use. Transit has always been a significant tool for achieving urban vision into reality by adopting supportive zoning and creative financing (Suzuki et al, 2013). For meeting the increased transportation need, through transit-oriented development (TOD), it is important to look out global experiences for providing successful transit as well as land use integration for revenue generation and value capturing (Suzuki et al, 2013).

To bring TOD from theory to reality, it is difficult to define any ideal format to activate systemic operational plan for executing a sustainable TOD (Curtis, Renne, & Bertolini, 2009). For adopting implementation in any cities, whether in a developing or developed country, it is beneficial to review and learn from previous operational examples. There are international examples of “Finger Plan” of Copenhagen and “Green TOD “of

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Stockholm. Global practice examples have been analyzed and differentiated for meeting the travel demand, defining planning processes, as well as for using corridors to channel the spillover growth from urban centers. (Curtis et al, 2009). International experiences can support to improve the transit corridors by reflecting useful planning instruments for urban regeneration as well as for improving sustainability, enhancing livability and increasing accessibility (Croses. S, 2016). Focusing the research question 'What is the contextual practice of TOD from theoretical concept to implementation course?' this study has tried to systemically review relevant international discourse of TOD studies to give an insight about the TOD theory and practices across different context as well as make a comparison among them to identify the underpinning challenge of emergence and similarity or dissimilarity of practice.

2. Emergence of the concept of TOD

The concept of TOD has been disconcerted with several definitions' evolutionary examples. One of the most significant examples of TOD is John Nash's "Blaise Hamlet for Easter worker" in Bristol, England from 1811. Another strong integration of transportation with housing development was subsequent British workers housing in close proximity with their factories (Ian, 2009). During 1875, the Jonathan Carr's development of Bedford Park was built as a planned community and paved the path of transit- oriented nature as well as modern concept of TOD. In London, two significant areas named Bedford Park and Charring Cross Station were connected with each other by railroad. Transport infrastructure designing also influenced by William Owen and Alexander Harvey's utopian design worker villages in late 1880's. This concept of focusing and shifting dwellings near transport route was conceptualized for conduit of goods instead of thinking for people. Emergences of modern planning theories as well as design of new towns were started during the great depression of 20th century beginning. Ebenezer Howard's "Garden Cities of Tomorrow", a kind of bible for planning was published in 1902 which was influenced with the socialist vision of Edward Bellamy's novel 'Looking Backward' and inspired by London's social conditions in defining Luddite's vision of small towns, made for workers to enclose with the best component of city and country planning and designed with green belt (Laaly, 2014). These were constructed near railway stations and intended with encircled civic spaces by neighborhood's like small villages. American cities were getting into shape by following garden city concept near 1990 as well as development-oriented transit was figured out (Ian, 2009). But the great depression of global market economy restricted the new town development. The French Architect, Tony Garnier introduced the first modernist vision of the 20th -century city for town planning as well as proposal for separate spaces (Laaly, 2014). During 1916, United States remained world's leader in transit miles with motorized vehicles. The growth of automobile ridership decreased after World War II for reduction in investments during depression (Ian,

2009). Le Corbusier and Frank Lloyd Wright explained better the modernist vision of Garnier by layout designing of urban and sub urban areas with inclusion of segregated use, relationship between automobile use as well as malignancy of private spaces upon public places. Eisenhower Interstate Systems was another significant system development of auto-orientation in 1956. With the systematic provision of easy accessed affordable private vehicle, transit ridership witnessed a long fall out (Ian, 2009). "The New Transit Town" characteristic of transit related development started in the early 20's as "Development-Oriented Transit'. (Dittmar & Ohland, 2004).

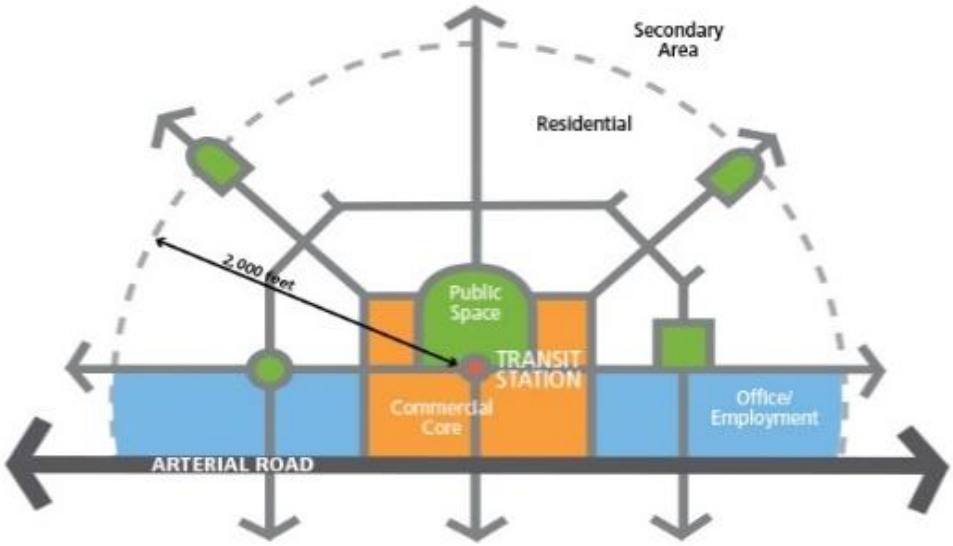
Suburban sprawl was encouraged by the two major subsidies from federal government (Calthorpe, 1993). He referred the 'Highway Bill of 1956' as 'largest public works system in the history of mankind' and single home mortgage deduction approach as incentive for people to support single occupancy and homes (London, 2002). For reaching into a suburban landscape with minimum downtown coverage, The Metropolitan Atlanta Rapid Transit Authority (MARTA) and the Washington Metropolitan Area Transit Agency (WMATA) provided new transit system by following the 1970's The Bay Area Rapid Transit (BART) system. Suburban commuters were considered mainly, who were the main accessed group of private vehicles and this approach was called 'park-n-ride' informally. Most of the system failed to achieve their ridership goals instead of calling 'New transit town' as 'Auto–Oriented Transit' (Dittmar & Ohland, 2004; Ian, 2009). The transit authorities revealed their capacity to facilitate the increase of ridership with the guidelines for typology and scale near transit stations during 1970s. Cervero (1993) referred this as 'Transit Supportive Development'. American suburban population grew 26% in the 50 largest metropolitan areas and the sub-urban employment grew 49.2% from 1980 to 1990 (Cervero, 1993). "Smart Growth" movement and the concept of "TOD" were powered actively with sprawl development and fiscal cost association in near early 90's.

The book 'Sustainable Communities' was coauthored by Calthorpe and reflected indication of TOD's early roots in 1986 (Van der Ryn, 1986). He followed "Garden City Movement "and" Stockhoim Satellite New Town" of Vallingby that defines his theoretical progression towards TOD.A booklet titled 'The Pedestrian Pocket Book" was published later based on his concept evaluation and design charrettes in Seattle with a proposed light rail '(Ian, 2009). In spite of not being a full TOD concept, it guided as a pedestrian pocket as a simple cluster of planning related to housing, retails spaces as well as combining them within a quarter mile radius of a transit system (Kelbaugh, 1989).This idea turned into a formal planning strategy in the early 90'-s after the introduction of the concept and publication of "Transit Oriented Development" in his book named "The Next American Metropolis: Ecology, Community and the American Dream" (Calthorpe, 1993).

The first formal definition of TOD was from Peter Calthrope in 1993. He described TOD as a mixed-use community within an average 2000 ft or 10 minutes walking distance of a

transit stoppage with core commercial area. The considered distance was based on the maximum distance most people were willing to walk to a station and that's the radius within which residential and other land uses had a greater possibility of transit use. (Calthorpe, 1993).

Figure 1 Transit Oriented Development



Source: Based on Calthrope's illustration of TOD in Next American Metropolis, 1993

Another popular TOD theory came from Cervero with the identification of most significant variables linked with TOD and those were the features of built environment, including density, diversity and pedestrian friendly design (Cervero & Kockelman, 1997). These were further expanded to 5 D's with the extension of distance to transit and destination accessibility.(Ewing & Cervero, 2010).

Dittmar and Ohland (2004) argued that TOD cannot be defined by only physical form rather also for the necessity of functional integration of transit along with the surrounding development and synergy among all the available uses. "The New Transit Town" directs to a performance-based definition of TOD for achieving five major goals: locational efficiency, rich mix of choices, value capture, place making and resolution of the tension between node and place (Dittmar & Ohland, 2004).

3. Global discourse of TOD practice

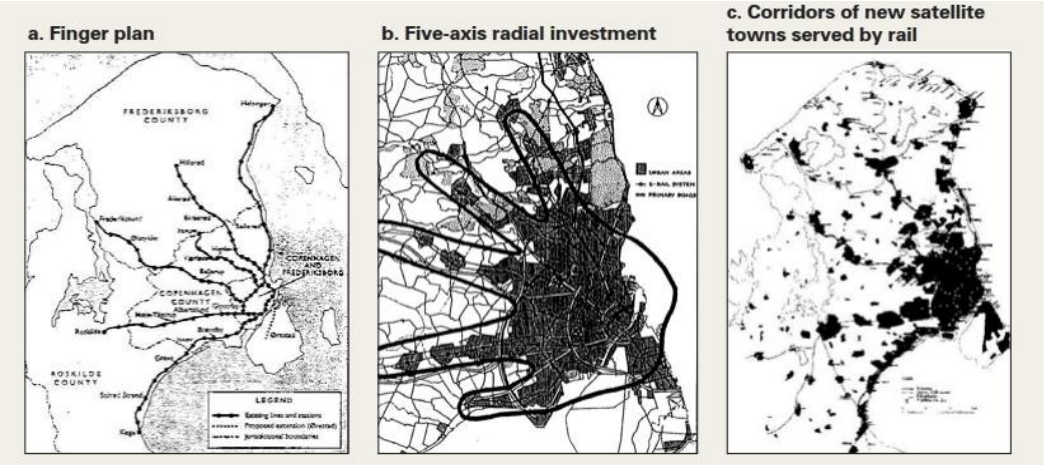
TOD is not a 'one size fit all' concept (Kamruzzaman, Baker, Washington, & Turrell, 2014). Considering the basic as same, different cities across the world adopted TOD in different form which results in varying planning and implementation strategies and tools.

3.1 Bike friendly TOD, Copenhagen

Copenhagen is well known for its renowned "Finger Plan" for shaping urban growth with long range planning visions and rail investments as well as bike friendly TOD. The main theme of their planning process was to control the overspill growth from urban centers by building rail infrastructure alongside with desired growth axes. Greenbelt wedges, open spaces and natural habitats were designated; and main infrastructures were shifted away from districts.

Evolution of Cpenhegen finger plan to a directed rail-investment program along with defined growth axes is shown in the following figure:

Figure 1: Evolution of Copenhagen's "transit first" plan



Source: Suzuki, Carvero and Luchi, 2014

Copenhagen executed their transit-oriented development with the construction of new rail "fingers" like completely separating the grades to one new town Orestad, that is situated in the southern part of the city center. It was a clear case of building first transit to guide development. Housing was built near open spaces and squares were placed to attract visitors by foot. Land value increased for implementation of new light rail line service investments like Cityringen, Orestad, Letbanen.

Copenhagen committed to become "The world's best city for bicycling" by following their master plan named "Eco-Metropolis, 2015" (City of Copenhagen, 2008). The main design principle was to make the periphery pedestrian friendly which accommodated almost 10,000 to 30,000 inhabitants as well as articulated with greeneries which connect neighborhoods, schools, retail centers, and pocket parks for attracting rail stops. They also designed one of the longest car free streets in Europe by serving 55,000 pedestrians in summer. At present, pub squares have developed with the inspiration of provisioning casual sitting and relaxing pedestrians rather than busy ones. A survey from 2002 on 15

suburban rail stations revealed that people walked for 38-100 percent of access trips up to 1 kilometer, in the cases of 1-2 kilometer trip, 40 percent of the access trips were conducted by cycling (Suzuki, Cervero, & Iuchi, 2013). In between 1990 and 2008, Copenhagen succeeded to reduce CO2 emissions per capita by 25 percent (City of Copenhagen 2010).

Denmark's national policy as well as local policies implies to make good faith efforts to encourage TOD by moderating car ownership and usage. Denmark increases different taxes and fees for enhancing the retail price of new car. For having only 250 motor vehicles per 1,000 inhabitants, Copenhagen's vehicular ratio is about half of Hamburg and Frankfurt. Copenhagen has been able to restrict parking near rail stops and continued a system of reserving lanes with single prioritization.

3.2 Green TOD of Stockholm

Stockholm is labeled with leading TOD in motorway age through master plans for new towns where rail stoppage is situated the town center. After exiting from the station, passengers can step in a car-free public square which is surrounded with commercial and community facilities. The square sometimes gets doubled for farmers to sell agricultural products or for street artists to perform as an open space(Suzuki et al., 2013).

Stockholm has followed the viewpoint of recognizing the place values of community rail station and the surrounding areas by treating TODs as "Places to be" instead of "Places to pass through" (Bertolini, 1999). Their transit-oriented development project focused on new inner-city transit line and designed with energy self-sufficiency and minimal waste which given them the name "Green TOD" (Cervero & Sullivan, 2011).

Stockholm planners made a balanced directional flow by establishing balance between employment and residences through long rail served axial corridors. Stockholm transit mode shares nearly twice in larger rail served in European cities like Berlin, London. This one of the few places where automobile appearance is decreasing. In between 1980-1990, Stockholm was the only city among 37 cities where 229 annual kilometers off travel per person had dropped (Kenworthy and Laube 1999). Through following this method, Stockholm has been able to reduce per capita CO2 emissions from transportation. This doesn't mean that Stockholm is "anti-car", they have comparatively high level of car ownership (555 cars per 1000 in habitants) (European Commission, 2012). Most of the people use public transport to go to work in this well-designed transit metropolis.

In TOD plan, taller buildings (mostly 6 to 8 stories) have been designated as cluster along transit spine by maintaining distance from rail-served corridor. City bus services are well designated with parks, walkways and green spaces with possible preservation of landscape. Area were designed with 25% parking space per dwelling unit (this rate has been raised in recent years although) (Cervero and Sullivan 2011). In Slussen area, revenue is also principal feature for inner-city land reclamation project which is called a tangled mass of highway overpass for becoming a pedestrian and transit-oriented city infill project.

3.3 Profit making TOD of Hong Kong SAR, China

Hong Kong SAR, China is among few areas of the world where the city is affluent with a variety of transit services like high-capacity railway network, surface-streer trams, ferries and variety of buses, minibuses. The city's main passenger rail operator, Mass Transit Railway Corporation (MTRC) merged with the former Kowloon-Canton Railway Corporation in 2007 by forming a 168- Kilometer network of high-capacity, grade-seperated services on the island of Hong Kong; the Kowloon peninsula; the Northern Territories and still expanding its transit route (Tang, Chiang, Baldwin, & Yeung, 2004). In 2000, over percent trips were by public transit from all motorized trips (Cervero & Murakami, 2009).

The responsible authority for rail operation in Hong Kong “MTRC” adopted “Rail+Property”, the (R+P) program (Cervero and Murakami 2009).R+P is one of the most suited examples anywhere; for capturing the transit value that makes the Hong Kong public transit that much profitable. (Tang, 2017; Tang et al., 2004).

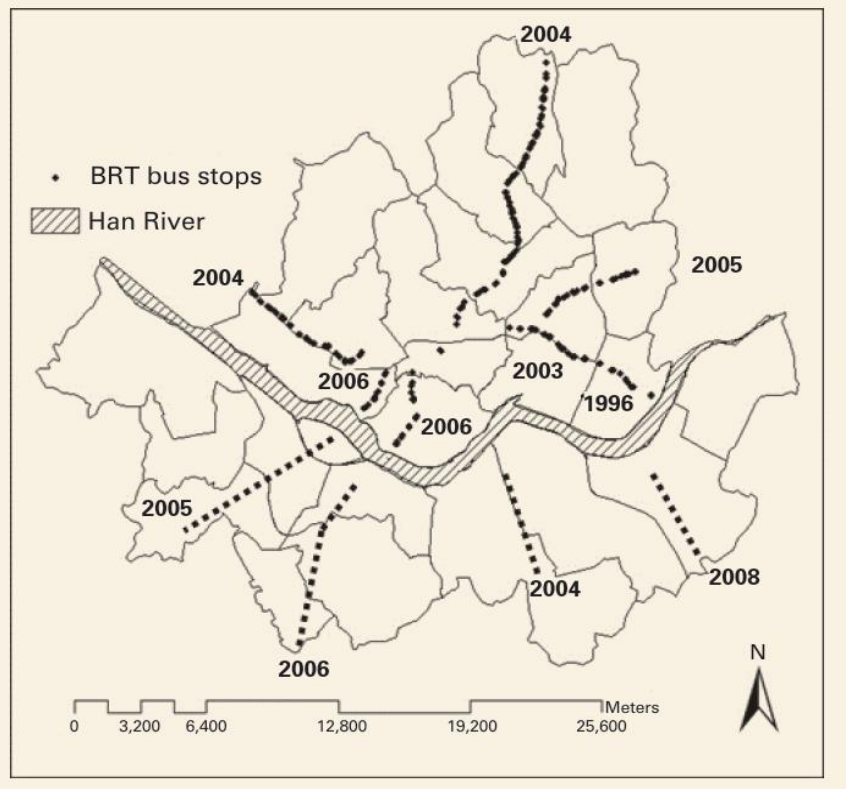
MTRC processes by purchasing the development rights from local government at a " before rail" price and then sells the rights to specific developer (among a list of qualified bidders) at " after rail" price. The difference in before and after rail service price is tangible that easily covers the railway investment costs. MTRC discusses a share of future property development profits or co-ownership from the highest bidder as well. (Tang, 2017; Tang et al., 2004). In this way, MTRC receives a "front end" payment for land and "back end" portion of revenues and properties in kind. Thus, the government receives notable financial return without giving any advance cash to MTRC. The whole expense of public transit investments, operational and maintenance cost are covered through fare supplementing and by other income sources (e.g.- sale of development rights, joint venture with private real estate developers and the operational retail outlets around subway stations) (Tang et al., 2004).

Most first-generation R+P projects were characterized with high rise apartments that brought pedestrians onto busy streets and made them using their own devices for finding subway entrance (Suzuki et al., 2013). Pedestrian friendly R+P projects not only capitalized the land prices but also contributed in sustainable urbanism and finance (Cervero & Murakami, 2009).

3.4 Seoul BRT oriented development and land reclamation

Like other countries. TOD has been introduced in Korea as significant key planning method to solve traffic congestion with the encouragement of high-density development in city areas (Sung & Oh, 2011). In earlier practices, TOD theory implementation focused more on railway-based development rather than bus services. However, locations near major railway stations also hold the potentiality for providing bus stops and terminals executions (Cervaro et al, 2004).

Seoul from South Korea is characterized with lack of land in central city with the presence of green belt (Jun and Hur, 2001). The biggest challenge for any planning initiative was the population density of Seoul (In 605 square kilometer area, 10.4 million population is staying over) (Sung and Oh, 2011). After several historical transitions of transportation system; In 2004, BRT got introduced in Korea in for reforming the city transport system after considering demonstration of diverse type of rail station areas as residential, employment and mixed use oriented. As the land use patterns were closely integrated with railway ridership and modal split at the rail station areas, few factors like density, diversity have to include as prime TOD planning concern in Seoul (Ko 2015; Sung et al, 2005; 2006).



Source: Cervero and Kang, 2011

With continuous expansion of BRT routes which resulted into 117.5 kilometers across 12 routes of 2014; this establishment inserted Seoul in sixth ranked largest number country with BRT comprising with a prominent number of local buses (7427), operating on 351 routes and 6087 bus stops in 2016 (Ko, 2015). In 2014, the modal share of bus transportation turned into 27% along with combined subway and railway share of 39% (Ko, 2015).BRT buses operate on regular mixed traffic lanes and carry more than six times as many passengers per hour (Seoul Development Institute, 2005).

The BRT corridors of Seoul influenced the property owners and developers for accessible land use diversity by linking BRT establishments with multifamily housing units, apartments and mixed-use projects (Cervero and Kang, 2011). Land market benefited with accessibility gains in higher density residential use. Within 300 meters of BRT stops, land price capitalized around 5-10 percent and for commercial zones, the impact level was almost 3-26 percent around 150 meters from the nearest BRT stop (Cervero & Kang, 2011).

3.5 Transforming from Car dependent to TOD based: Perth, Australia

Australia has embraced TOD in maximum metropolitan areas like Adelaide, Brisbane, Gold Coast, Melbourne, Sydney and Perth (Gleeson et al., 2004). Perth can be stated as one of the most contemplative initiatives shifting from car dependency to TOD development; where maximum metropolitan areas are within walking distance of rail stoppages that demonstrates the challenge of conversion from car dependency to public transport accessibility. After introducing TOD policy in 1988, it is being supported by National Charter on Integrated Land Use and Transport Planning (DOTARS, 2003). They enforced three different town planning model to direct the transition towards TOD. In traditional town planning process, state policy has been transformed into local policy and the implementation phase has been deployed on private sector. They suspended conventional town planning process in the redevelopment authority model and included the state as developer for operating quasi redevelopment agency model. Implementation of these models added further dimensions for transforming from car dependency to TOD based (Curtis, 2012).

Development Control Policy of 1988 stipulated densities of 'R40' (35 dwellings per hector). The same policy further added focus to enhance public transportation use in 1999 with addition of considering bus routes within residential subdivision (Curtis, 2012). In 2005 addition of development control policy aimed to support transit use and transit-oriented development. It determined minimum density of 25 dwelling in per hector area by keeping close proximity to rail stations and bus stoppage and defined 800 m distance for bus interchange and rail stations (Curtis, 2012). This policy amplifies to keep high density activities to close proximity of TOD like employment generating activities, leisure activities etc. The Western Australian Planning Commission (WAPC) designed transport network by ensuring the relationship with activity centers by following the theory "need to deal simultaneously with transport and urban development issues" (WAPC, 2004; Bertolini& Spit, 1998).

3.6 Tokyo Insight of TOD development

Two factors were responsible for the development of railway corridors in Tokyo: private railway operator along with local government. Tokyo Metropolitan Government (TMG) is responsible for developing railway corridors. TMG primarily focuses on grounding land use developments with proper facilitation as well as arranges several instruments. (Chorus,

2012). These elements are divided into planning and financial instrument and both of them are used in conjunction with each other.

The most significant characteristics of Tokeyo TOD is that the services are managed by private railway operators. They do control the feeder bus services nearby corridor station for providing "door to door" service in the buffer zone. Private railway operators belong surrounding land of railway tracks and utilize the land for construction of residential, commercial and other services. These activities of the private owners are highly diversified and stretching both the transport and land use domain.

The specified railway track named as 'The Toyoko Line' is 24 km long, consists of 21 stations and carry 1.36 million passengers in 29 minutes daily on an average. Now 60 percent of the daily number of passengers carried by this rail system is consisting commuters and 40 percent are from non-commuters (Tokyo Corporation, 2013). Highest densities are allocated in subcenters which are visible in Shibuya and Yokohoma station.

Within railway corridor, density levels differ considerably. There are several elements from this Tokyo approach which can be used to apply for the improvement of several station areas. They have restricted the whole system functionally between transport programs and station areas to prevent any competitive projects and strictly tend to focus the regulation of land use densities near station compounds. Initiative of incentives for triggering private sector investments along with land-use coordination have been possible for the significant role of regional governments for their functioning in sub regional level (Chorus, 2012).

3.7 Transit development success story of USA: Washington D C and Arlington

Washington D C shares one of the most successful transit-oriented development record. Being the capital of the United States, this 26 square mile county has observed notable addition in building activities since 1978. In 1980-1990s, 40 percent of the regions commercial and retail spaces were built within walking distance of a metro rail station (Cervero, et al, 2004). This coincided with a rapid growth of employment opportunities. Factors like height limit restriction along with mandatory rule of government office set up near rail station encouraged TOD development (Curtis et al, 2009).

The Washington Metropolitan Area Transit Authority (WMATA) is responsible as the individual regional transportation authority for design preparation, construction and operating rail transit and public bus services and been able to recapture values by joint development initiatives. They have been able to pursue value capture with the involvement of real estate department from the very beginning (Suzuki et al, 2013). WMATA positioned itself for executing remunerative joint development possibilities by

hiring seasonal real estate professionals. Since the administrative power of this value capturing project remains on the hand of transit agency, there remains potential for financing all rail investments. Though, the combination of building and operating transit services is executing with traditional mission by transit agencies, experts have suggested to reform the institutional set up to include entrepreneurial realms (Suzuki et al, 2013).

In the case of Arlington, more than 25 million square feet of office space, 4 million square feet of commercial and retail space, 25,000 mixed income dwelling units, and 6,500 hotel rooms have been built over the past three decades. Maximum of these growth have been delivered around metro rail stations. From 190000 living people in Arlington, 26 percent stays within metro rail existing corridor. This procedure has been succeeded to enhance the balance in between employment and housing growth that has produced balanced travel flows (Curtis et al, 2009)

The planners of Arlington County introduced different strategies like infrastructure movement, incentive zoning, development proffers to provide opportunities for shaping growth. These activities attracted private investments around stations and after this preparation of station area plans, they changed zoning classification on the basis of desired land use outcomes and density- sect back configurations. This county boasts highest transit use by making engage 39.3 percent residents nearby rail corridor commuting through public transit to work (Curtis et al, 2009).

3.8 TOD empowered by Travel Demand Management, Singapore

Singapore is well known for the successful integration of transit along with regional development by keeping balance in economic and environmental aspects in urbanized island of 5.1 million populations (Curtis et al, 2009).

Singapore applied Scandinavian planning formulas for connecting the radial corridors with central core. There is a master plan named “Constellation Plan “which protects greenbelts and connects with high capacity and performance-based rail system. Rail served settlement pattern has produced tremendous benefit along with dispersal of mixed land use corridors which met the spread travel demand evenly (Curtis et al, 2009). The progressive “transit first” policies complement the constellation plan by introducing three tier fiscal program for “getting the prices right”. The first tier of charges come from car ownership; with high registration fees and import duties in purchase of automobile as well as license clearing. Second tier charges for fuel tax and parking fees and covers the additional costs for scaling road capacity and maintenance. Third tier forces motorists to internalize the externalities during peak hours care use which fluctuate congestion level and reduces air pollution by charging and time delays (Curtis et al, 2009).

Singapore follows an off-peak vehicle licensing scheme which holds new provision and allows license to be used only morning and evening off peak periods on weekdays. However, with rising income, care ownership and motorization push up with increase in transit usage (Curtis et al, 2009). The gathered revenues from different tolls and charges go

to treasury and utilizes for expansion of transit services like sidewalk networks, civic squares, bus staging areas construction and improvement (Suzuki et al, 2013). Because of the well-built forms of TOD, travel times are lower using public transit than private cars. Among 8.9 million daily motorized trips, 4.5 million are conducted by rail or bus transit which has made an increase in length from 67 kilometers in 1990 to 138 kilometers in 2011 (Suzuki et al, 2013). Singapore's latest master plan from 2008 strategized on "making public transport a choice mode" and "managing road usage" for embracing TOD more (Suzuki et al, 2013).

4. Underpinning forces of emergences and comparison among planning practice

TOD is an old concept from 90s'(Ian, 2009). When talking about TOD, Calthrope has noted closely related features like pedestrian pockets, raditional Neighborhood Development, urban Villages, and compact communities (Calthorpe, 1993). Peter Calthorpe though himself as a reviver of TOD instead of the originator of ideas (Morris, 1991). The array of TOD literature reveals that the concept of TOD emergence in different context focusing on different urban challenges and implantation strategies were also differ because of their focus, shows in table 1. The same concept appeared in different form rather than a unique one.

Table 1: TOD emergence and planning differences over context

Global Examples	Period of emergences	Urbanization model challenged	Strategies adopted for TOD planning/ implementation	Stakeholders and financing
Copenhagen, Denmark	1950s	Functional de-concentration	▪ Adopted "Finger Plan" by building rail infrastructure alongside with desired growth axes. ▪ Initiated green belt wedges along with better provisioning for bicycle.	▪ The capital regional authority of Copenhagen is responsible for maintenance.
Stockholm, Sweden	1980s	Automobile (car) dependency and carbon emission	▪ Introduced "Green TOD" concept for urban regeneration. ▪ Recognized place value and focused on place making along with TOD. ▪ Integration of land use with TOD mechanism to all manners as parking, pedestrian for reducing carbon emission.	▪ Stockholm County Council with municipalities are engaged for administrating; implementation was conducted through the funding of Dennis package.
Hong Kong SAR, China	2000s	Managing urban congestion with density controlling	▪ Implementation of transit and property ownership with pricing through "R+P" program under the new town development concept. ▪ Financial return from value	▪ "MTRC Corporation", the railway operator companyowned by The Hong Kong special administrative region (HKSAR) is managing

Global Examples	Period of emergences	Urbanization model challenged	Strategies adopted for TOD planning/ implementation	Stakeholders and financing
			capturing and promotion of services like walkability, parking.	this TOD. ▪ MTR captures the land value increment created by "Rail+ Property" (R+P) model that generates a profit of $869 million in a financial year (2012) on average.
Seoul, South Korea	2000s	For minimizing sprawl and controlling density	▪ Focused on BRT rather than railway development. ▪ Ensured combination of bus and rail-based transit through pedestrian friendly greenway. ▪ Balanced appropriate land use diversity and controlling density.	▪ Seoul Metropolitan Government with support of the ministry of land, transport and maritime affairs were involved in construction.
Perth, Australia	1990s	Automobile dependency and nebulous city	▪ Shifted from car dependency to transit accessibility. ▪ Developed density control policy, kept high density activities near TOD. ▪ Incorporated commercial activities with TOD (bus and rail stations) for reducing congestion.	▪ The state authority of Perth and the ministry of planning, government of Western Australia was responsible for establishment and is engaged for governance till now.
Tokyo, Japan	1990s	Density control	▪ Administrated TOD by private sector by keeping a balance between transit and land use domain. ▪ Co-ordination of land use in national and regional level. ▪ Restricted functional program near stations.	▪ Tokyo metropolitan government and private railway companies are currently responsible for administrating through a market oriented approach.
Washington D C and Arlington, USA	2000s	Urban sprawl and excess congestion with automobile dependency	▪ Maintained height limit restrictions. ▪ Ensured zoning with balanced transit, housing and employment opportunity growth simultaneously.	▪ Regional government and transportation authority (county department of community planning, housing and development) are doing maintenance. ▪ Local government and transit agency were responsible for construction with an estimated budget of $104 million for first station project.

Global Examples	Period of emergences	Urbanization model challenged	Strategies adopted for TOD planning/ implementation	Stakeholders and financing
Singapore	1990s	Travel demand management and reduction of car dependency	▪ Connected the radial corridors with central core with "Constellation Plan" of three tiers. ▪ Progressed on "Transit first" policy with right pricing. ▪ Standard service provision surrounding roads and railway network.	▪ The government of Singapore, housing development board along with Singapore planning department ▪ The SMRT and land transport authority (LRT) have paid almost 1060 million USD for operation and maintenance.

Metropolitan areas in the United States adopt the concept of TOD as an attempt to regulate and manage the environmental and social impact that causes for dispersed growth pattern or to combat urban sprawl. The focus of European cities is much more to challenge nebulous city. Asia cities are more to challenge traffic management or land pressure.

5. Conclusion

Transit stations are usually act as prime focus and get developed for restricting car access along with dominating walking and cycling through transit. For redeveloping an existing neighborhood, focus is need to put on cultural heritage value. To achieve proper balance in the mix of residential, commercial and community uses, it is essential to respect the rights and expectations of existing residents.

TOD can fail for the lack of enough pedestrian and place making as people from different backgrounds like to visit in attractive locations for living. A detailed urban and landscape design, street furniture (practiced in European and US TODs) can amend several limitations (e.g.: incorrect parking formulas).

Though a few TODs had incompatible start and had to face hurdles for those limitations, it's being famous and lucrative for evolving the solutions of complexities. There are still huge challenges for establishing a compatible TOD, however the results as creating better living placing and environment are commendable.

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Addressing the Impacts of Tannery Wastes on Soil Condition of Tetuljhora and Hazratpur Union: A Management Perspective

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Abstract: Leather industry is a well-established industrial sector in Bangladesh. It is the second ranked industrial sector of the country in terms of export earnings. Due to its high growth, huge value addition and employment opportunities, leather sector has already been declared a thrust sector of the country. Almost every tannery industry uses huge quantity of chemicals within the full process of transforming raw animal hides into finished leather piece. A huge quantity of dissolved salt and chemicals are discharged into the Dhalweshari River and surrounding area from the Savar Tannery Industrial Estate. The toxic effluents and solid waste of the tanneries contaminate soil, air and the water of the adjacent Dhalweshari River and creates severe ailments to human health like eye diseases, skin irritations, kidney diseases and gastrointestinal issues. The government project to relocate the tanneries from Hazaribag is a contemporary initiative. But the relocation of tanneries in Tetuljhora and Hazratpur union has already caused negative impacts on agricultural lands and agricultural labor market. In long term, it may also causes severe damages to agricultural lands and species of Dhalweshari River. So, it is not desirable to save the Buriganga River at the cost of Dhalweshari River and the agricultural land of Tetuljhora union.

Introduction

Primarily in the 1970s leather industry was developed on a large-scale in Bangladesh as one of the largest economic sectors of the country. The government considers 'leather goods and footwear' as one of the fundamental development generators for the economy of the country. Leather industry of Bangladesh includes tanning and finishing, footwear and footwear components, leather accessories, leather goods for export purposes. Bangladesh has a long-established tanning industry that produces around 1.13% of the world`s leather from a local supply of raw materials. There are 220 tanneries, 3500 micro, small and medium enterprises, 2500 footwear making units and 90 large firms are related with leather sector (Leather Goods and Footwear Manufacturers and Exporters Association, 2018). The sector generates direct and indirect employment for about 850,000 people, 53% of the workforce are women in the leather products industries (Leather Goods and Footwear Manufacturers and Exporters Association, 2018). Bangladesh is the eight largest exporters of the leather products in the world (Dhaka Tribune, 2018). Bangladesh represents 3% share of leather and leather related products trade in the world worth USD 244 billion. About 95% of its annual output is being exported (Leather Goods and Footwear Manufacturers and Exporters Association, 2018). The compound annual export earnings crossed billion dollar mark in the year of 2013-2014. Table 1 shows the export earnings of tannery sector in Bangladesh since 2013-14 to 2017-18.

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Table 1: Tannery Industries in Export

Fiscal year	2013-14	2014-15	2015-16	2016-17	2017-18
Total Exports(in billion $)	1.12	1.13	1.16	1.23	1.08

Source: The Daily Prothom Alo, 2018

The tannery industry is one of the most polluting industrial sectors. The country's tannery industry uses around 40,000 tons of salt annually. Only 255kg of finished leather (grain and embossed split) is obtained for every 1000kg wet salted hides processed, i.e. just 25.5% of the raw material becomes finished leather. The factories use a combination of 40 different types of metal, acid and other compounds in the raw hide processing, 40 per cent of which is absorbed into the leather whilst the rest is discharged into surrounding water bodies (The Independent, 2018). This leads to extreme environmental degradation. Other hazardous toxins used in the production process include – Chromium (Cr), Sulphuric acid (H_2SO_4), Formic acid (CH_2O_2), Caustic soda (NaOH), Soda ash (Na_2CO_3), Arsenic (As), Sulphate (SO_4), Potash, etc. (The Independent, 2018).

According to Bangladesh Tanners Association, annually Bangladesh produces 300 million square feet of hide (Light Castle, 2017), where 64.82% cowhide, 2.25% buffalo hide and 1.2% sheepskin. Every year around 85 000 tons of raw material are processed in Bangladesh (Leather Goods and Footwear Manufacturers and Exporters Association, 2018). The estimated quantity of tanned and untanned waste from the processing of one ton of salted hides/skins according to various authors and Bangladeshi leather industries is shown in Table 2.

Table 2: Solid waste generated (kg) during processing of 1 ton hides and skins

Type of Solid Waste		Alexander	Buljan	Bangladesh	Quantity generated tons per annum
Untanned waste	Raw trimmings	120	100	100	8500
	Fleshings	70-230	300	250	21250
Tanned waste	Split	115	107	100	8500
	Shavings	100	99	100	8500
	Crust/finished cutting	32	25	30	2550

Source: Paul et al., 2013

Though the tanneries were moved from Hazaribagh of Dhaka to Savar with the sole purpose of saving the Buriganaga from being polluted by effluent, it appears that the same sad tale is being repeated with Dhalweshari River and surrounding areas becoming the current victim. Relocation of tanneries from Hazaribagh to Savar creates a lot of employment opportunities for the local people. The plan of relocating tanneries from Hazaribagh to Savar was very simple, to protect water bodies of Dhaka city from toxic contamination by establishing an ecologically sustainable tannery zone. It also changes the land price and land use of the surrounding areas. It have a large impacts on the socio-

economic condition of the area. But the same times tanneries of Savar have been causing various pollutions like water, air, soil etc. Approximately half a million inhabitants of Dhaka, the Bangladesh capital are at risk of genuine ailment due to chemical contamination from tanneries close to their residences (WHO, 2001). As the Central Effluent Treatment Plant (CETP) of the tannery estate is not functioned properly a huge quantity of dissolved salt are discharged into the Dhalweshari River from the Savar Tannery Estate which has adverse impact on the agricultural activities and water of the river. As a result, the agricultural lands of the surrounding areas of tannery estate are being contaminated, which not only reduce the crop production but also the produced crops in the polluted soil contain different harmful chemical elements create several dangerous diseases in human body. The capacity of the CETP is only 25000 m^3 tannery effluent per day but this tannery estate generates 28,000 m^3 tannery effluent per day, whereas all the industries are not starting their production in the tannery estate (The Daily Prothom Alo, 2018). So, the situation will be worse when all the industries will be functioned. In these circumstances, this study tries to examine the soil condition of the surrounding areas of Tannery Estate and identify its negative impacts. Finally this study tries to recommend some guidelines to control soil pollution at the surrounding areas of Tannery Estate and reduce its adverse effects as well.

Objectives and Methodology of the Study

The main aim of this study is to examine how issue of management and maintenance of the tannery estate pollutions can be brought under a well-developed planning scheme for long-term solution introduce some possible guidelines for better provision of tannery estate as well as improving the surrounding environment and the modern technology of tanning which has less impact on the environment. In this circumstance, the present research is intended to determine the present soil quality of the study area and it also tries to make a comparison of existing soil condition of the study area with previous condition. This study makes an attempt to address the impacts of tanneries on the soil condition of the study area. And finally this study comes up with some recommendations to reduce the negative impacts of the tanneries on soil condition of this area.

The study was carried out, in the relocated tannery industrial site at Tetuljhora and Hazratpur union, to know the adverse impact of tannery effluent on the surrounding agricultural area, soil condition and human health related to waste discharge. The study area was chosen deliberately to identify the soil pollution and health conditions of the tannery workers and residents. The research work is mainly based on primary data and laboratory test. Samples of soil were collected from the site of Tannery Estate and the surrounding agricultural land and tested in the laboratory of Soil Resource Development Institute (SRDI). 4 Focus Group Discussion was conducted in order to collect information from the local people of surrounding areas of Tannery Estate. The sessions' participants belong to a community whose voice are rarely heard and individuals who are engaged in agricultural activities, the representatives of Union Parishad, local NGO officials, local influential persons and others. There were 10-15 people present in every Focus Group Discussion. The secondary information was collected through surveying relevant literatures, such as published and unpublished materials such as annual reports of various organization, different books and journals, articles and newspapers relevant to tannery industry which are used for comparison of soil condition of the study area and the impact of hazardous chemicals on agricultural land and production.

A Short Description of the Tannery Estate

Before the Second World War in 1940, the renowned entrepreneur Ranada Prasad Shaha started the leather industry in Narayanganj. After 20 years, in 1960 it was moved to Hazaribagh from Narayanganj. The large-scale development of leather industry was started in Bangladesh from the 1970s. In June 2009 by the order of the High Court, and with help of Bangladesh Small and Cottage Industries Corporation (BSCIC), the tanneries were relocated from Hazaribagh to Hemayetpur in Savar on about 200 acres of land (The Daily Star, 2012). The relocated tannery industries located in Harindhara village under Telujhora union of Savar Upazila of Dhaka district between 23° 44' 00" N to 23°48' 00" N latitude and 90° 13' 01" to 90° 17'01" E longitude (Figure 1). The area is 20 km away from Dhaka City and 3 km far from the Hemayetpur area of the Dhaka Aricha Highway. The Dhalweshari River marked the western and southern boundary and the Karnatali River marked the northern boundary of the project. In the downstream the Dhalweshari River joins with the Buriganga River (Banglapedia, 2007).

Table 3: Savar Tannery Estate at a glance

Sector	Information
Tannery Area	200 acre
Total Plot	207
Tannery Industry	154
Starting Production	116
Under construction	38
Under Bangladesh Tanners Association	100
Under Bangladesh Finished Leather, Leather goods & Footwear Exporters' Association	54
Number of ETP	3
Number of CETP	1
Dumping Station	1
Effluent Discharge Point	5
Capacity of CETP	25000 m^3
Daily Effluent production	28000 m^3
Project Approved in ECNEC	August 18, 2003
Project started	July, 2005
Relocation Started	2008
Type of Plot (4 Types)	A type =26 (80000 square ft)
	B type =39 (40000 square ft)
	C type =114 (20000 square ft)
	D type =16 (15000-30000 square ft)
Project Cost	1079 crore taka

Source: The Daily Prothom Alo, 2018**;** Leather Goods and Footwear Manufacturers and Exporters Association, 2018; The Daily Star, 2012, Leather Tanning, 2018.

Fig. 1: Location of Tetuljhora Union
Source: Bangladesh Administrative Boundary, 2018

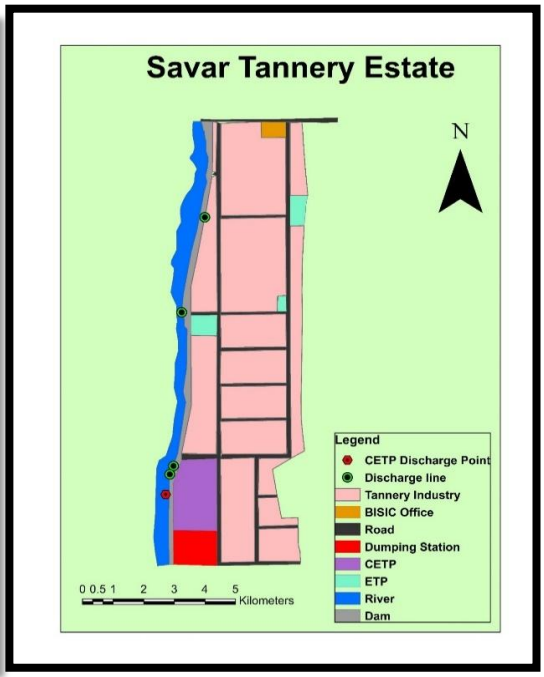

Fig. 2 Layout Plan of Savar Tannery Estate
Source: Buljan and Karl, 2018

Conceptualization: Industrial Soil Pollution, Lather Tanning and Lather Processing

The most of the tannery industries in Bangladesh follow the chrome tanning process, as this process is very simple in operation and less time consuming. The tanning process is almost completely a wet process that consumes significant amounts of water and produces around 90% of the used water as effluent (Chowdhury et al. 2013). Tannery effluents carry overwhelming contamination due to a massive presence of highly colored compounds, sodium chloride, ammonia, nitrate, sulphate, various organic and inorganic substances, toxic compounds, different types of tanning agents and other sludge which are alarming for the environment (Dargo and Ayalew, 2014). Presence of these components in the effluent affects human beings, agriculture and livestock.

Industrial Soil Pollution: Soil is a significant arrangement of the earthbound biological system. There is an immediate effect of contaminations on minerals, natural matter and microbial community of soil (Nagaraju, Sunil Kumar and Thejaswi, 2014). The discharge of industrial effluents particularly without treatment may have significant effect on physico-chemical and biological properties of soil related to soil fertility. Usually soil pollution occurs when chemical pollutants contaminate the soil or degraded by the industrial wastes. Contamination of soil is dominantly related to human activities directly or indirectly discharges destructive chemicals, substances, or objects into the soil in a way that causes damage to the land surface.

Leather Tanning and Leather Processing: Leather tanning is the process of converting raw hides or skins into leather and then it is then finished. Finally, the finished lather is used to manufacture a wide range of products. Leather tanning is a complex and lengthy

process. There's a lot of diversity in the various tanning processes and there are advantages and disadvantages to each of them. Despite the fact that automation has made it less work escalated, it actually comprises of a perplexing arrangement of treatments that require significant time and energy. The reason for the tanning interaction is to adjust the protein construction of the skin to increase its durability, texture, and appearance. All types of leathers have to go through four fundamental stages. This includes - preparatory steps; tan yard operation; re-tanning and finishing. Table 4 shows the detailed information of these four fundamental stages.

Table 4: Stages of leather tanning and leather processing

Stages	Sub Stages	Effluent	Solid waste
Preparatory steps	Receiving and storing hides, Trimming, Soaking and Washing, Fleshing, Unhairing	BOD, COD, SS, DS from soluble proteins, dung, blood, salts, org-N, AOX, emulsifiers, surfactants, biocides.	Parts of the raw hides, salt, fat, connective tissue, lime, hair, sludge from liming effluents.
Tanyard operation	Bating, Pickling, Tanning (Chrome ,Vegetable), Draining and Samming , Spliting, Shaving	BOD, COD, SS, DS, salt, low pH, fungicides, complexing agents, sulphides, NH4-N, calcium salts.	Hides , tanning liquors, wastewater treatment sludge, lime split (flesh-side),trimmings
Re-tanning	Retanning, Bleaching and Coloring, Fat liquoring (Chrome tanning), Setting Out, Drying	High color, organic solvents, dyeing agents, AOX, high oil, chlorinated organic compounds, surfactants.	Residues of chemicals dyeing agents
Finishing	Conditioning, Staking, Dry Milling, Buffing, Finishing and Plating	Finishing agents, organic solvents, heavy metals, auxiliaries	Dust, residues from chemicals, sludges from finishing agents.

Source: European Commission, 2003

Existing Soil Quality at the Surrounding Areas of Tannery Estate

Entire area of the tannery estate is an agricultural area and located under Mouja-Kandi Boilepur, Chandra Narayanpur, Char Narayanpur and Char Algi of Savar and Keraniganj Upazila of Dhaka District. Besides the agricultural lands there are a number of different industries around the tannery estate. These industries discharge untreated industrial wastes on the low and wetland of the surround area and in the Dhalweshari River. So the soil of this area is continuously polluted. Though in the layout plan there is provision of Central Effluent Treatment Plant (CETP) in the tannery estate, but still it is not functioning yet. So, like other industries of this area, the existing tannery industries also create pollution in this area. Table 5 shows the existing soil condition of the agricultural land and other areas surrounding the tannery estate.

Table 5: Soil quality at the surrounding areas and agricultural lands of Tannery Estate

Parameter of Soil	Standard	Soil quality of agricultural land surrounding Tannery Estate, 2018	Soil quality of surrounding Area of Tannery estate ,2018
Boron (µg/g)	0.451-0.6	0.46	8.59
Cadmium (ppm)	1-3	0.09	0.055
Chloride(ppm)	160	213	3621
Chromium (ppm)	1-75	137.52	629.18
Copper (µg/g)	0.451-0.6	5.88	6.82
EC (ds/m)	0.50-1.25	3.8	5.9
Iron (µg/g)	9.1-12	98.86	102.15
Lead (ppm)	60	21.90	11.20
Manganese(µg/g)	2.251- 3	31.08	34.65
Organic matter (%)	1-10	4.17	11.63
pH	6.6-7.3	7.2	5.9
Phosphorus (µg/g)	22.51-30	14.61	7.83
Potassium (meq/100g)	0.271-0.36	0.18	0.15
Sulphur (µg/g)	22.51-30	78.35	251.32
Total Nitrogen (%)	0.271-0.36	0.033	0.027
Zinc (µg/g)	0.226-0.30	3.45	5.62

Source: SRDI Standard (n.d), Laboratory test from SRDI, 2018

From the above table, it is observed that as compared with the standard level the presence of **Boron (B)** in the soil of surrounding areas of the Tannery Estate is very high, while it is within the standard level in the agricultural land. The presence of **Cadmium (Cd)** is found below the standard level both in the agricultural land and other areas surrounding the tannery estate. The concentration of **Chloride, Chromium (Cr), Copper (Cu), Electric Conductivity (EC), Iron (Fe), Manganese (Mn), Sulphur (S)** and **Zinc (Zn)** is found very high both in agricultural land and other areas surrounding the tannery estate. The concentration of **Lead (Pb)** and **Total Nitrogen (N)** is found within the optimum level as per the standard in both agricultural land and other areas surrounding the tannery estate. **Organic Matter** is in optimum level in the agricultural land, while it is very high in the other areas surrounding the tannery estate. **p^H** and **Phosphorus (P) i**s found in optimum level in the agricultural land, while it is below the standard level in other areas surrounding the tannery estate. **Potassium (K)** is found below the standard level both in the soil of agricultural land and other areas surrounding the tannery estate.

Comparison of Previous and Present Soil Quality at the Surrounding Areas of Tannery Estate

The concept of soil quality is developed to describe the effectiveness and health of soils. Soil quality includes soil fertility, potential productivity, contaminant levels and their

effects, resource sustainability and environmental quality (László, 2009). The tannery industries of tannery estate discharge a huge amount of untreated liquid and solid waste which contaminates the soil quality day by day. Pollution from tannery estate poses a huge risk to the ecosystem and surrounding soil. A comparative analysis of the existing soil quality of tannery estate and its surrounding agricultural land with 10 years previous data is shown in Table 6.

Table 6: Quality of soil parameters of surrounding areas and agricultural lands of tannery estate in 2008 and 2018

Parameter	**Surrounding Area of Tannery, 2008**	**Surrounding Area of Tannery, 2018**	**Change of Parameter from 2008 to 2018 (Surrounding Area of Tannery)**	**Surrounding Agricultural area of Tannery, 2008**	**Surrounding Agricultural area of Tannery, 2018**	**Change of Parameter from 2008 to 2018 (Surrounding Agricultural Area of Tannery)**
Boron (µg/g)	0.25	8.59	8.34	0.31	0.46	0.15
Cadmium (ppm)	0.11	0.055	-0.055	0.2	0.09	-0.11
Chromium (ppm)	9	629.18	620.18	22	137.52	115.52
Copper (µg/g)	7.60	6.82	-0.78	7.78	5.88	-1.9
EC (ds/m)	0.91	5.9	4.99	0.84	3.8	2.96
Iron (µg/g)	456.4	102.15	-354.25	514.2	98.86	-415.34
Manganese(µg/g)	84.4	34.65	-49.75	92.6	31.08	-61.52
Organic matter (%)	1.07	11.63	10.56	3.08	4.17	1.09
pH	7.0	5.9	-1.1	6.7	7.2	0.50
Phosphorus (µg/g)	20.21	7.83	-12.38	23.62	14.61	-9.01
Potassium (meq/100g)	0.23	0.15	-0.08	0.38	0.18	-0.20
Sulphur (µg/g)	20.06	251.32	231.26	42.58	78.35	35.77
Total Nitrogen (%)	0.054	0.027	-0.027	0.047	0.033	-0.014
Zinc (µg/g)	13.10	5.62	-7.48	17.27	3.45	-13.82

Source: Ahamed, 2008 and Laboratory test from SRDI, 2018

From the above table it is identified that, the presence of **Boron (B), Chromium (Cr), Electric Conductivity (EC), Sulphur (S)** and **Organic Matter** in the soil of surrounding areas of the tannery estate and agricultural land are increasing very rapidly. In both cases of surrounding areas of the tannery estate and agricultural land the change

of these parameter is very high within the time interval. So, it is clear that **Chromium (Cr), Sulphur (S)** and **Organic Matter** which is released during tanning and finishing operation are the pivotal reason for the degradation of the soil of the surrounding area. On the other hand, the presence of **Phosphorus (P), Potassium (K), Total Nitrogen (N) and p^H** in the soil of surrounding areas of the tannery estate and agricultural land has decreased over time which is below the standard level. The presence of **Cadmium (Cd), Copper (Cu), Iron (Fe), Manganese (Mn)** and **Zinc (Zn)** has also reduced in the soil of surrounding areas of the tannery estate and agricultural land which indicates the improvement of soil quality. Values of the parameters indicate that the soil quality of this locality was not good in 2008, while in 2018 the quality of soil becomes worse than previous time.

Effects of Polluted Soil in the Study Area

The pollutant of tannery wastes has created serious environmental pollution at surrounding areas of the tannery estate. Environmental component such as water, soil surface and air etc. are adversely affected by the tannery effluents. The soil productivity is adversely affected when tannery wastewater is applied on land and some parts of the land may become completely infertile. This effect is primarily attributable due to the presence of an excessive amount of salt in tannery wastewater. Some of the complex organic compounds, especially tanning are the other inhibitor agents present in the wastewater and pollute the soil in the vicinity. This section of the paper presents the adverse effects of polluted soil at surrounding areas of the tannery estate.

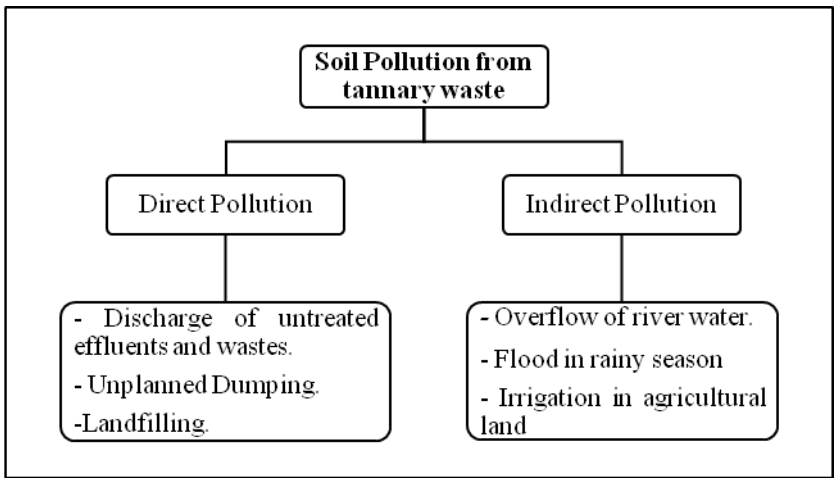

Figure 3: Soil Pollution pattern of Tannery Estate

Source: Developed by author, 2019

Effects on Plants: Tannery pollutants create a lot of problems to the crop production and the growth of plants. The major effects of the tannery pollutants on plants are shown in the following table.

Table 7: Effects of tannery pollutants on plants

Pollutants	Effects on plant
Boron	➢ Several problems to plant growth and production. ➢ Death of the shoot tip.
Cadmium	➢ Makes the food toxic and poisonous produced by plants.
Calcium	➢ Occurrence of chlorosis.
Chromium	➢ Restricts plant growth and metabolism process.
Copper	➢ Causes necrosis of the tip of the young leaves. ➢ Reclamation disease of cereals and leguminous plants
Electric Conductivity, High or low value of pH	➢ Restricts the plants to absorb rest of nutrition elements by roots from soil.
Magnesium	➢ Inter venial chlorosis of leaves.
Manganese	➢ Causes chlorotic and necrotic spots in inter venial areas of the leaf
Nitrogen	➢ Chlorosis of leaves.
Organic matter	➢ Reduces plants metabolism processes. ➢ Hampers crop production.
Phosphorus	➢ Premature leaf fall. ➢ Development of dead necrotic areas on leaves or fruits.
Sulphur	➢ Yellowing of the leaves.
Zinc	➢ Chlorosis of the older leaves

Source: Jain, 2000

Effects on Human Health: The pollution of tannery wastes is organic, inorganic and toxic in nature and required proper treatment before disposal to prevent physical, chemical and biological pollution of the receiving environment. When the tannery effluents disposed without any treatment, the receiving environmental components are become affected, directly or indirectly by this pollutant and create various health problem. Chemicals used in tannery like sulphuric acid, cromosol etc. are very harmful to human body. The untreated effluents from tannery, which contain unused chemicals, are dangerous for living around. From Focus Group Discussion it is found that almost 70% people suffer from various skin diseases, asthma or black coughing due tannery waste burning and dumping. Table 8 shows the effects of tannery wastes on human health.

Table 8: Health effects of various tannery pollutants

Pollutants	Health Effects
Salt dust, Hair, Soot	Causes Cancer, Respiratory and heart disease, Coughing and Throat and chest discomfort.
Hydrogen Sulphide	Unpleasant odor which creates nausea and Irritates eyes and throat.
Chromium	Affects skin and respiratory system and Causes cancer.
Ammonia, Nitrogen Oxides, Nitric Acid	Inflame upper respiratory passages, Respiratory and heart disease and Irritates lunges
Sulphuric Acid	Respiratory diseases, Impairs breathing and Irritates eyes and respiratory tract.

Source: Miller, 1982

Effects on Socio-Economic Condition: Due to the acquisition of 200 acres of agricultural land in Tetuljhora and Hazratpur union, a total of annual 4859 tons of crop production has already stopped. Since 2004 - 05 to 2007 - 08, there is a loss of 14577 metric tons in agricultural productivity in this locality (Ahamed, 2008). A huge number of people have become unemployed due to the acquisition of these lands. Besides that, the existing soil condition of the area is not good enough for cultivation. The untreated toxic tannery effluents will pollute the soul of Estate area and the surrounding areas. According to the Upazila Agricultural Extension Department (2015), present crop production rate of this area will be dropped out to 70 percent and if the trend of pollution is continued the soil will become totally non-fertile for crop production in near future. Agricultural workers are become unemployed due to damage of soil quality of agricultural land. From Focus Group Discussion it is found that 40% farmers completely change their occupation and 25% farmers engaged with tannery related works.

Reasons behind the Soil Pollution and its Associated Consequences in the Study Area

From general point of view the government policy to relocate tanneries of Hazaribagh to the Tannery Estate may be economically, socially and environmentally beneficial. It will generate the employment opportunities of approximately 100000 people (Leather Goods and Footwear Manufacturers and Exporters Association, 2018). But the process of improvement will not be so smooth due to the selected area, huge loss of jobs of the currently employed labors at the present sites and terms and conditions of the agreement among the owners of the tanneries and the government. If we try to evaluate the government policy of relocating tanneries from planning perspective, some policies be will seemed to be incomplete due to no specific direction. Some of the major drawbacks regarding the government policy of relocating tanneries at Tannery Estate from Hazaribagh are mentioned below:

- The government has taken an appreciable initiative to relocate the tanneries outside the Dhaka City to save the environment of highly densely populated area of Hazaribagh where the tannery industries are currently located and also save the River Burignaga from the industrial pollution. Nevertheless, there was a time schedule for the completion of different works of the project, such as land acquisition, plot development, provider of utility services, CETP construction, construction work of relocating tanneries etc. Accordingly the entire project work will have to be completed within June 2008. But at the middle of June 2018, still the development and construction works are going on. Most fascinating issue is that still now the construction and establishment work of some components of the project is not started at all. But 116 industries have already started their operation without have any treatment plant (The Daily Prothom Alo, 2018).
- There is no salt refining system in the Central Effluent Treatment Plant (CETP) which is the main problem for tannery effluent treatment. It needs more than 700 crore tk which is an additional expense. Besides there is no specific place for the chromium residual produces from the Central Effluent Treatment Plant (CETP) which contaminates the surrounding environment.

- Agricultural land becomes infertile and reduces the agricultural production. For this reason many people switched their occupation from agricultural activities to commercial activities.
- It attracts various real estate companies and the supporting industries as well which is the main cause of reducing the agricultural land.

Recommendations to Control Soil Pollution by the Tanneries and its Associated Impacts

The following guidelines from planning point of view should have to be implemented to solve the above address issues:

- It should have to be ensured that before starting the operation of all tanneries at the Tannery Estate, sludge dumping yard will be completed and the Central Effluent Treatment Plant (CETP) for proper treatment of the toxic and harmful tannery effluents. Modern technology can be used for the refining the salt of the effluent which reduces the amount of salt in the effluent up to 78% (Buljan and Kral, 2011). Fig. 4 shows the proposed Central Effluent Treatment Plant (CETP).
- Salt refining system must be installed in the Central Effluent Treatment Plant (CETP) which can reduce the pollution from the wastewater produces from the tannery.
- Green technology can be used for reducing the wastewater effluent. By this system a tannery can reuse the waste water and other chemicals which is more efficient and environment friendly.
- Regular monitoring system should be developed to restrict the indiscriminant discharge of waste into the Dhaleswhari River and on the agricultural land.
- Protection of the reducing agricultural land should be ensured with help of the "Land Use Policy, 2001".

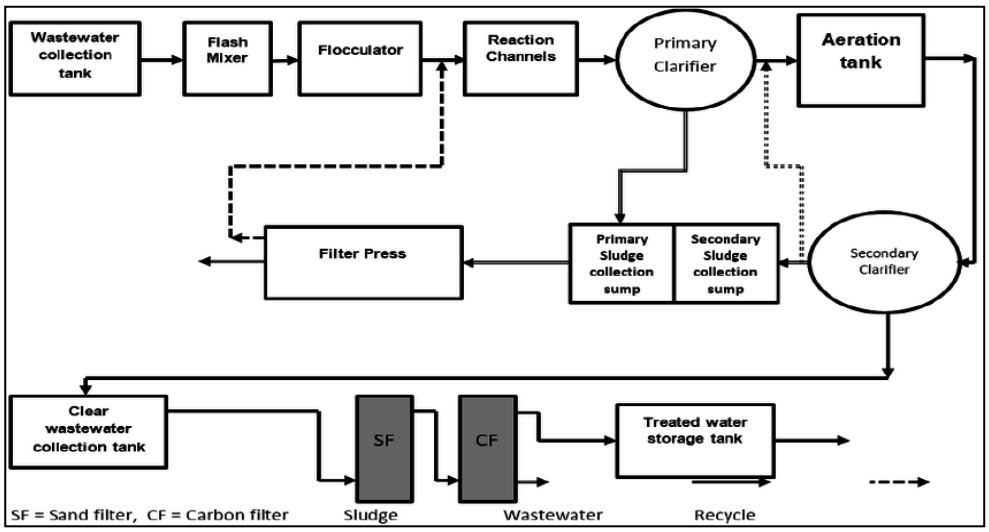

Figure 4: Schematic diagram of proposed Central Effluent Treatment Plant (CETP)

Source: World Bank Group, 2007

Conclusion

The government project to relocate the tanneries from Hazaribag is a contemporary initiative. But the government needs to be conscious about the externalities of the project. Because, the project of relocation of tanneries has already caused negative impacts on crop production and agricultural labor market at Hazratpur and Tetulihora union. It may also causes severe damages to agricultural land and species of Dhaleswari River. It not only creates the adverse environmental impacts, but also creates the socio-economic problems. So, it is not desirable to save the Buriganga River at the cost of Dhalweshari River and the agricultural land of the Hazratpur and Tetuljhora union. To make the project fruitful, environment friendly and economically vibrant for the country, it is the right time to address the existing and probable problems associated with the tannery estate and necessary corrective measures should be taken there on.

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Compensation Framework for Involuntary Slum Displacement: The Case of Khulna Railway Station Remodeling Project

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Abstract: Slum displacement without resettlement is a contentious issue in urban development in the Global South. Squatter displacement is an outcome of the city councils' increasing interests in land as assets and due to urban renewal projects' relatively easy scope for expansion in squatter areas. This paper accounts for the eight major losses due to slum displacement and proposes a compensation framework for slum displacement. Using the World Bank's pioneering operational manual on involuntary resettlement, in which project-affected populations are entitled to resettlement for eight major losses, this study analyzes the squatter displacement caused by the Khulna Railway Station Remodeling Project. The paper presents a qualitative study by employing a questionnaire survey among 120 displaced slum dwellers. The major findings of this study are as follows. First, resettlement of displaced slum dwellers are limited and is opted from a humanitarian perspective rather than a legal binding. Secondly, displacement of the slum dwellers has reduced their living standards from the pre-project level. Thirdly, considering the replacement costs, each squatter household is entitled to receive cash compensation of BDT 31,900 ($400 US). The study highlights the importance of incorporating slum resettlement policy in the official land acquisition and requisition policy of Bangladesh.

Keywords: Urban renewal, infrastructure; land acquisition, resettlement; Bangladesh.

1. Introduction

Squatter settlement formation has become a common feature of urbanization in the Global South. Squatter settlements are essentially slums without legal land tenure (Aldrich, 2016). In developing countries, more than 100,000 people are moving to slums/squatters every day(Norwegian Refugee Council-NRC, 2014). Slums and squatter settlements are an embodiment of poverty, informal employment and poor living condition, resulting from cities expanding beyond its social and economic, and planning or control capacity by relevant authorities.

The Census of Urban Slums (2005) suggests that about one-third of the total urban population of the six largest cities of Bangladesh are slum/squatter dwellers (UNICEF, 2010). Urban slum and squatter settlements in Bangladesh are routinely evicted for public and private purposes; a vivid description of slum and squatter eviction in Bangladesh is noted by Rahman (2001). Slum and squatter evictions take place for a variety of reasons, for example, city beautification and pressure from social elites. It is easy to evict squatters because of their illegal status, and their eviction without

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compensation for urban infrastructure development is a common practice in many countries including Bangladesh.

Development-induced displacement and resettlement (DIDR) is one of the most contentious issues in development worldwide. Cernea (2000) estimated that more than 10 million people were displaced per year due to development projects between 1980 and 2000 (McDonald-Wilmsen, 2008). Globally, there is a rising trend in number of displaced population by development projects. Recent statistics suggest that about 15 million people worldwide are forcefully displaced every year as a result of development projects (Terminski, 2013; Cernea and Mathur, 2008). The World Bank identifies eight major consequences of DIDR: landlessness, joblessness, homelessness, social disarticulation, marginalization, food insecurity, increased morbidity and mortality, reduced access to common properties and social services, and social disarticulation. It is evident that the distribution of the costs and benefits of large infrastructure projects is unequal (WB, 1990; Neef and Singer, 2015). The broad consensus among practitioners, scholars, NGOs and civil society is that poor and marginalized communities such as the slum and squatter communities are the biggest victims of DIDR (Neef and Singer, 2015; Somayaji and Talwar, 2011; Meher, 2009).

Bangladesh is an epicenter of DIDR owing to its high population density (Feldman and Geisler 2012, 973) and has a long history of squatter displacement and the associated efforts to resettle them. For example, Choguill (1993, 1988) noted several government initiatives to house squatters in resettlement camps. Rahman (2002, 2001) described chronological squatter evictions and problems with NGO housing in Dhaka city. However, despite more than three decades of NGO and civil society movements and donor agency interventions (Cernea, 2015), domestic practice of DIDR in developing countries like Bangladesh is subject to criticism.

The principal legal instrument governing land acquisition and requisition in Bangladesh is the Acquisition and Requisition of Immovable Property Ordinance II, 1982. According to this instrument, only land titleholders are compensated or resettled. Compensation and rehabilitation for squatter displacement is the social responsibility of the government because squatters are the poorest and most marginalized urban communities. The basic necessities of life are guaranteed by the constitution of Bangladesh (GoB, 2016), which means that squatter eviction without resettlement is a violation of the constitutional rights of the people of Bangladesh.

The objective of this research to account for the eight major losses due to squatter displacement and to propose a compensation framework applicable to Bangladesh. DIDR of squatters is rarely implemented unless the project is financed by international donor agencies with the condition of squatter resettlement. However, until now, there has been no detailed study that has estimated the costs of squatter resettlement. We propose a financial compensation framework for the case of a government infrastructure development-induced squatter eviction in Khulna City, Bangladesh. This package has two major components: (i) the replacement costs of a wide range of assets that are lost, made unusable or require restoration (i.e., housing); and (ii) the temporary and transitional costs involved in the resettlement and rehabilitation process (see also World Bank, 2002).

Compensation estimation is case specific and the compensation components are subject to modification depending on the contexts. Using the World Bank (1990) framework as a backbone for compensation estimation, this paper draws indicators from previous slum displacement and compensation mechanism applied in different previous projects in Bangladesh. Noticeably, these projects were funded by different international development organization i.e. ADB. Additionally, different consulting firms i.e. Sheltech Consultants (Pvt.) Ltd implemented infrastructure improvement and displacement projects. The compensation guidelines proposed by those projects are used as secondary resource for compensation cost estimation.

The paper is organized as follows. The second section theorizes slum and DIDR in the Global South. The third and fourth section highlights the gaps between the World Bank squatter compensation policies and practices in Bangladesh, respectively. The fifth section elaborates on the methodology. The sixth section presents the major findings followed by a discussion in the seventh section. The last section a few concluding remarks.

2. Theorizing Slum and DIDR

D'souza (1979) explains formation of slums from three different perspectives. First, the slums are one among many other types of urban land use, an element of the city's spatial structure. Secondly, slums are often located on marginal land of little commercial value, and between transitional land uses i.e. residential and commercial. Thirdly, different social groups tend to segregate themselves and enjoy a differential advantage of their spatial location. Thus, from the spatial perspective, placement of slums/squatters in urban settings is through a natural selection. Contrary to the urban spatial and ecological perspective, Lees (2014) suggest that mega gentrification by mega displacement is a common characteristic in the global south where city authorities increasingly perceive urban land as assets and are part of the 'new urban renewal' type development trend. As part of the neoliberal process, city authorities ventures in previously neglected areas such as slums/squatters.

In modern capitalist society, DIDR of squatters is the outcome of three major actors: the state, NGOs/civil society and squatter organizations. The state, which is beyond the "government" (Kim 2010), often adopts the reformist-managerial view. This view sees development projects as inevitable despite the displacement of people, and intends to minimize the negative consequences of displacement through resettlement (Fujikura and Nakayama, 2015; Dwivedi, 2002). Drawing from Offe and Keane (1984), Gough (1979) and Kim (2010, 136) suggest that the state performs two core functions. First, it supports the continuous development of a capitalist economy through accumulation. Second, it ensures the legitimacy of the state by promoting social policies, such as housing for all, and providing other social needs that are not guaranteed by the private sector. From the perspective of capital accumulation, the benefit of cheap labor outweighs the costs of population agglomeration (Siddiqui 2015; Gardner and Gerharz, 2013). States in most developing countries therefore encourage urbanization and have setups to pull people to large cities for better jobs and services. In contrast, the legitimacy functions force the state to tolerate slum and squatter settlements to ensure low-cost housing and maintain a

low wage level. Therefore, any DIDR of urban squatters is an outcome of the accumulation support and legitimacy functions of the state (Kim, 2010: 136).

In a neoliberal governance system, NGOs and civil society are considered to be the primary locus of democracy and civil rights. Studies have highlighted NGO involvement in housing and service provision to slum and squatter settlements along with their voices against eviction drives (see for example, Morshed and Asami, 2015; Rahman, 2002, 2001). In addition to constitutional commitment and NGO movements, international donor agencies also influence domestic civil rights through their financial instruments. For example, the World Bank's pioneering involuntary resettlement policy is a tool for universal civil rights. With the help of NGOs and international donor agencies, slum and squatter settlers organize themselves to negotiate the basic necessities of life with the public sector. They also maintain an informal connection with local leaders, service providers, musclemen and other actors (Banks 2008). Therefore, DIDR of squatters is an outcome of the interaction among the state, NGOs, international donor agencies and squatter organizations.

3. Resettlement Policy Gaps

The first resettlement policy explicitly protecting displaced people from the negative effects of DIDR was adopted by the World Bank in 1980. At that time, no other international development agencies had adopted such normative policy frameworks (World Bank, 2004). Most development agencies funded infrastructure projects, but neither assumed responsibility for nor financed the resettlement of forcefully displaced people. The World Bank's pioneering policy has become a "game changer" at the international level through ripple effects or an internationalization process over the last three decades (1980–2010). Other international development agencies, such as the Asian Development Bank (ADB) and the International Finance Corporation (IFC), have adopted their own set of policy guidelines, which are based on the World Bank's involuntary resettlement policy (Cernea, 2015; XVIII in Fujikura and Nakayama, 2015).

The World Bank's Operational Policy (OP 4.12 2c, revised April 2013) recommends that

> "displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher." Similarly, the objective of the ADB 2009 Safeguard Policy (statement 17) is "to improve the livelihoods of all displaced persons in real terms relative to pre-project level; and to improve the standard of living of the displaced poor and other vulnerable groups."

In the case of squatter eviction, the World Bank Operational Directive (OD) 4.30 recommends compensation for the lost assets of project-affected populations. However, the government or implementing agencies often have difficulty convincing donor agencies to compensate for squatter eviction because compensation implies the legal recognition of property rights. According to the OD 4.30, "adverse impact" is the primary consideration for compensation and rehabilitation assistance, which is equal to the replacement costs (or an equivalent amount) for lost assets. In addition to these replacement costs, rehabilitation of project-affected populations must include in-kind common services (e.g., water supply, electricity, schools, health care centers) and other measures acceptable to them (WB, 1990; RHD, Unknown).

Recent times, however, have seen a reversal of the initial policy stance on displacement by the major international donor agencies. For example, in the name of "updating", the World Bank has removed much of the essential content of the resettlement and safeguard policy (Cernea, 2015). Secondly, in the midst of worldwide financial turmoil, donor agencies are moving towards investment safe havens, for example, infrastructure investments. The world at large is moving towards the biggest investment boom in human history; global mega-project spending is anticipated to be between US $6 and $9 trillion annually (Cernea, 2015; Fujikura and Nakayama, 2015; Flyvjerg, 2014). With decreasing financial dependence on Washington institutions (Pieterse, 2012; Ramo, 2004), the 21st century signals a new era of multi-polar development with the rise of alternative donor countries like China and India. Competition among donor agencies is expected to "set off a race to the bottom" (INDR, 2014), leading to cutting short much of resettlement and safeguard policies. Finally, donor funds – for example, almost half of the World Bank's fund – are often channeled through other lending institutions for traditional investment, which narrows down the scope of safeguard policies (INDR 2014).

In contrast to the "internationalization process", the "internalization process" has been quite slow in responding to the needs of the disenfranchised and marginalized communities that result from DIDR. While most borrowing countries acknowledge the need for a domestic resettlement policy, they often decline to adopt such policies. However, owing to the disastrous displacement and impoverishment of disenfranchised populations in the absence of legal protection, and the physical and political resistance by the affected people, most Asian countries have moved forward in adopting domestic resettlement policies (Cernea, 2015, 2005; Fujikura and Nakayama, 2015, XVIII).

4. Squatter Resettlement Policy in Bangladesh

Governments in Bangladesh have often expropriated land for building bridges, roads and factories with the financial backing of international donor agencies (Gardner and Gerharz, 2013). In 1975, a UN Mission remarked that

> "...before any action is taken to resettle or remove squatters...steps [must] be taken with a view to developing a short-term strategy for dealing with the squatter problem" (cited in Morshed and Asami, 2015; Rahman, 2001, 58; Ullah, 1994).

Since the 1990s, hyper-development has been enabled by the state's neo-liberal policies and the close association between government officials and businesses is shaping the development pattern with far reaching consequences (Gardner and Gerharz, 2013). One of these is surely the slow adoption of resettlement and safeguard policies in official land acquisition and resettlement policy and practices.

In absence of a resettlement policy, the principal legal instrument governing land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property Ordinance (ARIPO) II, 1982. This ordinance allows compensation only to legal titleholders (MOL, 2010). In accordance with this ordinance, the cabinet of Bangladesh approved a draft Immovable Asset Acquisition and Requisition Bill (IAARB) on 3rd April, 2017. This bill postulates that if the government acquires land from any individual or private organization, compensation is to be three times the market price of the acquired land, including the displacement costs of other assets. At the same time, if any private organization acquires land, compensation to the affected persons is to be four

times the market price of the land, plus the replacement costs of other assets (The Independent, 2017).

As yet, no progress has been made in legally incorporating squatter resettlement into the IAARB. Similarly, donor-funded projects often blatantly ignore the existence of squatters in project areas. For example, ADB-funded Urban Governance and Infrastructure Improvement (UGIIP) projects for Kishoreganj and Muktagacha *Pourashavas* (second tier urban centers) mention that "there are no structures, encroachers/squatters and/or mobile vendors/hawkers along the proposed alignment and Right-of-Ways (ROWs)"(for Kishoreganj, see ADB, 2014a, 12 and for Muktagacha, see ADB, 2014b, 4) – the same statement is reported verbatim in two separate project documents. This also shows the donor's (ADB's) reluctance to enforce its own safeguard policies.

Unlike Bangladesh's legal system, the World Bank's operational policy does not bar compensation to project-affected populations in the absence of a legal land title (WB, 2004, 25). Squatters are entitled to

> "resettlement assistance in lieu of compensation for the land they occupy...if they occupy the project area prior to the date of the beginning of the census or prior to the date the project area was delineated, whichever date is earlier [OP 4.12, para. 16]."

The ADB's resettlement policy is crucial for Bangladesh because it provides technical assistance in strengthening the national rehabilitation and resettlement policy (Atahar, 2013). The ADB Safeguard Policy Statement also includes compensation and assistance to all displaced persons, including illegal dwellers and squatters (ADB, 2009). A comparison of the land acquisition policies in Bangladesh and those of international donor agencies (WB and ADB) is in Table 1.

Table 1: Comparison of resettlement policies

Issues		National Policies		International Policies	
		ARIPO 1982	IAARB 2017	WB Policy	ADB Policy
Eligibility for Compensation	People with land title	Entitled to compensation	Entitled to compensation	Entitled to compensation	Entitled to compensation
	People without land title	Not entitled to compensation	Not entitled to compensation	Entitled to compensation	Entitled to compensation
	Marginalized communities[1]	Not entitled to compensation	Not entitled to compensation	Special consideration for compensation and assistance	Special consideration for compensation and assistance
Types of Compensation	Replacement cost	Not entitled to compensation	Not entitled to compensation	Entitled to compensation [2]	Entitled to cash compensation
	Relocation assistance	Not entitled to compensation	Not entitled to compensation	Entitled to cash compensation	Entitled to cash compensation

Issues		National Policies		International Policies	
		ARIPO 1982	IAARB 2017	WB Policy	ADB Policy
	Income and livelihood restoration	Not entitled to compensation	Not entitled to compensation	Assistance in finding new job opportunities	Assistance in finding new job opportunities
	Access to common property resources	Religious properties cannot be acquired	If religious properties are acquired, they must be rebuilt	Provision of facilities at lowest cost	Access ensured by consulting with host community
	Loss of land	In-cash compensation	In-cash compensation	In-kind or in-cash compensation	In-cash or in-kind compensation
	Social capital recovery	None	None	Integration with host community	Integration with host community

Sources: Adapted from Picciotto 2013; ADB 2012, 2007; Cernea 1997

[1] Vulnerable households, indigenous groups, ethnic minorities and female-headed households

[2] In-cash allowance, construction materials, technical assistance, etc.

5. Methodology

5.1 Study area

Khulna is the third largest city in Bangladesh. An estimated 172,219 people live in slums and squatter settlements in the city (BBS, 2015). The number of people living in slums is increasing as a result of the rapid decline in public land, which is being cleared for various infrastructure projects (Angeles, Lance, Barden-OFallon, Islam, Mahbub, & Nazem, 2009). The Khulna Railway Station Remodeling Project – a public infrastructure development-induced displacement of squatters – is used as a case study.

Prime Minister Sheikh Hasina promised that the Awami League government would build a modern railway station in Khulna (The Financial Express, 2014). The upgraded railway station will improve the existing Dhaka–Khulna connection. It will also connect Khulna with the Monglaseaport and Kolkata, India (The Daily Observer, 2017). About 10 acres of land belonging to the Bangladesh Railway has been selected for the new railway station (The Daily Star, 2007).

In a preliminary field survey, there were about 300 squatter households, railway staff quarters and some shops on the 10 acres of land earmarked for the new railway station – all of these were cleared to acquire land for the railway. The evicted squatter settlers moved to different public land (squatter settlements) and private slums. The squatter settlers submitted an application for compensation to the Deputy Commissioner (DC) – the public authority responsible for land acquisition, displacement, compensation and rehabilitation. The DC temporarily relocated a few of the squatters to nearby railway land, *Bishghor Bosti* (Figure 1). The number and locations of the displaced squatter households are shown in Table 2.

Table 2: Location of displaced households in Khulna city

Squatter Description	Number	
Evicted households	About 300	
Living in *BishogohorBosti* (land given by DC)	88 households	120 households within Khulna City
Living beside railway line	23 households	
Living in '5 No. ghat' slum	9 households	
Other 180 households	Unknown	

Source: Field Survey, 2016

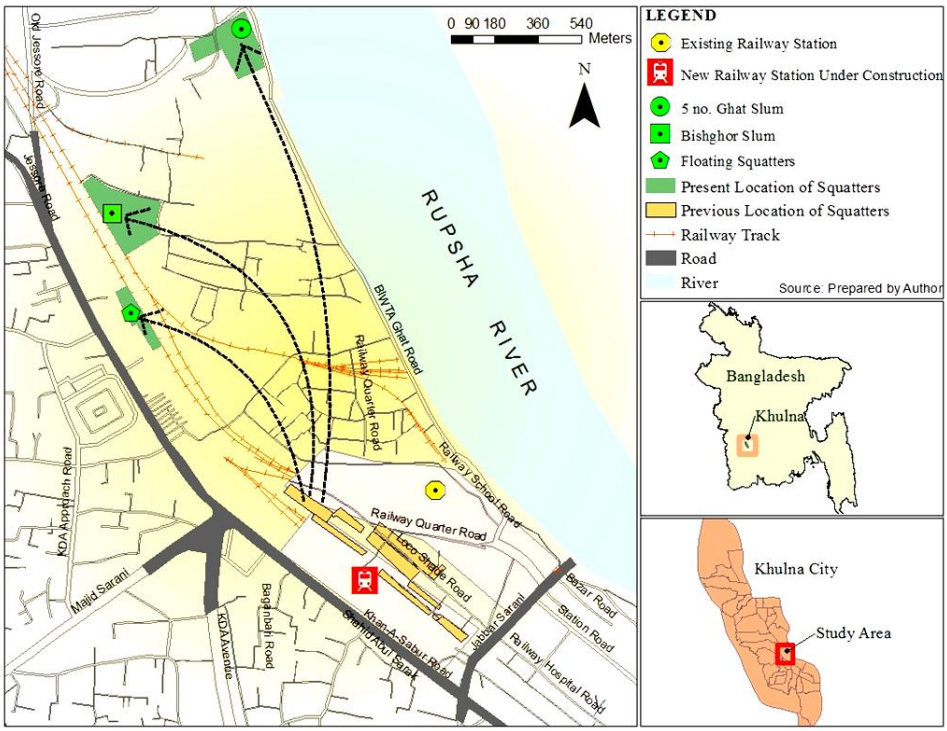

Figure 1: Location of the Railway Station and evicted slum households

5.2 Estimation of compensation costs

To estimate the compensation costs, the eight major consequences of DIDR noted by the World Bank (1990) were identified in a field survey. Secondary information on compensation cost estimation practices from different development-induced slum displacement and resettlements in Bangladesh are used to refine compensation component applicable to this particular context.

The losses and consequences of displacement, as well asan estimation of the replacement costs, are summarized in Table 3. An estimation of compensation for social losses is beyond the scope of this research.

Table 3: Consequences of displacement categorized under major losses

Type of Loss	*Variables*	*Compensation*	*Monetary Value*
1. Landlessness	Amount of land expropriated	-	N/A
	Value of land resources	-	
	Security of land tenure	-	
2. Joblessness	Difference between past and present income	√	Yes
	Loss due to taking time off from work during transition period	√	
	Change in occupational pattern	-	N/A
	Dependency on natural resources	-	
	Lack of skills	-	
3. Homelessness	Cost of buying construction materials	√	Yes
	Labor costs	√	
	Cost of transporting salvage materials	√	
	Cost of transporting household belongings	√	
	Transaction money for housing permission	√	
4. Marginalization	Integration with host community	-	N/A
	Downward social mobility	-	
	Loss of social status	-	
5. Food Insecurity	Nutrition required for normal growth and activity	√	Yes
6. Increased Morbidity and Mortality	Exposure to disease	-	N/A
	Psychological stress	-	
	Vulnerability of elderly groups	-	
7. Reduced Access to Common Properties and Social Services	Access to education	-	N/A
	Access to health care facilities	-	
	Access to safe water sources	-	
	Access to proper sanitation	-	
	Access to electricity	-	
	Access to religious facilities	-	
	Cost of drinking water	√	Yes
	Transport costs for going to school	√	
	Transport costs for going to the market	√	
	Transport costs for going to the hospital	√	
	Transport costs for going to the workplace	√	
8. Social Disarticulation	Loss of employment opportunities	-	N/A
	Loss of kinship and emotional attachment	-	
	Loss of cultural capital	-	
	Loss of security	-	

✓ Financial compensation to be paid
- Monetary value could not be estimated

Sources: Adapted from WB, 2013; ADB, 2012, 2007, 1998; DWASA, 2008

5.3 Data

Primary data were collected through a questionnaire survey and field observations. All of the evicted households found within Khulna City were taken as samples for the questionnaire survey (n=120). First, site visits in slums and squattersettlementsclose to the railway station were conducted to find the current locations of the evicted squatter settlers and a questionnaire was developed to identify the eight major consequences of the displacements. Thereafter, the snowball sampling technique was applied to identify the current locations of the evicted squatter households within Khulna City.

A pilot survey was conducted among four displaced households living in *BishghorBosti*. The final questionnaire was developed based on the pilot survey. The questionnaire survey was conducted by interviewing the household head or an elderly person in each household at their current location listed in Table 2. In-depth interviews were also conducted with representatives of the Khulna Development Authority (KDA) and DC office.

Information on development-induced slum displacement and resettlements were collected from project reports of World Bank, Asian Development Bank and consulting firms. To estimate the cost of compensation for the evicted squatters, we relied on guidelines and previous practice in various development projects funded by international donors. The standards of compensation and their sources are listed in Table 4. Additional secondary information was collected from newspaper articles and television reports to gain understanding on the intimate project working and day-to-day displacement and resettlement of the squatter settlers.

Table 4: Sources for compensation calculation guidelines

Type of Loss	**Compensation Types**	**Standard/Guideline**
Joblessness/Income loss	Transition allowance for 6 months	Resettlement Action Plan (RAP) of a World Bank-funded Dhaka Water and Sanitation Authority (DWASA)drainage channel development project, 2008.
Reduced Access to Common Properties and Social Services	Transport allowance for 1 month (for going to the market, the work place, the hospital and school)	
Homelessness/Loss of Shelter	One-time shifting allowance/replacement cost	Involuntary Resettlement Safeguard of the ADB, 2012
Food Insecurity	Food assistance for 3 days during transfer period	ADB-funded river environment management project in the Philippines, 2008
Special Consideration for Vulnerable (Female-headed and Hardcore Poor) Households	One-time cash payment	Resettlement Action Plan (RAP) for the Dhaka–Chittagong National Highway No.1 Bridge construction project, 2012.

Sources: ADB, 2012, 2008; MOC, 2012; DWASA, 2008

6. Major findings Discussion

6.1 Squatter displacement

The DC gave a piece of railway (public) land close to the railway station to the resttlers where another squatter settlement already exists. In total, 88 of the 300 households on the land earmarked for the new railway station have moved to *BishghorBosti*. The rest of the surveyed squatter settlers (n=120) have moved to different temporary locations and slums. *BishghorBosti* is only a temporary solution for the resettled squatters because the land belongs to the Bangladesh Railway, and is thus another squatter settlement. Therefore, it is possible that the resettlers will be evicted again for a future extension of the railway station. The state applied a dispersing strategy by not resettling the evicted squatters in one place. Out of the 300 households, only 88 were resettled in *BishghorBosti*; the remaining evicted households had to find shelter on their own.

6.2 Housing and services at the relocation site

On average, the plot size per household at the relocation site is 3.65 × 3.2 m. The *BishghorBosti* area is essentially a water body (Figures 2), which means that the resettlers had to erect housing floors with bamboo posts. They mostly used materials salvaged from their previous houses or cheap/temporary materials to build their present houses.

Figure 2: Land of *BishghorBosti*

Water logging during the rainy season is a major problem because this season lasts for at least 4 months. There is no water source nearby for drinking and washing purposes, which means that the *Bishghor Bosti*residents have to collect drinking water from a tube well about 1.5 km away. They use the severely polluted and unhygienic water from the local water bodies for washing and day-to-day purposes. In addition, there is no drainage or sanitation facility in *BishghorBosti*. Community life, social safety, economic opportunities and access to social services have also been severely disrupted by the displacement. In their previous location, the squatters had developed a convenient system for obtaining the minimum urban services, such as a water supply, sanitation and electricity, through NGOs and informal means.

6.3 Compensation estimation

The World Bank's OD 4.30 states that squatters without a legal title are entitled to rehabilitation assistance instead of compensation, which is *"the equivalent, at minimum, of full replacement cost for lost assets"* (WB, 1990). To calculate the minimum cost for lost assets and rehabilitation assistance, we have considered four major economic consequences of displacement: joblessness/loss of income, homelessness/loss of shelter, food insecurity and reduced access to common properties and infrastructures.

Table 3 outlines the major consequences of eviction and the possibility of monetary assistance. Table 5 estimates the costs for the relocated squatters. Because there are no uniform guidelines for estimating replacement costs, we have used various project guidelines from donor-supported development projects. The replacement costs are calculated with the assumption that all (n=120) resettlers within Khulna city have resettled in *BishghorBosti*.

Table 5: Compensation for squatter resettlement

Type of loss	Compensation/household	Total/household
Homelessness/Loss of Shelter	All affected squatters will be entitled to compensation in cash for affected structures/shelter. - Shifting Allowance/one-time replacement cost[1]: o (for buying construction materials BDT 4700)[6] o (for labor costs BDT 1750) o (for transport of household belongings BDT 380) o (for transport of salvage materials BDT 470)	BDT 7,300
Joblessness/ Loss of Income or Wages	- All affected squatters will be entitled to: o Transition allowance for the permanent loss of income/wages for a period of 6 months (BDT 2600/ month)[2] o In the case of temporary (average 15 days) loss of income/wages immediately after shifting for taking time off work (BDT 185/ day) [3] o For 57 vulnerable households (Female-headed households/hardcore poor): one-timepayment of 1 month's average income (BDT 4500/household)[4]	BDT 22,875
Food Insecurity	- All affected squatters will be entitled to: o Food assistance during the transfer period for 3 days (BDT 150/day) [5]	BDT 450
Reduced Access to Common Properties and Infrastructures	All affected squatters will be entitled to transport allowances required for access to common facilities during the transition period for 1 month [2] o (for going to the market BDT 350/month) o (for going to school BDT 300/month) o (for going to the hospital BDT 325/month) o (for going to the work place BDT 300/month)	BDT 1,275
Total Compensation/household		**BDT 31,900**
Compensation for 120 households		**BDT 3,828,000**

(Source: Field Survey, 2016)

[1] In the Involuntary Resettlement Safeguard of the ADB (2012), there is provision for a one-time 'shifting allowance' for squatters.

[2] For a World Bank-funded DWASA drainage channel development project, a resettlement action plan (RAP) was prepared in 2008 by Design Planning & Management Consultants Ltd. &Sheltech Consultants (Pvt.) Ltd. This RAP is followed for the calculation of compensation in this study. They calculated a 'transition allowance' for income loss for 6 months and a 'transport allowance' for 1 month.

[3]Based on the questionnaire survey, the average time taken off from work by the affected people was 15 days.

[4] For the Dhaka–Chittagong National Highway No.1 Bridge construction project, 2012, a Resettlement Action Plan (RAP) was prepared on behalf of the Ministry of Roads and Highway Department (RHD) by Oriental Consultants Co. Ltd. and Katahira& Engineers International. They calculated a one-time compensation for vulnerable households.

[5] A resettlement plan was prepared in 2008 in an ADB-supported project in the Philippines regarding river environment management. A food allowance was calculated for the resettlers for 3 days during the transfer from one place to another.

[6] 1 USD = 81 BDT (Bangladesh Taka) in 2016

The occupations of the displaced squatters have not changed significantly because the resettlement site is near to the original squatter settlement. The income of the resettlers has therefore not changed significantly; however, the replacement costs for housing are considerable. Our estimated cost for each household is 31,900 BDT (approx. $400 USD), which totals 3,828,000 BDT for all of the resettled squatters (n=120). In addition to the estimated replacement costs, we suggest that government bodies are responsible for in-kind provision of acceptable basic urban services and facilities (e.g., water supply, sanitation, electricity, health care centers) that is mentioned in the in the OD 4.30 (WB, 1990). The OD 4.30 also recommends that entitlement packages are to be culturally acceptable. We do not see any cultural conflict in providing cash assistance to evicted squatters in the Bangladesh context.

7. Discussion

In line with the argument of D'souza (1979) that slums locate in marginal land of little financial significance, the displaced railway slum area had a marginal use because of being public property. The remodelling and expansion of Khulna railway station is the primary reason for the displacement. However, the remodelling of the station needs to be understood from a regional economic perspective. As part of the government investment in rejuvenating the economy of the south-western region, remodelling of the Khulna railway station is a part of other mega-projects, i.e., Padma Multi-purpose Bridge, Mongla port, Rampal power plant, and rail connection to Kolkata, India. Khulna is expected to be a regional hub for economic development and transportation network. In reference to argument of Lees (2014), the slum displacement of is part of the 'new urban renewal' type as Khulna used to be an industrial city that requires significant remodelling and renewal to attract global capital.

In reference to Offe & Keane (1984) and Gough (1979), here, the state definitely plays the legitimacy function by resettling the squatters. When asked about compensation for squatter displacement, one representative of the DC office said that there was no such provision in Bangladesh law. However, if there is no provision for squatter compensation, why did the DC relocate the squatters to *BishghorBosti*? The response was:

> "These people are poor and have nowhere to go. Out of kindness, the DC has given a public land on a temporary basis. It is somehow our moral responsibility to ensure housing for all."

From the above statements, it is quite clear that the right to housing and the resettlement of displaced people have become ambiguous moral responsibilities, rather than a binding obligation of the state.

The resettlers did not pay any transaction fees for the land they are living on in *BishghorBosti*. The responsibility for allocating land among the resettlers was given to the local ward commissioner. Settlers with good connections to local leaders, musclemen and ward commissioners managed to gain access to the new location. Therefore, our study confirms the findings of Banks (2008) and emphasizes that the poor's informal connections with local decision makers are important factors in winning a space in the city. However, contrary to the findings of Hossain (2012, 2006), the squatters could not use their voting rights as collateral for resettlement. In addition, the squatters could not mobilize themselves as a power block against the eviction. One possible reason for not being able to ensure resettlement for all may be the small number of squatters – 300 households hardly makes a difference in the city's political geography.

NGOs and civil society organizations have been key players in protesting against squatter displacement. However, in this case, we did not find any organization or entity protesting in favor of the evicted squatters. Similarly, we did not find a single newspaper or television report mentioning the resettlement needs of the evicted squatter households. One possible explanation for such an inactive stance by NGOs, civil society and the media is probably the small number of squatter households, unlike in previous large evictions, such as that of the *KorailBosti* in Dhaka (see BRAC, 2012; The Guardian, 2012). A second explanation is that NGOs and civil society activities tend to pivot around cases in Dhaka, and rarely operate in other regions. Therefore, squatter settlement size and location are important criteria for NGO and civil society movements against squatter eviction.

When resettling, this system, which had been developed over a long time, was severed. Additionally, consultation with the host community is the cornerstone of any successful resettlement (WB, 1990). However, no consultation with the host community has taken place because the host community is also without tenure security, and is thus without any power to negotiate with the authorities. The affected population includes both the resettled and the host squatters, and the World Bank (1990) OD 4.30 recommends

> "*to improve, or at minimum to reestablish, incomes and living standards of those directly and adversely affected by formal land acquisition".*

Here, the living standard of both the resettlers and the host community has deteriorated.

8. Conclusion

This paper presents a case of squatter displacement and its consequences in light of the World Bank guidelines on displacement and resettlement in Khulna City, Bangladesh. With rapid urbanization, (infrastructure) development-induced squatter displacement is a contentious urban issue.

Several concluding statements can be made from this study. First, the state is making an educated balance between the accumulation and legitimacy functions, as mentioned by Offe and Keane (1984), Gough (1979) and Kim (2010, 136). Similarly to the findings of Kim (2010), the state favors the accumulation function over the legitimacy function. Second, the World Bank's pioneering resettlement policy, which is followed by other donor agencies (e.g., ADB and IFC), is an effort to enhance the legitimacy function of the state. While the "internationalization" process has gained significant momentum in the last three decades, the "internalization" process is quite slow in responding to the needs of disenfranchised people. The Bangladesh experience suggests that the "internalization" process of resettlement policies has indeed moved in the opposite direction by making land acquisition and displacement a simple process for both government and private agencies. Third, the urban poor use informal connections with local leaders and decision makers to gain access to basic housing and services. NGOs and civil society organizations have been the key to mobilizing squatters against displacement and for the provision of basic services, for example, water and sanitation. However, squatter mobilization by NGOs and civil society organizations is limited to large slums and squatter settlements, mostly in capital cities, such as Dhaka. Fourth, the displacement and resettlement of squatters fails to restore or improve the living conditions of the affected people to pre-project levels. Finally, considering that basic service provision in squatter settlements is the responsibility of the government, we estimate the replacement assistance costs to be 31,900 BDT per squatter household in Bangladesh.

In conclusion, with the increasing number and size of public infrastructure projects, urban space for squatters is shrinking. Although squatter resettlement is considered the government's social responsibility, it is difficult to ensure this responsibility without any legal protection. Therefore, measures relating to squatter resettlement should be included in national land acquisition and requisition policy. The compensation matrix proposed in this research may be used as an initial template for the estimation of squatter replacement costs. However, a more systematic comparison of national and international experiences is needed to develop a compensation framework with wider application.

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Health Facilities in Urban Areas: Planning Standards and Practices from Global and National Perspectives

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Abstract : Proper planning for health facilities in urban areas is very important for ensuring proper health and wellbeing of people. Hence designing proper planning standards for various types of health facility is important for health facility planning of a city. Health services can be of various types, likely primary health care and secondary health care or hospital and clinic facilities and development of proper standards for various types of health facilities always poses challenges for planners, practitioners and policy makers. Therefore proper understanding of health facility standards followed in various cities and countries around the world is quite important for development of planning standards for health facility in Bangladesh. This paper primarily focuses on health facility standards followed in various cities and countries in the world as well as health facility standards adopted in various plans and projects in Bangladesh. Based on the findings of this study, this paper also recommends health facility standards for urban areas in planning contexts of Bangladesh.

Keywords: Health Facility, Clinic, Hospital, Planning Standard, Primary Health Care

1. Introduction

Health facility planning is very significant for city planning due to its importance on ensuring proper health and wellbeing of people at urban areas. Hence designing proper planning standards for various types of health facility is important for health facility planning of a city. Cities have the opportunity to safeguard and develop the health and welfare of communities, through encouraging healthy lifestyles and ensuring proper access to health facilities while providing communities with a range of choices regarding healthcare services (City of London, 2009). Health services can be of various types, likely primary health care and secondary health care or hospital and clinic facilities (MRSCW, 1994).

Development of proper standards for various types of health facilities always poses challenges for planners, practitioners and policy makers. National Health Policy' 2011 of Bangladesh aims to develop a system to ensure easy and continued availability of health services across all people and communities as well as to provide necessary basic medical utilities within reach of people of all cross sections of communities (MOHFW, 2011). However, Bangladesh, being a developing country, faces the challenges of providing proper health facilities adequately and with appropriate quality to its various levels of urban dwellers as well.

Different cities and countries have adopted various standards for planning and designing their health facilities considering their own contexts. It is explicable that searching for a common standard for health facilities is not a right choice for planners and practitioners while designing their particular cities. However, proper understanding of health facility standards followed in various cities and countries around the world is quite important for development of planning standards for health facility in Bangladesh. This paper primarily focuses on health facility standards followed in various cities and countries in

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the world as well as health facility standards adopted in various plans and projects in Bangladesh. Based on the findings of this study, this paper also recommends health facility standards for urban areas in planning contexts of Bangladesh.

2. Methodology of the Study

This paper is primarily based on secondary sources and desk research on the readily available data have been conducted for a better understanding of the planning standards for health facilities across various cities and countries around the world. Planning standards and provisions regarding health facilities at urban areas in Bangladesh have been explored in respective master plans, structure plans or any other relevant plans.

In order to get an overall picture of planning standards and provisions of health facilities in urban areas of Bangladesh, various categories of urban areas have been selected for this study to represent each category of urban areas. Moreover, study areas are purposively selected across various regions of Bangladesh for proper representation of various types of urban areas in Bangladesh.

Six major Metropolitan Cities of Bangladesh have been selected as well as four 'A' Category, Three 'B' Category and Three 'C' Category Paurashavas[1] have been selected for analysis of health facility provisions at different categories of urban areas in Bangladesh.

Table 1: Urban Areas Selected for the Study

Metropolitan City	**Paurashava / Municipality**		
	A Category	**B Category**	**C Category**
Dhaka, Chittagong	Savar (Dhaka)	Daudkandi (Comilla)	Nageswari (Kurigram)
Rajshahi, Khulna	Jhenaidah, Gopalgonj	Bajitpur (Kishoreganj)	Kasba (Brahmanbaria)
Barishal, Sylhet	Bhairob (Kishoreganj)	Pirganj (Thakurgaon)	Melandaha (Jamalpur)

Based on the findings regarding health facility standard and provisions from international and national practices, planning standards have been proposed for various types of health facilities for urban areas in Bangladesh.

3. Types of Health Facilities in Urban Areas

3.1 Health Facility Types: Examples from Foreign Countries

Health is defined as Primary healthcare and Secondary healthcare in UK (City of London, 2009). Primary healthcare is defined as the provision of general practitioners. Secondary healthcare is defined as a combination of:

- Acute healthcare provision, covering intense elective and non-elective in patients and intense day case
- Mental healthcare provision, covering mental health
- Intermediate healthcare arrangement which is considered to incorporate those administrations that don't require the resources of an acute general hospital, but are past the scope of conventional primary care.

[1] Paurashavas that have prepared master plans for their respective municipalities have been considered for this study.

Essential healthcare is characterized as the arrangement of common professionals. Auxiliary healthcare is characterized as a combination of: Acute healthcare arrangement, covering intense elective and non-elective in patients and intense day case Mental healthcare arrangement, covering mental health Intermediate healthcare arrangement which is considered to incorporate those administrations that don't require the assets of an intense common healing center, but are past the scope of conventional essential care.

According to Local Plan Manual (2002) for Putrajaya City of Malaysia, health services within the local plan area are categorized in two tiers as Clinic Facility and Hospital Facility. The health clinic is to provide an adequate health service within neighborhood. Clinic should comprise the following elements such as – out-patient clinic, diagnosis and treatment department, medical support services department and non-medical support services department (Putrajaya Local Plan, 2002). The hospital is considered to be a 'Centre of Excellence' in health services in Malaysia. It is estimated that the hospital generally caters about 140,000 outpatients and 35,000 inpatient services.

Hospital facilities have been recommended for mainly 3 levels in South Africa, such as – Tertiary Hospital, Regional Hospital and District Hospital. In addition Standards have been provided for Specialist Hospital, Community Health Centre, Primary Health Clinic and Public Clinic Prototypes (CSIR, 2011).

Table 2: Standard for 'Community Health Center' in South Africa

Factors	**Standard**
Population Threshold Range	60,000 – 1,40,000 people
Access Distance	90% of population served within 5 km
Site Size	1.5 ha minimum

Source: CSIR, 2011

Community Health Center in South Africa is open 24 hours a day, 7 days a week, offering a broad range of primary health care services including observation beds, accident and emergency services, midwifery services, but not surgery under general anesthesia (Table 2). Primary Health Clinic in South Africa is a permanent facility that may be government or private at which a range of primary health care services are delivered for at least 8 hours per day and 4 days per week (Table 3).

Table 3: Standard for 'Primary Health Clinic' in South Africa

Factors	**Standard**
Population Threshold Range	Optimal 40,000 people, (range 5,000 – 70,000 people, Largely for those not privately insured)
Access Distance	90% of population served within 5 km
Site Size	0.5 ha (range 0.2 – 1 ha)

Source: CSIR, 2011.

Planning and administration of medical and health services in Hong Kong generally follows regional approach. An integrated service network is formed by grouping of hospitals and clinic facilities in a common geographical area in this system.

Under the system, hospitals and clinic facilities in a common geographical area are grouped together to form an integrated service network. This system confirms uniform

use of Government and Government-assisted hospital beds and also ensures that patients are treated with the level of staff and facilities most suitable to their medical conditions. Hong Kong targets to offer 5.5 beds (including all types of hospital beds both in public and private sectors) per 1,000 persons and for site reservation purpose, a standard of $80m^2$ per bed is suggested for hospitals (HKPD, n.d.).

Table 4: Medical and Health Facility Standards in Hong Kong

Facility	**Standard**	**Land or Floor Area Requirement**	**Area Served**
Hospitals	5.5 beds/1 000 persons with a distribution of beds between various types of hospitals determined on a regional basis.	(a) Regional and district hospitals - average of 80 m^2 per bed. (b) Convalescent/infirmary hospitals - average of 60 m^2 per bed	regional
Polyclinics/Specialist Clinic	One specialist clinic/polyclinic whenever a regional or district hospital is built.	Site reservation: about 4 700 m^2 (62m x 76m)	regional
Clinics/Health Centres	One clinic/health centre for every 100 000 persons.	Site reservation : about 2 200 m^2 (37m x 60m)	district
Rural Clinics	Future needs to be determined on a district basis.		district

Source: Hong Kong Planning Department (HKPD, n.d.).

3.2 Health Facility System in Bangladesh

National Health Policy (NHP)' 2011 of Bangladesh perceives 'Primary Health Care' as very much important for common people and recommends for universal access to primary health care for all. It envisages 'Community Clinic' as the fundamental base for providing this care to everyone. NHP proposes for community clinic for every six thousand people and urges for proper and adequate health care and family planning facilities for urban poor as well. Primary Health Care (PHC) system provides various level of service delivery in Bangladesh. Following Table presents current health services at different levels in Bangladesh.

Table 5: Health Services at Different Levels in Bangladesh

Facility Type	**Services / Types**
Primary Level	
Community Clinic and Home Visitation	FP, MCH, immunization, communicable disease control, treatment of common problems and referral.
Union Health and Welfare Centre	Out Patients Services: FP, MCH, communicable disease control, clinical care, normal delivery, adolescent health care
Upazilla Health Complex	Out Patient Services, impatient services (31-50 beds) with diagnostic and operative treatments.
Secondary Level	
District Hospitals	Outdoor and Indoor Services (50-250 beds) with laboratory, radio graphic and ambulance services
Maternal and Child Welfare Centre	EOC and other related services
Tertiary Level	
Medical college Hospitals	Specialized Hospitals
Post graduate institutes & hospitals	Homeopathic Medical College hospital
Dental College hospital	Ayurvedic Degree College hospital

Source: Ministry of Health and Family Welfare, Bangladesh. (available at http://www.who.int/social_determinants/action/MOHFW%20Bangladesh.pdf)

According to National Urban Health Strategy (NUHS, 2014) responsibilities of urban health care belong to two ministries such as Ministry of Health and Family Welfare (MOHFW) and Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MOLGRDC). 37 health related laws are administered by MOHFW and LGD is liable to oversee the functions of ULBs. According to the City Corporation Act, 2009 and the Paurashava Act, 2009, providing preventive health and partly curative care are the responsibilities of ULBs. However ULBs have not been able to properly execute their statutory responsibility because of their limited resources and manpower, they. Imprecise allocation of functions for the MOHFW and LGD in the prevailing government document called 'Allocation of Functions' under the 'Rules of Business' is a major reason behind the related inefficiencies of ULBs (NUHS, 2014) .

Health Care Facilities in Urban Areas in Bangladesh

Provision of preventive health and limited curative care are responsibilities of city corporations and municipalities according to the Municipal Administration Ordinance of 1960, the Paurashava Ordinance of 1977, the City Corporation Ordinance of 1983 and the Local Government (City Corporation) Act 2009, Local Government (Paurashava) Act 2009. But limited resources and manpower in public-sector health services were major deterrent behind the ULBs success in providing health services to urban people. Therefore main resources for providing remedial care, including tertiary and expertise services to the urban people are the private health care providers, however they rarely provide preventive and promotional health services (Hossain, n.d.). On the contrary, MOHFW has been engaged in setting technical standards, packaging services, strategies and policies of the country's health sector. Nevertheless, MOHFW provides urban primary healthcare through outpatient services disseminated through its secondary, tertiary and specialized hospitals placed in the city areas.

Thought different facilities and services for secondary and tertiary level health care are available in the urban areas in Bangladesh, primary health care facilities and services for the urban poor people are largely inadequate. Primary health services for urban poor have been provided by the city corporations and municipalities through contracted NGOs under Ministry of LGRDC through implementation of two urban primary health care projects (UPHCPs) since 1998. The non-project urban areas are being covered by the health facilities of MOHFW through satellite centers and urban dispensaries under Directorate General of Health Services (DGHS).

In addition to the public health facilities in the urban areas – private clinics, hospitals, nursing homes, pathology laboratories and diagnostic centers, in many cases without proper approval due to absence of proper monitoring from concerned authorities – are providing health care services in urban areas and specially middle income and lower income people are taking medical services from these facilities.

4. Planning Standard for Health Facility in Foreign Countries

The planning standard is used to determine the minimum area for each use for a certain population or for a certain land area. These planning standards are formulated for a particular locality by reviewing the functional requirements, number of users and other

similar parameters (LGED, 2010). The main idea behind recommending various norms and standards for urban development plans formulation is to provide a basis for formulation of planning decisions. The recommended norms and standards are therefore indicative and can be appropriately adjusted based on the local conditions (Rao, 2001). Planning standards for health facilities have been described here under two major categories, namely hospital facility and clinic facility.

A clinic is a health center or a private consulting room operated by a practicing physician. On the other hand, a hospital can be a private or a government building for patients admitted for treatment. A clinic is a medical consultation room where a patient goes before getting admitted into a hospital. Clinic may be privately operated or publicly handled and financed, and it can typically provides the primarily health care requirements of populations in local communities. Another major dissimilarity between a clinic and hospital is that a clinic normally does not have beds for patients whereas a hospital has many beds for patients.

4.1 Hospital Facility Standard in Foreign Countries

India recommends for three different types of hospital for urban areas – General hospital of 6 hectare (ha) for 2.5 lakh people having 500 beds, Intermediate level hospital (Category A) of 3.7 ha for 1 lakh population with 100 beds and Intermediate level hospital (Category B) of 1 ha for 1 lakh people with 80 beds including 20 maternity beds. Hong Kong suggests for 5.5 beds/1,000 persons with a distribution of beds between various types of hospitals determined on a regional basis.

South Africa set out standards for three different categories of hospital – namely tertiary, regional and district hospital with different set of standards. Abu Dhabi city of UAE proposes a hospital of 10 acre for 60–90 thousand population whereas Kuala Lumpur city of Malaysia set forth a standard of 3.7 acre hospital for a population of 50 thousand, as presented in Table 6. Putrajaya city recommends that plinth area of a hospital should not exceed 16 percent of total area of hospital premise.

Table 6: Hospital Facility Standard in Foreign Countries

Plan/Project/Category	Population Coverage	Area	Other Standards
India			
General hospital	2.5 lakh	6 ha. (Hospital-4 ha; Residence-2 ha)	500 beds
Intermediate level (Cat A)	1,00,000	3.70 ha. (Hospital-2.7 ha; Residence-1 ha)	100 beds
Intermediate level (Cat B)	1,00,000	10,000 sq-m / 1 ha. (Hospital-0.6 ha; Residence-0.4 ha)	80 beds (including 20 maternity beds)
Bhutan			
	30,000	5000 – 20,000	Regional Level
		Max. 1 hour drive within region	
Hong Kong			
5.5 beds/1 000 persons with a distribution of beds		Regional and district	Regional Level

Plan/Project/Category	Population Coverage	Area	Other Standards
between various types of hospitals determined on a regional basis.		hospitals - average of 80m^2 per bed.	
South Africa			
Tertiary Hospital L3	24 lakh	Up to 35 ha	Location on key access routes within the metro area is more important
	Compulsory above 1.5 million threshold but may be required in cities with a lower threshold such as 900000+ if access distances are greater than 200 km to a comparable facility elsewhere		
Plan/Project/Category	**Population Coverage**	**Area**	**Other Standards**
Regional Hospital L2	17.7 lakh	Up to 7 ha	
	Not required if residents can reach (within 30 km) any higher-order hospital that is not overburdened		
District Hospital L1	3—9 lakh	Up to 5 ha	Access Distance – 30 km
Abu Dhabi			
	60,000 - 90,000 residents. • 180,000- 240,000 transient population.	40,000 sq-m	180-270 beds; Emergency service access 15 minute drive
Kuala Lumpur			
	50,000	3.7 acre	0.07 acre/1000
Putrajaya			
	140,000 outpatients and 35,000 inpatient	11 ha	Plinth area: 16% (max)

Source: Compiled by Author (Data Source: APA, 1965; Lancaster, 1990; Planning Department of Hong Kong, n. d.; Putrajaya Local Plan, 2002; chgre Structure Plan, 2006; PPDC, 2008; Green, 2012; Magigi, W. and Majani, B. B. K. 2005)

4.2 Clinic Facility Standard in Foreign Countries

India recommends three types of clinic facility for urban people in its UDPFI guidelines – Poly Clinic with some observation beds for 1 lakh people in an area of 0.20 – 0.30 ha; Child Welfare and Maternity Centre of 0.20 – 0.30 ha area for 45 thousand to 1 lakh population and a 'Dispensary' having 800 – 1200 sq-m area for 15 thousand population.

South Africa suggest for three types of 'Primary Health Clinic (termed as Public Clinic Prototypes)' for urban areas in their planning standards for social facilities – Small to medium sized clinic of 0.5 acre for a population of 5 – 20 thousand, Large Clinic (with or without maternity) of 1.25 acre for 30 – 50 thousand people and Extra-large clinic (with or without maternity) of 2.5 acre for 60 t0 70 thousand population (Table 7).

Australia proposes a community health clinic at sub-district level for a population of 10 thousand whereas Kuala Lumpur city recommends a clinic for 25 thousand people having an area of 1.2 acre. Abu Dhabi city set forth a standard for 'Small Clinic' of 5500 sq-m (1.4 acre) for a population of 6 – 10 thousand and a 'Large Clinic' of 10,500 sq-m (2.6 acre) for 30 – 40 thousand residents and 0.9 – 1.2 lakh transient population. On the other hand, Tanzania suggest a 'Dispensary' facility for a population of 7 – 10 thousand.

Table 7: Clinic Facility Standard in Foreign Countries

City/ Country	Category/Plan/Project	Population Coverage	Area in Acres	Other Standards
India	Poly Clinic with some observation beds	1 lakh	0.20—0.30 ha	
	Nursing home, child welfare ad maternity centre	45,000—1,00,000	0.20—0.30 ha	25—30 beds
	Dispensary	1 per 15000	800 – 1200 sq-m	
City/ Country	**Category/Plan/Project**	**Population Coverage**	**Area in Acres**	**Other Standards**
Bhutan	Clinic	1 per 2500 – 5000	200-800 sq-m	
		30 minutes walking Distance; For larger towns only		
	Dispensary	1 per 10,000	3000-10,000 sq-m	
		30 minutes walking Distance; Basic Health Unit		
Hong Kong	Polyclinics/Specialist Clinic	One specialist clinic/polyclinic whenever a regional or district hospital is built.	Site reservation: about 4 700m^2(62m x 76m)	regional
	Clinics/Health Centres	One clinic/health centre for every 100 000 persons. #	Site reservation : about 2 200m^2(37m x 60m)	district
South Africa	Community Health Centre	0.60—1.4 lakh	1.5 ha minimum	90% of population served within 5 km
		Ratio of one Community Health Centre to eight Primary Health Clinics preferred.		
	Primary Health Clinic	optimal 40 000 people (range 5 000 - 70 000 people, largely for those not privately insured)	0.5 ha (range 0.2 ha - 1.0 ha)	90% of population served within 5 km
		Mobile and satellite clinics may supplement these static clinics in areas where the threshold is less than 5 000 people as a temporary measure but their space/land requirements are more flexible and are thus not dealt with here.		
	Types of Primary Health Clinic *(Public Clinic Prototypes)*			
	Small to medium-sized clinic	5,000—20,000	0.2 ha	
	Large clinic (with or without maternity)	30,000—50,000	0.5 ha	
	Extra-large clinic (with or without maternity)	60,000—70,000	1 ha	
Australia	Community Health Clinic	10,000		Sub-District level
Abu Dhabi	Clinic (Large)	30,000 -40,000 residents. • 90,000- 120,000 transient population.	10500	15-20 physicians
		Routine/ elective primary care services within a 20 minute drive.		
	Clinic (Small)	6,000- 10,000 residents. • 24,000- 36,000 transient population.	5500	4-6 physicians
		Pharmacy services (on site or within 10 minute walk).		
City of London		1 GP (general practitioner) per 1,700 residents		
Tanzania	Dispensary	7,000—10,000		
Kuala Lumpur		25,000	1.2 acre	0.05 acre/1000
Putrajaya		Neighborhood	1.5 ha (Plinth 30%)	4 storey (max);

Source: Compiled by Author (Data Source: APA, 1965; Lancaster, 1990; Planning Department of Hong Kong, n. d.; Putrajaya Local Plan, 2002; Damphu Structure Plan, 2006; PPDC, 2008; Green, 2012; Magigi, W. and Majani, B. B. K. 2005)

5. Health Facility Standard for Urban Areas in Bangladesh

Health facility standard of 'bed/person' has been recommended in various Master Plans of metro cities in Bangladesh in the past; however District Towns Infrastructure Development Project (DTIDP) and Upazila Towns Infrastructure Development Project (UTIDP) proposed different standards for 'Hospital', 'Clinic' and 'Health Centre/Maternity Clinic' for urban areas in Bangladesh. Rangpur Master Plan suggests home to facility distance of 0.5-1 km for 'Health Care centre' for a population of 5-10 thousand. Barishal Master Plan recommends for a hospital bed facility per 1000 people, whereas Rajshahi and Sylhet propose for same standard of a bed per 354 persons, while Khulna proposes per 527 persons (Table 8). It can be noted that, Sylhet Master Plan suggests for a 'Hospital Bed in a Public Health facility' per 625 persons for its city people. Nonetheless, Dhaka Metropolitan Development Plan (DMDP) has not provided any specific standard of health facility, rather suggested 'case by case' basis of health facility planning and 'Ward based Health Post/Center' which might be included in community center as it indicated.

Table 8: Health Facility Standard for Urban Areas in Bangladesh

City	Plan/Project	Type	Population Coverage	Area in Acres
Dhaka	DMDP	Hospital	Case by Case Basis	
		Health Post/Center	Ward Basis (to be included in Community Center)	
	DAP			
The Medical Practice and Private Clinics and Laboratories (Regulation) Ordinance, 1982		At least eighty square feet of floor space for each patient; *(it implies that, 12 katha land is required for bed facilities for 100 bed hospital)*		
Rajshahi	RMDP-2004		1 bed / 354 person	
Khulna	KMDP-2001		1 bed / 527 person	
Sylhet	Sylhet Master Plan	General Hospital and others	1 bed / 354 person	
		Hospital (public sector)	1 bed/ 625 person	
Barisal	Barishal Master Plan		1 bed/ 1000 persons	
Rangpur	Rangpur Master Plan	Health Care Centre/Clinic	5,000-10,000	0.3-0.5
			Home to Facility Distance (0.5 -1 km)	
		Hospital	2.5 Lakhs	5-10
Bangladesh	PRLDR-2004	Small Clinic	15,000	0.6
		Hospital	1 Lakh	4
Paurashava				
Paurashava	Paurashava Plans of Nineties by UDD & LGED	Hospital	20,000	5
Paurashava	Paurashava Plans of Nineties by UDD & LGED	Maternity/Child care	5,000	1
District level Paurashava	DTIDP	Hospital	1,00,000	4
			(minimum 100 bed per hospital)	
		Clinic	5,000	0.6
		Health Centre	5,000	0.6
City	**Plan/Project**	**Type**	**Population Coverage**	**Area in Acres**
Upazila level Paurashava	UTIDP	Upazila health complex/ hospital	Upazila HQ	10-20
		health centre/Maternity clinic	5,000	1

Source: Analyzed by Author; (Data Source: District Statistics of BBS, 2011; Latest Development Plan, Structure Plan, Master Plan and Detail Area Plans of the relevant Cities; RAJUK, 1995; RAJUK, 2014; RDP, 2015; RMDP, 2004; RMP (Draft), 2014; DAP, 2010.)

6. Health Facilities at Metro Cities in Bangladesh

According to the district statistics (2011) of BBS, a hospital bed is available per 295 persons and population coverage per health facility is 13 thousand in metro cities in Bangladesh, while government health facility is available for every 1.44 lakh people and one public facility health bed for every 1004 persons in metro cities. Therefore, it is revealed that health facility in terms of hospital bed is adequate in metro cities though health bed for public hospital is quite inadequate in number according to the huge population of the metro cities in Bangladesh.

Among the metro cities, Sylhet city proportionately offers higher numbers of hospital bed (one bed per 123 persons) facility while Khulna provides the lowest number of beds (one bed per 456 persons), as revealed in Table 9. Population coverage per hospital bed is quite similar for Dhaka (367) and Chittagong (351).

Table 9: Provision of Health Facilities at Metro Cities in Bangladesh

Name	Government Facility				Private		Total Health Facility			
	Health Facility		Bed		Facility		Total Health Facility		Total Bed Facility	
City	No	Thou/ Facility	No of Bed	Pers/Govt Bed	No	No of Bed	Total	Thou/ Facility	No	Pers/Bed
Dhaka	23	391	8719	1032	620	16944	643	14	24555	367
Chittagong	11	236	1464	1770	117	5926	128	20	7390	351
Rajshahi	5	90	540	833	33	870	38	12	1410	319
Khulna	8	94	865	868	73	783	81	9	1648	456
Sylhet	4	121	1080	449	44	2876	48	10	3956	123
Barisal	4	82	640	513	36	558	40	8	1198	274
Total	32	144	4589	1004	303	11013	842	13	15602	295

Source: Analyzed by Author (Data from District Data Statistics, 2011)

Number of health facility is significantly high in Dhaka city (643) than the other metro cities in Bangladesh as Chittagong city follows Dhaka with 128 number of health facility for its urban population. Dhaka city has the highest number (23) of public health facility though it has the most inferior coverage of 3.91 lakh population per facility in comparison to the other metro cities, followed by Chittagong city with coverage of 2.36 lakh per facility; while Barisal city enjoys superior coverage of 82 thousand per public health facility. Sylhet city provides one public health facility bed for 449 persons which is better than the other metro cities in Bangladesh while Chittagong city offers a public health bed per 1770 persons which is lowest among metro cities in Bangladesh.

According to district statistics of 2013, one diagnostic centre is available for 81 thousand people for urban areas in Bangladesh while one primary level health facility is offered for every 22 thousand people on average (Table 10). Chittagong city has a primary health care facility per 24 thousand people whereas Rajshahi city has this type of facility for every 9 thousand people and for Khulna city, service population of a primary health care facility is 25 thousand.

Table 10: Provision of Ancillary Health Facilities at Metro Cities in Bangladesh

Name	Diagnostic Centre		Missionary Hospital	Primary Level Health Facility					
				Union Health Centre/Primary Health Care		Community Clinic		Total Primary Level Facility	
City	No	Thou/ Facility	No	No	Thou	No	Thou	on	Thou/Fac
Chittagong	104	25	6	41	63	68	38	109	24
Rajshahi	35	13	1	6	75	44	10	50	9
Khulna	40	19	1	3	250	27	28	30	25
Sylhet	39	12	0	0		0			
Barisal	27	12	4	7	47	15	22	22	15
Total (above)	**245**	**81**	**12**	**57**	**62**	**154**	**30**	**211**	**22**
Dhaka	*1040*	*9*		*73*	*123*	*27*		*100*	*90*

Source: Analyzed by Author (Data from District Data Statistics, 2011)

7. Health Facilities at Municipalities in Bangladesh

For the case of Municipalities in Bangladesh, one public hospital bed is available per 1333 persons which are quite inferior to the current provision of 1004 beds in metro cities. Population coverage for government hospital is 42 thousand in municipalities, however including the private facilities – this coverage comes down to 8 thousand for every health facility and one bed is available for every 314 persons (Table 11). For Dhaka city, primary health care facility is available for every 90 thousand population on average. However, primary health care facility, operated by Urban Primary Health Care Project (UPHCP) of LGD, is available for every 1 lakh population in Dhaka South City Corporation areas whereas one facility is accessible for every 1.2 lakh people in Dhaka north city.

Table 11: Provision of Health Facilities at Metro Cities in Bangladesh

Name	Government Facility				Private Facility		Total Facility			
	Hospital		Bed		Hospital	Bed	Hospital		Bed	
Paurashava	No	Thou /Fac	No	Pers/Bed	No	Bed	No	Thou /Fac	No	Pers /Bed
Jhenaidah	1	108	100	1080	16	500	17	6	600	180
Bhairob	4	30	50	2380	24	169	28	4	219	543
Paurashava	No	Thou /Fac	No	Pers/Bed	No	Bed	No	Thou /Fac	No	Pers /Bed
Savar	4	42	100	1660	17	300	21	8	400	415
Bajitpur	1	35	31	1129	1	390	2	18	421	83
Pirgonj	1	28	50	560	2	26	3	9	76	368
Kasba	1	40	31	1290	0	0	1	40	31	1290
Melandaha	1	31	50	620	0	0	1	31	50	620
Nageswari	1	62	30	2067	2	50	3	21	80	775
Total	14	42	442	1333	62	1435	76	8	1877	314

Source: Analyzed by Author (Data from District Data Statistics, 2011)

It is worth-noting that hospital coverage for C category Paurashavas are relatively inadequate (Kasba-40; Melandaha-31; Nageswar-21 thousand) with regard to the 'A' or 'B' Category Paurashavas. Similarly, hospital bed facilities are quite inaccessible for people of 'C' Category municipalities as they have quite fewer hospital beds for their people, i.e. one bed is available per 1290 persons for Kasba, 620 for Melandah and 775 for Nageswari.

Health Facility in 'A' Category Paurashavas

Currently there are only 0.06 acre space is available per thousand population for health facilities in studied 'A Category Paurashava' which is expected to increase upto 0.23 acer per thousand people in those municipalities. It is likely to be 0.23 acre space per thousand people for health facility in Bhairob Paurashava while it would be 0.34 acre per thousand population for Gopalgonj Paurashava (Table 12), if Master Plans proposals are rightly implemented by concerned authorities.

Table 12: Provision of Health Facility in 'A Category Paurashava'

	Present		Future	
A Cat Paurashava	Acre_Prs	Prs_Acre/Thou	Acre_Fut	Fut_Acre/Thou
Jhenaidah	9	0.08	21	0.13
Gopalgonj	5.62	0.07	45	0.34
Bhairob	6.53	0.05	49	0.25
Savar	5	0.03		
Total	**26.15**	**0.06**	**115**	**0.23**

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)
[Data Source: Master Plan for Jhenaidah Paurashava, 2013; Master Plan for Gopalgonj Paurashava, 2013; Draft Master Plan for Bhairob Paurashava, 2014.]

DTIDP proposes a clinic or health centre of 0.6 acre for every 5 thousand people and a hospital having 4 acre of land for one lakh population in district level municipalities. Master Plan for Jhenaidah Paurashava proposes 8 Health Center or Maternity Clinic with a mean size of 1.22 acre while Gopalgonj Paurashava proposes 7 Health Center having an average size of 0.82 acre (Table 13). In addition, Gopalgonj Paurashava Plan recommends for a Hospital with 14 acre space. Grossly mean size of health facilities proposed in the A category municipality is 1.48 acre which is above the proposed standard in UTIDP.

Table 13: Proposed Health Facility in 'A' Category Paurashava

A Category Paurashava	Type of Facility	No	Area	Acre/Fac
Jhenaidah	Health Center/Maternity Clinic	8	9.75	1.22
Gopalgonj	Health Center	7	5.73	0.82
	Hospital	1	14	14.00
Bhairob	Maternity Clinic	6	3	0.50
Total	**Health Facility**	**22**	**32.48**	**1.48**

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)

Health Facility in 'B' Category Paurashavas

According to the Master Plans of B Category Paurashava that have been studied in this research, 0.11 acre land per thousand population are currently dedicated for health facilities which are expected to increase upto 0.27 acre per thousand population. Currently Bajitpur Paurashava has 0.31 acre for health facility per thousand population whereas Daudkandi Paurashava has only 0.02 acre of land per thousand population for health facility which is expected to rise upto 0.22 acre per thousand people in future, as shown in Table 14.

Table 14: Area for Health Facility in 'B Category Paurashava'

Name	Present		Future	
Paurashava	Acre	Acre/Thou	Acre	Acre/Thou
Daudkandi	0.74	0.02	16	0.22
Bajitpur	11	0.31	13	0.29
Pirganj	0.42	0.01	13	0.33
Total	12.16	0.11	42	0.27

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)

Proposed Health Facilities in B Category Paurashava

UTIDP suggests for a 'Maternity Clinic' of 1 acre for every 5 thousand population and Upazila Health Complex or Hospital in Upazila Headquarters having an area of 10 – 20 acres. Review of the proposed Master Plans for B Category municipalities finds that 16 'Maternity Clinic' have been proposed in three municipalities with mean size of 0.79 acre (Table 15). In addition, 5 hospitals are planned in those municipalities with average size of 3.12 acre whereas one Upazila Health Complex is proposed with an area of 5.6 acre in Daudkandi Paurashava.

Table 15: Proposed Health Facilities in B Category Paurashava

Name	Proposed Maternity Clinic			Proposed Hospital			
Paurashava	No	Acre	Acre/Thou		No	Acre	Acre/Thou
Daudkandi	5	3.5	0.70	Health Center	3	6	2.00
				Upazila Health Complex	1	5.6	5.6
Bajitpur	4	2.2	0.55				
Pirganj	7	7.00	1.00		1	4.00	4
Total	16	12.7	0.79		5	15.6	3.12

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)

Health Facility in 'C' Category Paurashavas

Analysis of three 'C' Category Paurashava discloses 0.06 acre of space for health facility per thousand population in those municipalities at present which are expected to increase upto 0.27 acre per thousand people in future (Table 16). Nageswari Paurashava will have 0.42 acre for health facility per thousand population in future if proposals of Master Plan are appropriately implemented.

Table 16: Area for Health Facility in 'C' Category Paurashava'

Name	Present		Future	
Paurashava	Acre	Acre/Thou	Acre	Acre/Thou
Kasba	2.48	0.06	9.65	0.13
Melandaha	2.36	0.08	7	0.21
Nageswari	4.51	0.06	36	0.42
Total	9.35	0.06	52.65	0.27

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)

Hospital Facility in 'C Category Paurashava'

Kasba Paurashava has 3 hospitals with service population of 14 thousand on average while Nageswari Paurashava has 2 hospital with service population of 37 thousand per facility. 3 Community Hospital have been proposed in Melandah Paurashava with average size of 2 acre while 2 Health Center is proposed in Nageswari Paurashava with mean size of 3.5 acre. Hence average size of hospital facility in 'C Category Paurashava' has been found to be 2.6 acre in the proposed Master Plans of these municipalities, as revealed in Table 17.

Table 17: Provision of Hospital Facility in 'C Category Paurashava'

Name	Present		Facility	Proposed		
Paurashava	No	Thou/Fac	Type	No	Acre	Acre/Thou
Kasba	3	13.67				
Melandah			Community Hospital	3	6	2
Nageswari	2	37.00	Health Center	2	7	3.5
Total				5	13	2.6

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)

Clinic Facility in 'C Category Paurashava'

Currently one maternity clinic is available for every 23 thousand people on average in C Category Paurashava as Kasba and Nageswari, which are quite inadequate according to the UTIDP standard of 5 thousand per clinic facility. Kasba and Nageswari Paurashava Master Plans have proposed 19 maternity clinic with mean size of 1.57 acre per facility which is quite above the proposed standard of one acre per clinic by UTIDP (Table 18). Average size of a proposed maternity clinic is 2.25 acre in Nageswari Paurashava whereas it is 0.82 acre in Kasba Paurashava.

Table 18: Provision of Clinic Facility in 'C Category Paurashava'

Name	Present		Proposed Maternity Clinic		
Paurashava	No	Thou/Fac	No	Acre	Acre/Thou
Kasba	1	41	9	7.4	0.82
Nageswari	4	18.5	10	23	2.25
Total	**5**	**23**	**19**	**29.9**	**1.57**

Source: Analyzed by Author (Data from Master Plans of Respective Municipalities)

8. Major findings regarding health facilities in Bangladesh

National Health Policy (2011) acknowledges health facility as basic right, therefore it aims to make necessary basic medical utilities within the capacity of people of all strata as per Section 15(A) of the Bangladesh Constitution, and improve the health and nutrition status of the people as per Section 18(A) of the Bangladesh Constitution. National Health Policy (NHP) perceives 'Primary Health Care' as very much important for common people and recommends for universal access to primary health care for all (MOHFW, 2011). It envisages 'Community Clinic' as the fundamental base for providing this care to everyone. NHP proposes for community clinic for every six thousand people and urges for proper and adequate health care and family planning facilities for urban poor as well.

'Bed per Persons' is the most commonly used standard for health facilities in various master plans for different urban areas in the past – especially in the development and master plans for the metro cities in Bangladesh, though DTIDP and UTIDP proposed different standards for 'Hospital', 'Clinic' and 'Health Centre/Maternity Clinic' for urban areas in Bangladesh. This study finds that, Tertiary level services (Medical College Hospitals, Specialized Hospitals etc.) are mainly available in metro cities or divisional cities whereas Secondary level services (District Hospitals, Maternal and Child Welfare Centre etc.) are mainly available in District level Paurashavas or A Category Paurashavas while primary level services (Community Clinic, Satellite Clinic, Urban Clinic/Dispensary, Primary Health Care Centre etc.) are available in municipalities as well as metro cities in Bangladesh. Various types of health facilities of varying sizes for different level of health services should be planned for ensuring proper health facilities for urban people.

According to the district statistics (2011) of BBS, a hospital bed is available per 295 persons and population coverage per health facility is 13 thousand in metro cities in Bangladesh, while government health facility is available for every 1.44 lakh people and one public facility health bed for every 1004 persons in metro cities. Therefore, it is revealed that health facility in terms of hospital bed is adequate in metro cities though public facility health bed is quite inadequate in number according to the huge population in the metro cities in Bangladesh.

For the case of Municipalities in Bangladesh, one public hospital bed is available per 1333 persons which are quite inferior to the current provision of 1004 beds in metro cities. Local Government Division of Ministry of LGRDC have formulated 'National Urban Health Strategy – 2014' for providing better health services to urban people with special emphasis on urban poor groups (NUHS, 2014). However, no specific recommendations have been made in this strategy paper regarding the categorizations of health facilities and their planning standards which is quite necessary for achieving the targets of this strategy paper.

Size of the urban areas should be considered while planning for different levels of health services in cities in Bangladesh. Therefore, tertiary levels health facilities and various types of specialized hospitals should be established in the metro cities and divisional or regional centers considering the population size of the urban areas, regional importance of the urban centers, easy accessibility to the urban area and so forth.

9. Recommended Standard for Health Facility at Urban Areas in Bangladesh

Local Government Division of Ministry of LGRDC has formulated 'National Urban Health Strategy – 2014' for providing better health services to urban people with special emphasis on urban poor groups (NUHS, 2014). However, no specific recommendations have been made in this strategy paper regarding the categorizations of health facilities and their planning standards which is quite necessary for achieving the targets of this strategy paper.

India generally suggests for six categories of health facilities in its UDPFI guidelines while South Africa also proposes three types of hospitals and another three types of Primary Health Clinic for their urban people. Likewise different countries have various sorts of classifications of health facilities for urban areas. Therefore, after analysis of all these health facility standards, subsequent consultation with doctors and officials related with health services providers as well as analyzing the present context of Bangladesh, three types of health facilities are recommended for urban areas in Bangladesh, namely General Hospital, Intermediate Hospital/Community Hospital and Primary Health Care Centre.

General Hospital

One 'General Hospital' with 100 – 200 beds is proposed for 1 – 2 lakh population in urban areas with an area of 5 – 10 acres.

Intermediate Hospital /Community Hospital / Clinic / Health Center / MCWC

Intermediate Hospital is recommended with 50 beds including 20 maternity beds and some observation beds for 30 to 50 thousand population with an area of 1 – 2 acres.

Primary Health Care Center

Primary Health Care Center (PHCC) should be available for every 5 – 10 thousand population as government sets an standard of 'Community Clinic' for every six thousand population in order to ensure primary health care for each citizen. If PHCC is built on a separate structure, 0.3 – 0.5 acre area may be allocated for this facility – otherwise it is preferable to plan and develop this facility within Neighborhood Complex or Ward Centre. Home to Facility Distance of PHCC is recommended to be within 0.5 -1 km.

Standard for 'Bed per Persons'

A standard of one bed per 300–350 persons is recommended, whereas one hospital bed under public facility is recommended per 500–600 people for urban areas in Bangladesh, as presented in Table 19. Currently, number of beds is quite adequate in urban areas, but hospital beds under public facility are quite inadequate, as this study finds the ratio of persons per bed as 1004 persons per bed in metro cities and 1333 persons per bed in municipalities.

Table 19: Recommend Standard for Health Facility

Type of Hospital	Population Threshold	Area	Service Radius	Bed Facility
Hospital (General)	1 – 2 lakh	5 – 10 or 10 – 20 (in low density area)	*Home to Facility Distance (2 – 3 km)*	100 – 200 beds (might be 300 beds)
Intermediate Hospital / Clinic / Community Hospital or Health Centre, which includes Child Care & Maternity Centre	30,000 – 50,000	1 – 2	*Home to Facility Distance (2 – 3 km)*	50 beds including 20 maternity beds / some observation beds;
Primary Health Care Centre	5,000 – 10,000	0.3 – 0.5 acre or within the neighborhood complex	*Home to Facility Distance (0.5 -1 km)*	
Specialized Hospital	In large and metro cities			
Bed Standard	1 bed/ 300 – 350 person			Public Sector: 1 bed/ 500 – 600 person

Source: Developed by Author

10. Concluding Remarks

Urban health care facilities are inadequate at urban areas in Bangladesh according to the planning standards as revealed in this paper. Civil Society Institutions, working on urban health sector in Bangladesh, are urging to shifting these responsibilities of urban health care to Ministry of Health and Family Welfare (MOHFW). Therefore policy discourse should be done regarding the current role and responsibility of urban health care on urban local bodies.

Primary Health Care facilities has not been properly developed in urban areas in Bangladesh. Primary health care projects are running in metro cities, however in Paurashava areas, state of primary health services are too poor. According to National Health Policy (2011), 'Community Clinic' should be established for every 6 thousand population. No attempts yet has been made to develop such type of 'Community Clinic' for providing primary health care to urban areas through proper assessment of population at relevant urban areas (BHW Report, 2014). Therefore primary health care facilities should be developed as per the population standard set out in health policy. Revision of population standard might be done for urban areas for this purposes. However, special attention should be given to take appropriate steps for providing primary health care to urban poor people and their communities.

Planning standards should be developed by DGHS for different levels of health facilities (at Primary, secondary and tertiary levels) for urban areas in Bangladesh and appropriate planning is necessary for ensuring proper health facilities for urban people in Bangladesh. Health facilities, especially primary health care, should not be over reliant on private sector providers, as lower and middle income people constitutes major portion of urban population in Bangladesh who do not have the ability to afford the health facilities provided by the private sector. However, private sector health facilities should be integrated with government facilities for health facility planning at urban areas in Bangladesh.

Ward based 'Health Centre' may be developed at urban areas in Bangladesh which could provide basic primary and maternity health services to common people. 'Grouping of Hospital and Clinic Facilities on an Integrated Service Network' and 'Regional Approach in planning and administration of medical and health services' might be developed in Bangladesh for providing better health services to common people. This Study has suggested standards for health facilities for urban areas in Bangladesh which could be a guideline for planners and policy makers while planning for various cities in Bangladesh. Respective government agencies and urban local bodies should develop their health facilities by following proper planning standards in respective urban areas to ensure proper health and wellbeing of people.

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Planning Approach to Reduce Fire Risk of Urban Poor: A Case Study in Korail Slum of Dhaka Bangladesh

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Abstract: Dhaka metropolitan city receives a large number of rural migrants annually. The growing urban poor increase housing demand, informal settlement, slums. Poor housing condition and other facilities in slum's makes the slum people vulnerable to many hazards like health hazard, earthquake, fire etc. Among those, fire hazard is the common because of the flammable building materials, faulty electric wires, lack of fire hazard prevention materials etc. This study tries to prioritize the factors of vulnerability to fire hazard in Korail slum using the AHP method and also tried to sum-up the possible planning options that could be implemented in study area to reduce the fire risk of the local people.

Introduction

Worldwide more than one million people live in slums. It has been projected that the number will be folded by the next 25 years and this is actually forcing people to accept living condition below standard and hazardous (UN-HABITAT 2003). With more than 14 million people Dhaka city is the world's eighth largest metropolis. Along with this huge population every day about 1418 people are adding to Dhaka's population due to rural to urban migration (Shisir, 2014). According to Mohit, about 300000 to 400000 rural poor people migrate to Dhaka city annually. In between 1996 to 2005, the amount of slum communities augmented by 70% and the slum dwellers increased from 1.5 million to 3.4 million (CUS, 2006). Due to the growing number of slum people, housing demand increased which results formation of informal housing such as slums and squatters (Hossain, 2008). Thousands of slums and squatter settlements are located in prime locations of Dhaka (Shisir, 2014). In Dhaka city about 70% slum residents experience unhygienic living conditions and they are often evicted (IOM, 2002). It has been estimated that in 2005 around 34 million people were residing in 5000 slums of Dhaka.

The impacts of disaster are worse in cities than any other environments and the poor communities of the developing countries face the greatest risks (Blaikie et al 2003). Over the past eras the rate of occurrence of natural disaster augmented and the number becomes quadrupled in over the years 1986-2006 (UN-HABITAT 2006). As per the Disaster Risk Index 2016, "Bangladesh is the fifth most vulnerable country to disasters in the world. In Dhaka, Bangladesh, over 4,500 houses have been destroyed and 22 people killed from slum fires since 2010". In most of the fire hazard cases the reasons of hazard/ fire are not mentioned accurately and actual data of losses are kept hidden. The slum residents are highly vulnerable to disasters and suffer loss of lives and assets due to the existing physical, economic and social vulnerability (Dodman et.al. 2013). Relevant authorities face challenges in managing urban slum's fire because of unplanned city growth and poor infrastructure (Dutta, 2018). From the evidence of past five events it has been found that urban slum areas are at greater risk from fire hazard (Huq, 1999). Gas cookers are the main cause of fire outbreaks in domestic households but industrial units are the main reason in slum areas (DIPECHO, 2010). Fire hazard occurred due to many

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reasons; these are cooking on open fire, use of flammable fuels, problematic electric connections, combustible building materials, congested building, and lack of fire resistance and water sources (Twigg et al, 2017). According to the findings of a study of world vision bangladesh in korail and Kallyanpur slum the most vulnerable slums in Dhaka all the respondents have mentioned fire hazard as major risk for them. Among the respondents both in korail and kollayanpur slum around 755% and 30.8% have effected from fire hazard in recent past. Due to fire hazard people face many loses and on an average each family at korail slum face BDT 30000 loss until December 2017 (Dutta, 2018).

Considering the above mentioned issues, this study tries to prioritize the factors of fire hazard in study area and summarises the appropriate possible options related to informal housing planning that can be implemented in korail slum to reduce the factors responsible for fire risks of the urban poor.

Objective and Methodology

The objectives of this study was to prioritize the factors of fire risk in Korail slum and summarises the appropriate possible options that can be implemented in study area to reduce the fire risk.

To fulfil the objectives of this study primary and secondary data have been collected. The primary data were qualitative to find out the factors of fire risk in study area. The factors of fire hazard were listed on the basis of information collected from the residents of korail slum and later the factors were also crosschecked with the information provided by the BFCD office. Some semi structured interviews and focus group discussions were conducted with the slum dwellers to explore the following issues, locations, causes of fire, rate, losses, and reasons of vulnerability, warning, and their knowledge on fire risk management, means and methods to cope with the fire risk. Semi structured interviews were also conducted with the two station officers (Baridhara and Tejgaon Fire station, Dhaka) and respected authority from Social Welfare and Slum Development Department of DNCC. Upon considering the findings from the local dwellers and the authorities who deal with the slum seven factors were listed.

Seven factors were considered and calculate their acceptance on the basis of opinion of responsible authorities. In prioritizing the factors Analytical Hierarchical Process (AHP) was calculated. The detail of this process discussed in the theoretical part of this paper. After that, this study tries to summarise the possible options that can be adopted or implemented in the korail slum to reduce the risk of fire hazard. This has been done based on primary data collected from the slum dwellers and secondary sources.

Theoretical Aspects

Analytical Hierarchical Process (AHP)

Thomas Satty (1980) develops the Analytical Hierarchical Process (AHP) which deals effectively in making intricate decision. It aids to fix up the priorities and to come up with the best decision. It reduces the complex decision by making pairwise comparisons and could consider both the subjective and objective aspects.

- **Pair-Wise Comparison Matrix**

In the context of Analytical Hierarchy Process (AHP) the pair-wise comparison matrix was developed by Saaty in 1980. In this process parameters are compared pairwise and their relative weights are evaluated. This process can be done by personal and subjective judgement (Chen, 2006).

Table 1: Pair-Wise Comparison Matrix

	A1	A2	A3
A1			
A1			
A1			

Source: Saaty, 1980

In this study the below table of 9 point scale that is usually used in hierarchy studies is ranging from 1 (indifference or equal importance) to 9 (extreme preference or absolute importance) has been used. The details of the scale has been shown in below table 2.

Table 2: Relative Importance Scale of Opinions

Intensity of Importance	Definition	Description
1	Equal Importance	both the activity contribute equally
3	Week importance of one over another	one activity slightly favored by another because of experience and judgment
5	Essential/strong Importance	one activity strongly favored by another because of experience and judgment
7	Confirmed importance	An activity is strongly favored and its dominance is demonstrated in practice
9	Absolute importance	Evidence favor one activity over another is of the highest possible order
2,4,6,8	intermediate values between the two adjacent judgments	when compromise is needed
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, than j has the reciprocal value, when compared with i.	

Source: Saaty, 1980.

The pair wise comparison actually help the decision takers to access the influence of each one of the factors to the objective independently and this make decision making process simple. At each level the opinions are compared pair wise with respect to its importance over the next higher level.

Starting at the top of the hierarchy and working down, the pair wise comparison at a given level can be reduced to a number of square matrices $M= [a_{ij}]_{n\times n}$ as in the following:

$$\begin{bmatrix} a_{11} & a_{12} \cdots & a_{1n} \\ a_{21} & a_{22} \cdots & a_{2n} \\ \cdots & \cdots \cdots & \cdots \\ a_{n1} & a_{n2} \cdots & a_{nn} \end{bmatrix}$$

When the pair wise comparison are formed, the vector of weights, [w =w1, w2 ....wn] is calculated on the basis of Satty's vector weights procedure. The pair wise comparison matrix M= [aij]n×n is normalized by the below equation-1.

$$a_{ij}=\frac{a_{ij}}{\sum M} \quad \text{.....} \qquad (1)$$

For all j=1, 2, ... n.

Satty (1980) showed that there is a relationship between the vector weights, w and the pair wise matrix A. is is shown in below equation 2.

$$N_{max}=M\times W \quad \text{.....} \qquad (2)$$

The below equations are used to calculate the Consistency Index, CI and Random Consistency Index, RI for each matrix of order n.

$$CI = \frac{N_{max}-n}{n-1} \quad \text{……...} \qquad (3)$$

$$RI= \frac{1.98(n-2)}{n} \quad \text{……} \qquad (4)$$

Consistency Ration, CR is calculated using the equation 5.

$$CR= \frac{CI}{RI} \quad \text{……} \qquad (5)$$

The value of CR should be less than 0.1 for consistent judgement. If the value CR>0.1 than it indicated inconsistent judgement and the decision takers need to revise the valued in the pair wise comparison matrix.

Study area and causes of vulnerability

Korail the largest slum in Dhaka with 36423m^2 area and over 100000 populations (Synthia, 2013). It is located adjacent to Gulshan- Banani Lake and the slum is bounded by Gulshan and Banani model town. The residents of the slum involve in many formal and informal jobs. The summery of socio economic conditions of the slum inhabitants are presented through below table 3

Fig 1: Map of Study Area (Korail Slum)

Source: RAJUK, 2018, Modified by Authors, 2018

Table 3: Summary of the socio economic conditions of the residents in Korail slum

Summary of Socio Economic Characteristics of Residents in Korail		
Family Status	Average number of family members	4.4
	Average age of family head	39 Years
Living condition	Average length of living in slum	13 Years
	Ownership of house	
	Informal	30.7
	Rented	69.3%
Family Income	1500 TK ≤, ≤4500TK	3
	4500 TK <, ≤ 7000TK	6.4
	7000TK <, ≤9500TK	13.5
	9500TK <, ≤ 13000	35.5
	13000 TK <	41.6
Education Level	Illiterate	67.3%
	Only Signature	5.2%
	Primary Education	18.1%
	Secondary Education	9.4%
Occupation	Formal Job (example- Garments sector, teacher or social service worker, service)	18.7%
	Informal Job	81.2%
Housing Type	Katcha	31.8%
	Pucca	4.5%
	Semi Pucca	63.7%
Road Type	Brick paved	80%
	Unpaved	20%
Accessibility	Accessible for fire engines	About 25%
	Not accessible for any fire engines	About 75%
Availability Of Utility	Gas+Electricity+Water	5.2%
	Gas+Electricity	17.2%
	Electricity	77.6%
Rent of House	1200-1800TK	22%
	2000-2500TK	89%
	2600-3000TK	19%
	3100-5000TK	24%
	More than 5000TK	7%

Source: Field Survey 2018, Alam and Matsuyuki, 2017

Firstly Bangladesh Telecommunication Company Limited, BTCL was the only owner of the land of korail slum. The land was allotted for housing of the BTCL's staff. Some of the staff sold their position of land to private people. Later in 1990 government allocated 364230m^2 of land to Public Works Department (PWD). As the land allotted to PWD, private land owners took lawful actions against BTCL and BTCL claiming the land again from PWD. So at present three stakeholders actually have rights in Korail slum. Now RAJUK is doing their functions and responsibilities at Korail assigned by the government.

Prioritizing the Factors responsible for fire hazard

Seven factors are considered more important and prioritized for fire hazards. The factors considered are building type (materials used in construction of the building), utility connections, accessibility, number of storeys , existence of fire source inside buildings, presence of flammable materials in building, lack of fire prevention facilities and lack of awareness and training of the local people. Using the comparison matrix and expert's opinion the weight of these factors are calculated.

Table 2: Comparison matrix of fire hazard factors

	Poor Utility connections (A1)	Accessibility (A2)	Building Type (A3)	Lack of awareness and training (A4)	Number of Stories (A5)	Lack of Fire Hazard Prevention Facilities (A6)	Existence of Fire Source in Building (A7)
Poor Utility connections (A1)	1	2	3	1/3	1/2	1/3	3
Accessibility (A2)	½	1	½	½	2	3	2
Building Type (A3)	½	½	1	2	3	2	1/3
Lack of awareness and training (A4)	½	1/3	2	1	1/3	1/3	½
Number of Stories (A5)	½	½	1/3	½	1	½	2
Lack of Fire Hazard Prevention Facilities (A6)	2	3	½	1/3	½	1	3
Existence of Fire Source in Building (A7)	½	2	1/2	3	½	1/2	1
Total	**5.5**	**9.33**	**7.83**	**7.67**	**7.83**	**7.67**	**11.833**

Source: Developed by Authors, 2018 on the basis of exparts opinion.

To normalize the weights, the sum of each column was calculated. Each column was than divided by the sum. To calculate the weight of the factors, the average value of each row was calculated.

Table 3: Weight of the Fire Hazard Factor

	Poor Utility connections (A1)	Accessibility (A2)	Building Type (A3)	Lack of awareness and training (A4)	Number of Storeys (A5)	Lack of Fire Hazard Prevention Facilities (A6)	Existence of Fire Source in Building (A7)	Total Value of Normalized Factor	Weight
Poor Utility connections (A1)	0.182	0.214	0.383	0.043	0.064	0.043	0.253	1.182	0.169
Accessibility (A2)	0.091	0.107	0.064	0.065	0.255	0.391	0.169	1.139	0.163
Building Type (A3)	0.091	0.054	0.127	0.261	0.383	0.261	0.028	1.205	0.172
Lack of awareness and training (A4)	0.091	0.036	0.255	0.130	0.043	0.043	0.042	.690	0.092
Number of Stories (A5)	0.091	0.054	0.043	0.065	0.127	0.065	0.163	.614	0.088
Lack of Fire Hazard Prevention Facilities (A6)	0.364	0.321	0.064	0.043	0.064	0.130	0.253	1.239	0.177
Existence of Fire Source in Building (A7)	0.091	0.214	0.064	0.391	0.064	0.069	0.085	.974	0.139
Total								6.993	

Source: Developed by Author, 2018 on the basis of exparts opinion.

The comparison matrix is based of human judgement, so it is usual that there remains some degree of inconsistency. it is important to ensure that the degree of inconsistency is tolerable and not unreasonable. To ensure the reasonability and tolerability a quantifiable measure for the comparison matrix was developed. Consistency Ration (CR) was calculated to determine the consistency of the comparative matrix. The calculation is done using the following procedure:

$CR = \frac{CI}{RI}$

$CI = \frac{Nmax - n}{n-1}$

$RI = \frac{1.98(n-2)}{n}$

Here,
CI= Consistency Index of M
RI= Random Consistency Index of M
n= Number of factors
N max=M×W (Weighted Matrix)

In this case,

n =7

Nmax=(5.5×0.169)+(9.33×0.163)+(7.83×0.172)+(7.67×0.092)+(7.83×0.088)+(7.67×0.177) + (11.83×0.139)

=7.53

$CI = \frac{7.53-7}{7-1} = 0.088$

$$RI=\frac{1.98(7-2)}{7}=1.41$$

Consistency Ratio,

$$CR=\frac{0.088}{1.41}$$

$=0.06< 0.1$

Consistency Ration (CR) is acceptable if it is less or equal to 0.1. So it can be said that the comparison matrix is acceptable as the value of CR is less than 0.1. From the analysis it is found that the factor that has the highest weight is lack of fire prevention facilities.

Table: Prioritizing Factor

Factor	Priority
Lack of Fire Hazard Prevention Facilities	1
Building Type (materials used in building construction)	2
Poor utility connections (Electric, Gas)	3
Accessibility	4
Existence of Fire Source in Building	5
Lack of awareness and training	6
Number of Stories	7

Source: Authors, 2018

Potential Strategies to Reduces Fire Risk in korail

Risk reduction methods are designed to reduce the current risks and prevent the future risks of the community (Abarquez and Murshed, 2004). The risk reduction measures should be assembling of structural and non-structural measures. Response time is correlated with the volume of damage (Challands, 2010). The rapid the well trained and well equipped people reach the fire incident location the better the possibility to minimize the losses (Castillo, 2002). So reducing the response time of the fire department is important. There are also many actions that are identified by the community and the responsible authority to reduce the fire risk and incidence.

Reduction of fire risk through Slum Upgrading Program (SIP)

From the mid 1980's Bangladesh government started to implement slum upgrading programs in urban areas with UNICEF. Now the program is active in 25 cities and it focused on components like improvement of drains and sanitation facilities. Some slum improvement programs were undertaken with the support of World Bank, ADB- Asian Development Banl and some large NGO's working in Bangladesh without housing component. Later in 1990's Slum Improvement Department has been established. Though one third of the city population live in slum, the fund allocation for this department has always been very small (World Bank, 2007). Slum upgrading has been widely used in many developing countries as it is cost effective (Choguill, 1994).

If slum upgrading could be applied in Korail slum the following benefits could be identified:

- Firstly it will preserve the present income generating activities and opportunities for residents of korail slum.
- Secondly it will maintain the community feelings and as previous.
- Thirdly, it will be affordable to the residents of Korail than sites-and-services projects.

Reduction of fire risk through Land sharing Program

Major parts of the respondents (67.4%) are not agree to pay any cost because the fear of eviction and lack of tenure right. Only 32.6% respondents are willing to pay according their monthly income after providing proper tenure right and removing the fear of eviction (Field Survey, 2018). So in case of implementing any slum improvement program the fear of the slum residents must be removed.

All over the world, many projects have been implemented to ensure the tenure of the slum dwellers (Durand-Lasserve, 2002). In land sharing method land owners are able to ensure their share of land for commercial use if the land is occupied by illegal occupier (Yap and De Wandeler, 2010). More than three fourth of the slum dwellers in korail prefer this method (six stories with full tenure ship) and three fourth of landowners prefer land sharing with six stories and long term leasehold (Alam and Matsuyuki, 2017).

Some Recommendations to Reduce Fire Risk at local level

Fire Risk Reduction Approaches That Local People Want To Adapt

Structural and non-structural measures can be taken to increase the resilience of the residents of the korail slum. The measures are as follows:

a) Structural Measures

- Road
  - ✓ Access roads should be widened by road side drain and road side should not be blocked by storing construction materials, wastages.
  - ✓ Ensure the easy and free accessibility in the main road which is 30 feet wide.
  - ✓ new road network should be constructed which will be a great challenge for the authority.
- Structure
  - ✓ The materials used in construction of the housing in study area are more likely to fire risk. the refusals from domestic and industry should not be kept near fire sources.
- Mass implication of Lumkani- an Innovative and Effective Approach for Early Fire Detection. It is basically a devise used for fire alarm.

- ✓ Lumkani a low cost devise for fire detection. This system is a very effective tool for the poor and for the fire prone communities. The mission of this devise is to prevent the devastating loss of fire. Since 2014 this devise has been successfully trailed in the South African's slums. Lumkani devise is also using in korail slum through World vision Bangladesh. World vision Bangladesh has installed almost 3000 devise in korail and kallanpur slum. Large scale use of this devise in this slum will help to reduce the losses from fire.
- ✓ *Cost of installation*- The total cost of installing a devise is around BDT 1260 (field survey, 2018). Total cost will be recovered by the service user as 230 taka per month instalment around in six month at 9.6% profit. Installation of this devise in slum will reduce the possibility of spreading of fire and mitigate the fire risk in colaboration with the BFSCD and DNCC.

- Relocation of Electric Poles and Transformers

A lot of electric poles and transformers in Korail located within 10 feet from the building in lot of cases. These increase the vulnerability of the building. These poles and transformers need to be relocated by the government or DESA in order to reduce the fire vulnerability of those particular buildings.

b) Non-Structural Measures

- Evacuation shelters and safest route to reach those shelters during disaster should be identified. The evacuation plan should be well discussed and spread to the local people so that each and every age group and gender of the local people have clear visualization of the plan.
- Three open spaces in Korail slum must be kept free from encroachment so that these locations could be chosen as evacuation shelter.
- The accessibility towards the evacuations centres should be ensured and must e kept free from any kind of obstructions.
- Public awareness in another significant issue through which many incidences could be avoided. Electric short circuit and burner is the major of fire spread in Korail (BFSCD, 2018). So in study area public awareness should be ensured.
- The local people must have a clear idea and knowledge about what to do before, during and after the fire hazard. Fire drill could be organized at community level to provide minimum emergency training to the people.
- The participants should disseminate their knowledge to others through regular community group discussion, at school, social clubs.

Strengthening Institutional Linkage

The institutional relationship diagram actually shows the level of closeness of the contact and cooperation between the organizations and groups (Cavestro, 2003). The below figure was developed to represent the linkages among the community, NGOs, other local organizations and the respective authority. By strengthening the interrelations among these the risk of fire could be minimized.

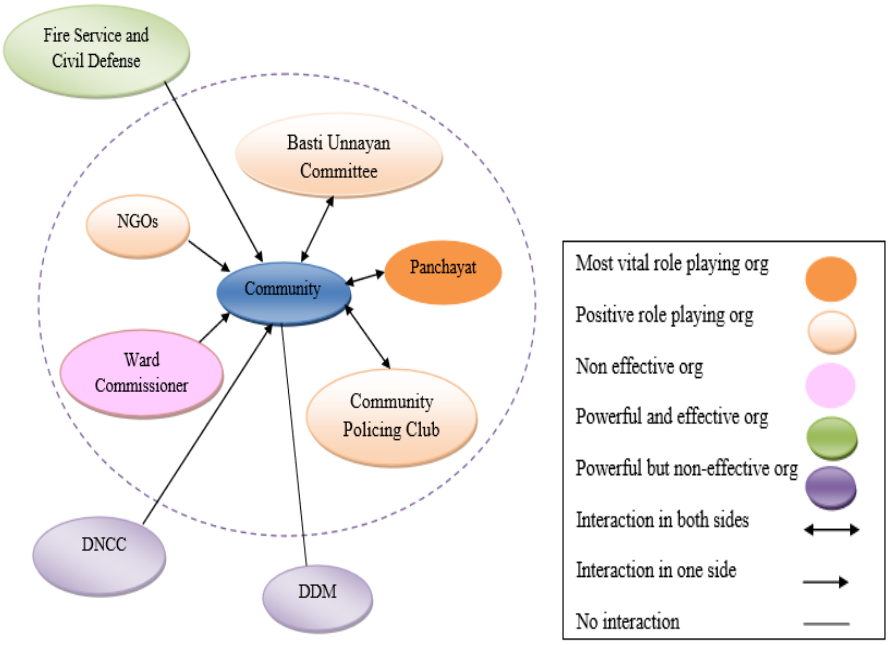

Figure 2: Venn diagram of institutional organization of the study area

Source: Prepared by Authors, 2018.

Conclusion

Number of options can be adopted to reduce the fire risk of the urban poor. Though there are number of policies adopted by government to deal with slum's problem none of this workout well. There is need to find out the factors of fire risk and also prioritize the factors. On the basis of priority the factors need to be addressed to reduce their risks. Poverty is not the only reason for slums and inadequate infrastructure. There are some other reasons like unsuccessful policies, wrong implications of the regulatory framework, malfunction of land market, corruption and lack of political motivation (Tannerfeldt and Ljung, 2006). So finding a solution to improve the safety of the urban low income people includes diverse activities. It is the government's perception towards the urban low-income groups as generating economic, social and political instability (Wendt, 1997). DNCC, DSCC along with National Housing Authority need to come forward to diminish the factors responsible for fire risk and develop a holistic approach for ensuring safe housing of the urban poor incorporating the local community and land owners.

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Press Freedom and Democratic Governance
Interplay in the context of Bangladesh

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Abstract: The paper tries to discuss about the nexus between the freedom of press and democratic governance in the context of democratic Bangladesh where press freedom is the underlying discourse among the different stakeholders. Freedom of press is an important force in the state apparatus and could play a critical role as the conscience keepers to protect those who have no other redress in a democratic political landscape. Unquestionably, freedom of expression in Bangladesh are facing challenges over the decades to run the usual business with own fashion for consolidating democratic culture. Certainly, to turn into a just and harmonious society as well as for brining maturity of democratic governance, freedom of press has been foreseeable. Sustainable development even couldn't be conquered without the presence of press freedom and press freedom can articulate the voices of people making sure that no body left behind to mainstream into the wave of development across the level. The study explores that, still there are number of restrictions behind the free flow of press in Bangladesh and the political participation and biasness of the newspaper editors, journalists and publishers turn into the reality of present day in Bangladesh and remain as strong barrier for the freedom of press. Notwithstanding the reality, Bangladesh today is in good position compared to other South Asian countries where a considerable freedom of press is enjoyed. This is the reason why democracy and responsible governance are being carried out towards attaining sustainable development. The paper also tries to understand different factors responsible for less effectiveness of democratic governance while examining the current state of freedom of press in Bangladesh.

Keywords: Press Freedom, Democratic Governance, Development, Political Parties and Bangladesh

Introduction

Alexis de Tocqueville viewed that, "the emergence of the press claims itself as a powerful instrument for democracy" (Adhikari, 2000). Press freedom turns into the reality of society. Protecting freedom would be delimiting to their importance. Democratization process for good governance and freedom of press is important to reinforce their ties. Reality suggests that for meaningful democracy, we must confirm liberty of information to the community. The free flow of information has been an important element for effective democratization and its journey for promoting the concept of sustainable development. In fact, freedom of press is an influential change mediator in a democratic culture as well as development discourse.

Coming to the context of Bangladesh, it is apparent that the reintroduction of the Parliamentary Democracy from 1991 has carried a significant freedom for the press upholding the spirit of democratic order. The successive democratic regimes are found to be respectful in the freedom of the press. We know, the responsibilities of continuation in freedom for the journalists have not been simple in this country. According to the statistical evidences, frequent cases have been recognized where journalists are continuously harassed, frightened and killed by political protestors, police and often

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assigned groups of the society and these turn into the reality of everyday challenges the press faces.

The government and its relevant bodies are the most noticeable sources of media restriction, reconsideration and suppression. However, some action points have a stake in overturning the activities of journalists. Solid illegalization of the economic and political landscape clarifies abundant of the brutality and violence practiced by members of the press where political ill motives aggravate the situation. Pervasive corruption also becomes obstacles to continue the spirit of freedom of press.

The problem is not so much of domineering laws only. Even the current laws are not precisely generous, but more of the extralegal actions and unlawful forms of extortion, intimidation and viciousness to silence the press to act independently to some extent. The several newspapers and magazines published in Bangladesh appear press freedom for the greater interest of democracy and good governance. Notwithstanding the fact prevailing in the country, the press in Bangladesh agonizes from some thoughtful restrictions to work with its own fashion for brining change in the society and political arena. As a result of the fact, press freedom is an important element for the alliance of fledging democracy to promote democratic governance with more responsibility in Bangladesh (Rahman, 2000).

To what extent will Bangladesh's print media contribute to fostering democratic governance is the study's main research issue apart from learning about Bangladesh's condition of press freedom? The research is focused on content analysis and therefore the study widely undertook a review of important books, posts, interviews, podcasts, editorial pieces and other sources related to the study subject. This analysis of the study results related professional literature helped contextualize the research outcome. The paper considered only print media to understand its relationships with Bangladesh-focused democratic governance.

Press Freedom: Conceptual Analysis

The press has been ever more fundamental to democracy in the world. The existence of freedom of the press distinguishes a freely operational democracy from a controlled dictatorship. More than two centuries ago, the current impression of a free press progressed. A significant advance in the latter half of the 20th century has been an increasing global apprehension of the spread of the concept of freedom of the press, as an essential pillar of democracy.

Besides, it is important for the long term sustainability of social values. In a century and a half following 1791, when the first modification was written into the U.S. Constitution to assurance press freedom, it did not draw the global attention. Only a few developing societies in the west permissible the press to function freely within their boundaries (Hadenius, 1992).

Many most recent independent countries like Bangladesh stated themselves to be democratic of one kind or another, but their administrations in many cased utter the significance of freedom of press while reentering the meaning of democracy. The condition begun transforming into the new third trend of democratization originated

among the 3rd world countries in the second half of the 20th century. The award giving of the 1998 Nobel Prize in economics to Amartya Sen was therefore a milestone for those who identify the vital link between welfare and freedom, between growth and democracy (Sen, 1999).

Meaningfully, that link has been stated by the world's top development agency, The World Bank. Until present, the Bank hardly stated words like "democracy" or "press freedom" in its formal testimonials. These days, the Bank flexibly states its sustenance for freedom of the press as a vital factor in economics and social advancement. A fresh press is not a luxury; a free press is at the thorough core of equitable progress, because if you can not emancipate meagre people, if they do not have a right to countenance, if there is no search light on corruption and unfair practices, you cannot figure out the public consensus needed to bring about modification (Wolfensohn, 1999).

Each and every free man has an absolute right to lay what feeling he satisfies before the public; to prohibit this, is to extinguish the press freedom. The freedom of press means the right of a person to announce for the better interest of the civilization (Dicey, 1915). We can't afford a government without newspaper. Otherwise, newspaper without government can't take a moment to prefer the latter as such spirit works in long run to promote democracy for a just based society (Akindele & Obiyan, 1996)".

Democratic Governance: Conceptual Clarity

To commence with, meaning of "Democracy" should be conversed in brief to apprehend the implication of democratic governance justly. More than a type or structure of government, it has come to assume the eminence of a stylish nomenclature. As style is a rapid changing thought, if not always in concept. Though often presumed to be modest system of government, democracy appears to have expected most of the difficulties of the globe. A numerous number of adjectives have been accepted to distract the devotion of the critics of democracy in some countries.

Civic freedoms, such as freedom of speech, freedom of religion, freedom from illogical arrest, are acknowledged and protected within the political scheme. This adopts that there is extensive amount of freedom and freedom from governmental control of the mass media, i.e., television, radio, newspapers. A demonstrative assembly has some system of regulation over the judiciary and the executive is sovereign of both legislature and executive (Ball, 1977). Democracy is the single governance framework having a comprehensive perspective on human development (UNDP, 2002).

Press Freedom in the Sphere of Democratic Governance: An Analysis

The practice of liberty of opinion, information and expression is acknowledged as an essential portion of human rights and basic freedoms. This is an important issue in the establishment of peace, safety and harmony. Freedom of press is a vital part that could act an influential role to stimulate democratic governance in the emerging countries. Factually, utmost happiness for the highest number of people is entitled democracy and it counts on the liberty of thought. Freedom to speak is confidentially tangled to the freedom of thought on what one can consider is an outbreak on other personality.

As a result of the fact, freedom of opinion is certainly a dynamic power of firming up democracy as it is necessity for enhanced governing process of the country (Sen, 1957)". Appreciating the prominence of press liberty for responsive governance, David Flint asked for people must to be up-to-date about everything of public concern; altercation of free and full info is the main key of a market based economy, good governance; and ideas compete in the market-place for recognition, full and free debate exposures the wrong and they advance few believers (Flint, 1998).

Choice of expression and liberty of the press are confidently important essentials as it enables disseminate information to make the process of governance truly transparent. Naturally, everyone has the right to liberty of opinion and choice of expression, this right comprises freedom to embrace sentiments without interference. It also strained the importance upon the free flow of evidence through press freedom in South Asian states for the institutionalization of democratic governance (AMIC, 1999). Undoubtedly, freedom of press sources political life to flow and detect the confidential mechanisms of political designs. It rallies the attention of the society round certain principles to afford a means of intercourse between those who catch and report each other.

In a democratic system, right to information or access to be acquainted with the public delivery system is the basic component of good governance. Press is the single way to coherent the public view for organizing people's opinion. Freedom of press can deliver people the actual and truthful news that shows an acute role to carry a sense of keenness in the state operational and quickening governance procedure. When human rights are dishonored anywhere by anyone through the state, press arises frontward to express voice in support of it. And of course, press freedom is significant to safeguard the actual situation.

Consequently, the authority anxiety drives through right actions on time to lift development procedure (Development and Freedom of Press). Press is one kind of mirror of a society given that it delivers the actual image of a society. Any sort of malpractice, abuse of power, and resource wastage, partiality, can be inspected and uncovered by the press. In a contemporary world, press is recognized as the 'fourth state' for the democratic growth of any country as press can motivate the state and the society positively.

Press Freedom in Democratic Governance in Bangladesh: A Critical Analysis

Parliamentary democracy has been in practice in Bangladesh since it was born in December 16, 1971, as an independent country. Unfortunately, we have seen Bangladesh suffering a political turmoil with the success of coups and counter coups after some years in parliamentary democracy since its independence. Many political ups and downs similar to the implementation of one party method have placed the democratic journey of countries susceptible through military roles to seize power and thus pushed development efforts backwards.

Nevertheless, the nation has resumed her trip to democracy in 1990 but the track is not nourished still now as we have crossed about 50 years but our accomplishments in the ranges of democracy, development and better governance are not noteworthy owning to

major impediments. Even, the country today is poked with frequent problems frightening the consolidation of democratic governance, essential parameter to promote people choice in leadership selection and development planning. We know, democratic governance is broadly divided into four elements covering freedom and democracy, human rights, rule of law, and accountable public institutions.

Absence of real and robust presence of press freedom is one of them creating hurdle towards the smooth journey of democratization from top to down. By the constitution of People's Republic of Bangladesh reassurances freedom of speech and opinion under the article no. 39, but such liberty is focus to sensible limitations we could perceive from the practices. Furthermore, several actions along with the government regulate over the evidence are turning into a strong barrier for less effectiveness of press freedom.

Good governance, democratic leadership and development are significant objectives in their right. Freedom of press at the same way rely upon and strengthen each other for the advancement of mindful governance process. Again, absence of people's participation and restriction of them to have an access to information are not supportive to strengthen democratic governance in Bangladesh.

We know, political parties play an important role in democratic governance and they provide a structure for political participation by the way of serving as a training ground for political leadership. Even political parties help transform social interests into public policy. Pervasive corruption has also convert a fundamental barrier to freedom of press and corruption or influence of black money could render negative impression on professionalizing press force. Even, what we notice, current laws are not generous but rather more that untouchable actions and illicit types of frightening, pressure and brutishness regularly to quietness the press and press freedom on the top.

In Bangladesh, journalists are found to be harassed as well as physically assaulted on duty and regular reasons of physical assaults and fear, mainly in rural and marginal areas are coming out, to some range. Study showed that, journalists who report on political ferocity, formal corruption and planned crimes are main targets for revenge by the police, political cadres allied or by the underworld criminal gangs resulting in a wave of threat towards attaining press freedom in Bangladesh.

It is also explored that, upon publication of the stories that incriminate influential interest groups, false cases are given against press officials in many cases. We have witnessed, journalists become victim when they stand against on the hooliganism and dishonesty of political parties. Vilification and insult cases against journalists triggers harassment tools what we have counted while undertaking this exercise based on literature review. Roughing up and threatening individuals on robbing offices, may seem democratic and clarification of it.

It is the demand of time to protect the journalists from the anxiety of arrest even if their reports are grounded on truths. The public administration is often reported where corruption and maladministration are very regularly taken place. The bureaucratic system in Bangladesh looks at the press with doubt and distress, and tries to sidestep the journalists till now, though the development management partly contributes to modify the traditional mindset of them.

The press can retain the people up-to-date of all the national, local and international improvements. It can deliver the widest thinkable scope for public conversation on matters of the good and responsible governing process, development, social justice, pro-people development and better governance. We must come to a common understanding that liberty of the press can't be a single path of the journalism rather it safeguards the reader's right to see about their political rights, and the functions of the government, political parties in power and opposition giving a space of interaction in a multilevel stakeholder's approach.

The press' impact on Bangladesh's responsible and efficient democratic system is apparent in the deliberate study (Kanti, 2003). We also found that news distortion barriers in the collection of news in rural areas contribute equally to the downward trend in press freedom. Journalists, especially in the broadcasting and electronic media, have been a popular trend here, whereas political influencing media ownership takes complete control of the media environment, both governments and big business.

Media freedom may, however, increase dramatically if the government enables state media outlets to operate independently without control or censorship. The study believes that the media should simultaneously improve their own professional standards in order to minimize political partiality and to promote ethical reports for the country's democracy growth (Ranjana, 1990). In addition, the political connection and bias of press managers and publishers, publishers and journalists was the recent trend that undoubtedly jeopardizes Bangladeshi freedom of the press. I would suggest that today Bangladesh, despite all these underlying realities, has the luxury of enjoying a significant freedom that is essential for raising democracy governance.

Conclusion

Bangladeshi news media have played a courageous and commendable role in upholding democratic principles despite so many constraints. A Bangladesh Awami League patriot government and media owners must therefore realize the potential of media freedom for a democratic society. Both parties need to take appropriate steps to reduce legal, political and corporate media restrictions. Apparently, the free press is the backbone of every democracy that works.

Bangladesh on the verge of becoming a middle-income country and watching the world closely, ensuring sanctity and independence of journalism is more critical. In order to ensure transparency, be it in government or otherwise, in cases of misunderstanding we must educate the citizens of this country correctly, ensuring that there is no point to division-centered reporting and that pro-people behavior represents the significance of freedom of the press.

We also encounter disseminating false news and rumors with the advent of social media and other channels. A strong press has become ever more important to uncover the facts in the face of false news and rumors. The Government of Bangladesh led by Prime Minister Sheik Hasina should be honored by her continuing honest efforts endorsing the essence of freedom of the press to make the nation progress with sustained success and sustainable growth.

Press freedom has become a crucial feature and indispensable pre-requisite for democracy and sustainable development of the developing countries where people strive to survive with dignity and freedom in action and voices. The people of Bangladesh are to some extent enjoying the freedom to keep attitude without interfering and to pursue, impart and receive information and thoughts. They must be given cent percent freedom to practice their rights as independent citizen of Bangladesh. People should take part logically and efficiently for the sake of democratic development of Bangladesh which is the underlying principles of our constitution.

It is important that every journalist must abbey the morals of their profession. Journalist of the new generation should be prepared with professional integrity, skills and greater understanding of the consequences of their reports, features and stories. That is the cause why, a clear system of management like Right to information (RTI) must be in exercise to confirm the free flow of information from the central and local government. To overcome misappropriations, inefficiencies and letdowns of the government, RTI can be unprotected to the wider public engaging all actors on the same board. Additionally, political parties must practice democracy throughout their different wings from the central to the grassroots level. Practices of democracy certainly enable upholding the spirit of press freedom in Bangladesh.

The study is concluded with a strong recommendation calling upon the political parties, public intellectuals, civil society and sensible citizens to work shoulder to shoulder for upholding the spirit of freedom of press. Such collective efforts will help strengthen democratic governance in Bangladesh. As an essential watchdog of democracy and responsible governance, press must be free.

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Health Situation of Mothers and Children and Associated Socio-Economic and Environmental Condition: A Case Study on Chuadanga Sadar Upazila

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Abstract: Mother and child health are an important issue in the developing country like Bangladesh. Poor knowledge, behavior and hygiene practice of the mother make children vulnerable to delays in growth and development. This study attempts to find out the relationship between mothers and their children's health problems with different socio-economic and environmental variables in the rural areas of Bangladesh. This study was conducted on Teghori-Kalagachi Mauza at Chuadanga Sadar Upazila under Chuadanga district. Questionnaire survey and several case studies were employed for collecting quantitative and qualitative data. Pearson bivariate correlation, cross tabulation, multiple linear regression and simple statistical techniques were used to analyses data. This study observes that that there exists low and moderate association between sanitation systems and health. About 62.86 percent people used ring slab toilet with a fence, 22.86 percent used pucca toilets and 5.7 percent had no toilet facilities. During the survey it was observed that the people who lived with their children in the rural areas had limited modern amenities such as sanitary facilities, health care facilities etc. Pneumonia (34.39 percent), diarrhea (31.43 percent) and typhoid (24.29 percent) were the main diseases of children of the study area. Mother suffered more from diarrhea (27.14 percent), typhoid (21.43 percent), dysentery (18.57 percent) and other diseases. It was observed that due to lack of consciousness of the mother regarding sanitation, health, and hygiene practices the children of the study area suffered from diverse sorts of infectious diseases.

Keywords: Mother, Children, Health, Hygiene Practice, Sanitation System, Cross Tabulation, Correlation, Regression.

Introduction

The development issue of a country is dependent on the development of the human population. For a healthy and worthy population there is an urgent need to emphasize on mother and child health. Studies have observed that there are significant differences between mother and child health of the urban and rural regions in the underdeveloped and developing country. The rural women are the foremost vulnerable section of the society and frequently suffer most from ill-health (Whittle and Inhorn, 2001). Bangladesh still records a high maternal fatality ratio and regarding 12,000 women die because of maternity or childbirth related complications each year (UNICEF, 2009).

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Another vital concern in this respect is low nutritionary level of the mothers and around fifty percent of Bangladeshi women undergo chronic energy deficiency (UNICEF, 2009). Low birth weight incidence is concerning 45% within the country, and micronutrient deficiencies are quite ordinary. A study ascertained that over 43% of pregnant women were iodine deficient and over 2.7% developed night blindness during pregnancy (Bangladesh Ministry of Health and Family Welfare, 2000). Bangladesh additionally has low per capita expenses on health care and Gross Domestic Product is regarding 3.35%, that places chiefly vulnerable populations as an example, women and children at high health risk as well as quality of life issues (Islam, 2009).

The health of women is a crucial issue for the health of children. In Bangladesh there are many factors such as knowledge, behavior, attitudes, belief that influence mother and their children's health. Diarrhoea, dysentery, pneumonia, typhoid, hookworms, and anemia are the common diseases of mother and their children in Bangladesh (Islam, 2009). Leading reasons of death among under-5 children are preterm birth complications, birth asphyxia, pneumonia, malaria and diarrhea (WHO, 2016). Accounting for nine percent of all deaths among children underneath age 5 worldwide in 2015, as diarrhea is a leading killer of children (UNICEF, 2016). Determined 2.5 million cases of diarrhoea occur each year among children and Asian and Southern African countries account for over half of the cases (You *et al*, 2010). This rate is more in developing and under developed countries. More than 10 million children die each year from preventable diseases and almost all are from poor countries (Assegid, 2006).

Poor sanitation system and lack of proper knowledge of mother are the main causes of this high death rate. In each four minutes a child less than 1 month old in Bangladesh dies because of the very fact that their mother did not have access to correct post-natal and ante-natal care (BRAC USA, 2016). Its estimated that 1.5 million children die from diarrheal diseases annually worldwide, with 88% of those deaths occurring because of inadequate sanitation, inappropriate hygiene practice, and unsafe drinkable water (Lipson, 2010). A study on Bangladesh suggests that improved water and sanitation facilities truly decrease diarrhea by 99%, dysentery by 90%, intestinal worms by 51% (NHPS, 2012). A new approach to enhance sanitation coverage within the rural areas like, community-led total sanitation program has been first inaugurated to eliminate these health problems in Bangladesh (Wikipedia, 2012). Although the aspects of sanitation, hygiene, knowledge concerning children health have made substantial progress, the coverage is not appeasement. Within the remote areas the progress is considerably low. This research was conducted on one of the foremost backward regions of the country. This study specifically conducted to explore the health, hygiene, sanitation practices, knowledge about health and diseases and attitude of mother and their children towards health and diseases of the children diseases and hygiene associated practices.

Aim and Objectives

The main aim of this study is to identify knowledge, behavior and hygiene practices of the mother and their children within the study area to explore mother and child health problems and associated socio-economic and environmental situations.

The objectives are:

1. To identify present hygiene practices and knowledge of mother about themselves and their children under 5-year age;
2. To evaluate the present health problems of mother and their children in the study area;
3. To analysis the relationships between socio-economic and environmental variables regarding mother and their child health problems in the study area.

Data Sources and Methodology

For this study the primary information/data was collected through questionnaire survey. The questionnaires contained knowledge on household, socio financial condition, sanitation system in the study area, hygiene practices, sources of water, and occurrence of various types of diseases that occurred among mothers and their children in the last five years. The sample size determined consequential the steps such as, Population size (N) = 235, Confidence level= 95%, Error level (e) = 10% and z-score (z) =1.96 and the data were accumulated from 70 respondents who permanently lived in the study area. To have an idea about the knowledge of mothers about their own health and their children's health this study conducted some case studies. Secondary information was collected from published and unpublished materials, books and journals. Data received from the survey were analyzed applying descriptive and inferential statistical tools. To examine the relationship of mother and child health with socio-economic and environmental variables Pearson bivariate correlation, cross tabulation and multiple linear regression are used. Several software like Microsoft word, SPSS, Microsoft Excel, Arc View GIS were used for analyzing data. Teghori-Kalagachi Mauza in chuadanga had in total 2604 population. The entire number of under 5 years population were 235 (BBS, 2011). The ratio of male and feminine was 105:100. The mauza had in whole 621 units of household (BBS, 2011). Entire literacy rate was 54.1%. and therefore, the male literacy rate was 52.9% and female literacy rate was 47.1%. (BBS, 2011).

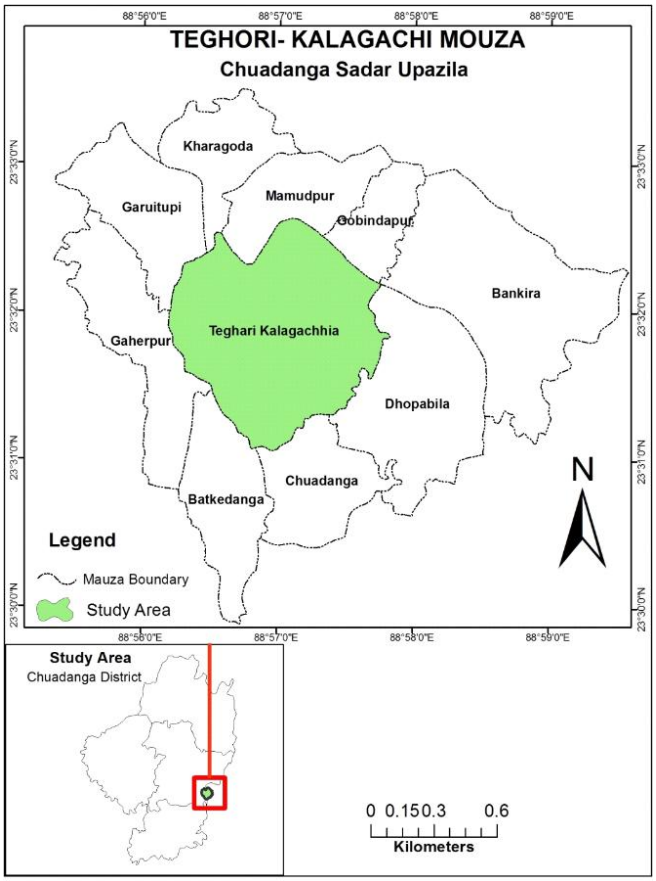

Figure 1.1: Teghori-Kalagachi Mauza map

Source: Developed by author, 2018

Health status of Mother and their Children in the Study Area

Health may be a state of complete physical, mental, and social well-being and not simply the absence of sickness or decrepitude (WHO, 2016). To understand the health status of an area, its needed to address the determinants of health. The social and economic surroundings, the physical setting, and also the person's individual characteristics and behaviors are the main determinants of health embrace. It has been observed that the main factors that influence human health are income and social position, education and literacy, social environments, social support networks, employment/working conditions, personal health practices and coping skills, biology and genetic science and health care services (WHO, 2016).

Children and Mother Affected by Different Diseases

Figure 2.1 reveals that the most common disease in the Teghori-Kalagachi Mauza was Fever. About 98.57% children were affected by fever. Among different communicable diseases, the most common diseases were Diarrhea, Dysentery, Pneumonia, Typhoid, Skin diseases and others. It was observed that pneumonia and diarrhea were the leading causes of death which matches the worldwide pneumonia and diarrhea situations. These two diseases are leading killers of the world's youngest children, accounting for twenty nine percent of deaths among children below age five or over two million lives lost annually (UNICEF, 2012). A rural child, on the average suffers from 4.6 episodes of diarrhea annually and 230,000 children die because of the prevalence of this malady within Bnagladesh (Baqui, *et al.* 2016). In the study area children also suffered from pneumonia (34.29%), diarrhea (31.43%) and typhoid (24.29%). In Teghori-Kalagachi Mauza mother were affected by different infectious diseases. Figure 2.2 delineate that mothers suffered from fever (97.14%), diarrhea (27.14%), typhoid (21.43%), head ache (31.43%) and dysentery (18.57%) and anemia, skin disease, chickenpox, heart disease, ulcer, dental problem, pils, acidity, and tumor diseases were also prevalent.

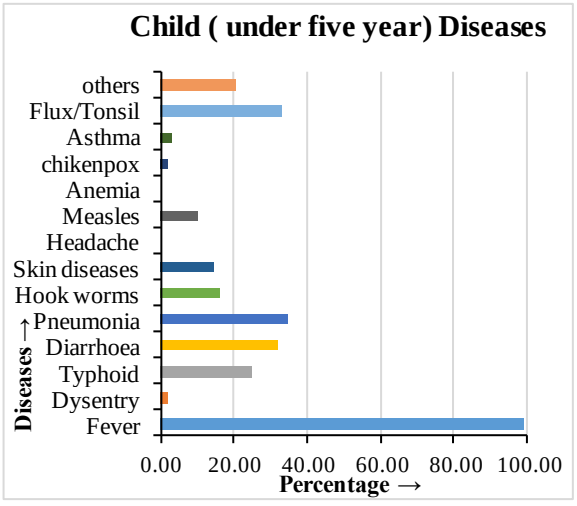

Figure 2.1: Child affected by different diseases

Source: Questionnaire Survey, 2018

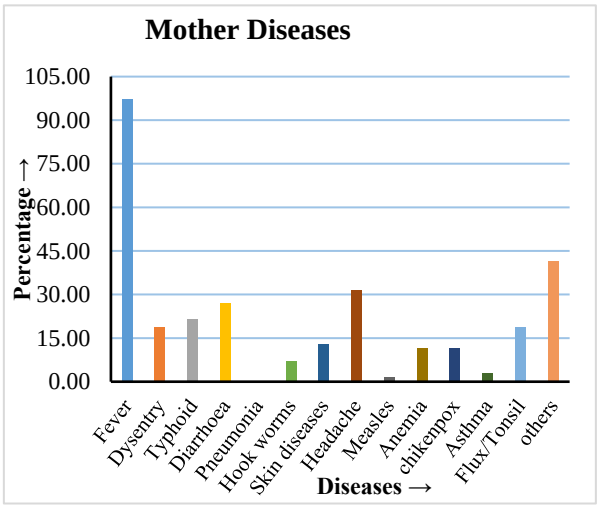

Figure 2.2: Mother affected by different diseases

Source: Questionnaire Survey, 2018

Treatment Accessibility

In the study area, accessibility to medical care was not good enough. Figure 2.3 reveals the fact that 39% of the mothers of the study area received treatment from quack doctors, 34.29% from local clinics, 7.14% from hospitals and 12.46% from homeopathic doctors. Govt. hospital and clinics were located quite far from the patients' homes and minimum distance of a clinic from home was about 7 kilometers. It was observed that homeopathic treatment was particularly given to children. To treat a child, Ayurbedik (Indigenous medicine) and faith-based treatment such as talisman, *jharphuk* etc. also practiced. Mothers had some superstitions. Mothers also believed that haircut caused diseases such as, fever. There were some sacrament prevails among mother about their children diseases and their treatment.

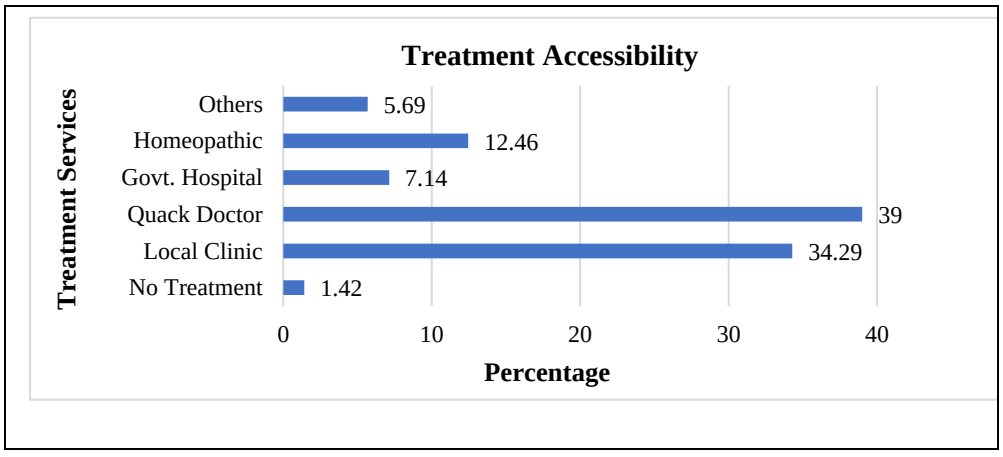

Figure 2.3: Treatment Accessibility of the Respondents

Source: Questionnaire Survey, 2018

Sanitation system and Hygiene practice within the Study Area

Evidence shows that hand washing can alleviate the incidence of diarrhotic diseases by 14-40% (Haque, 2003). Hand wash after defecation and before taking food is an important factor in hygiene practices. Figure 3.1 reveals the fact that most of the people in Teghori-Kalagachi mauza used only water (67%) and 30% of them used soap to wash their hand before taking food. In the study area almost 48.57% mother used soap, 25.71% people used soil and 22.86% people used ash for cleaning hand after defecation (figure-3.2). It was observed that villagers usually used damp soil or ash near the toilet as medium of cleaning their hands.

Latrine Structure

Most of the latrines were manufactured from (62.86%) ring slab with fence (Bamboo structure, corrugated sheet, Coconut or palm leaves etc.) and 22.86% of the latrines were manufactured from using ring slab with pucca wall and other types were *kucha* (made with mud) (figure-3.3). A study observed that about 57.95% households had hygienic toilets (DPHE, 2010).

Distance between Water Source and Latrine

Day by day people are motivated to make latrine near the water sources. In the study area about 52% latrines were located near the water sources and the distances between them were 1-15 feet (figure-3.4). A published report observed that less than 30 feet distance of tub well with 120 feet from latrine increased the probability to contaminate germs of feces with ground water (UNICEF, 2016).

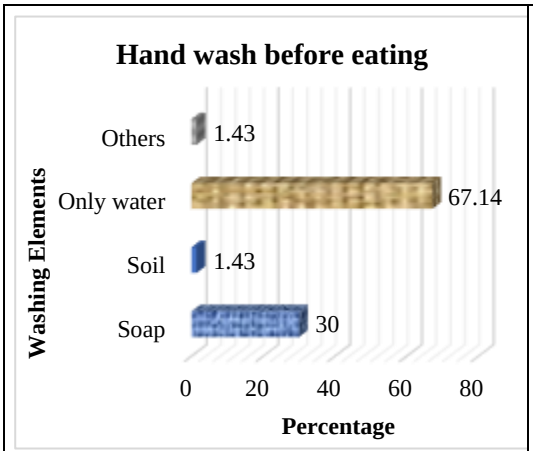

Figure 3.1: Hand wash practice before eating

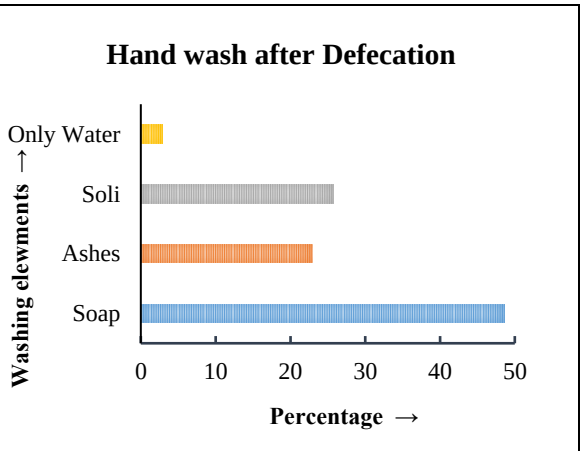

Figure 3.2: Hand wash practice after Defection

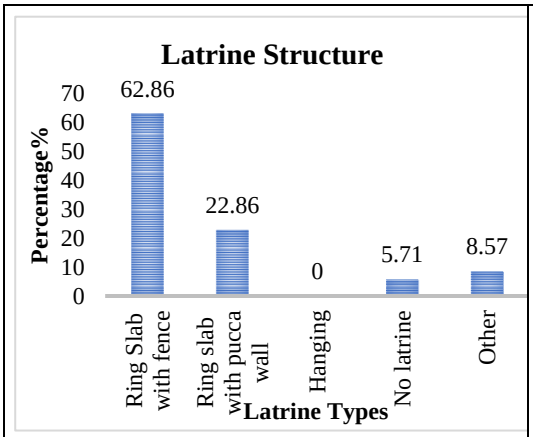

Figure 3.3: Respondent's Latrine structure

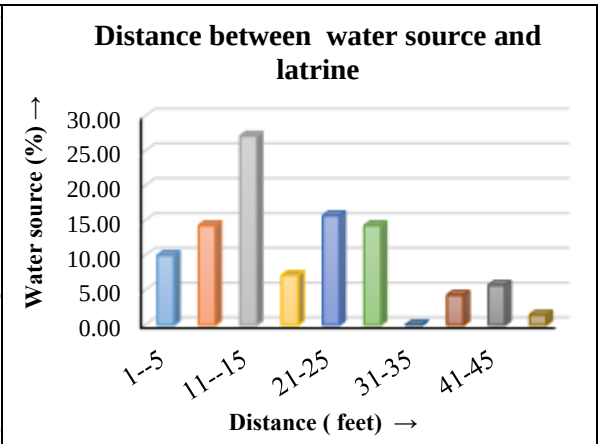

Figure 3.4: Distance between water source and latrine
Source: Questionnaire Survey, 2018

Shoe Use Practice, Defection Places (Children) and Hygiene Practices

In the study area about 44% mother used soap, 30% used only water and 13% used ash to wash their hands after cleaning their children. About 9% did not wash their hands. In a study it was found that 29.7% used soap, 7.6% only water and 62.6% people did not use anything to wash their hands (Haque, 2003). Mother who cleaned their child with cloth generally did not wash their hands (table-1). About 55.71% mother used only water for cleaning their children after defecation. And 31.43% mother used soap to clean their child. It also observed that 8.57% persons used cloth for washing their hands. Generally, mother used cloth in case of less than 4-month-old children. They had believed that using water for cleaning might cause diseases like cough, flux, pneumonia, fever and others (Table:1). About 53% respondents put on their shoes while using latrines and about 31.43% respondents occasionally used shoes and rest of the time went to latrine without shoes (table-2). Less than 1-2 years aged children used plastic pot for defecation purpose and more than 3 years old children defecated in the toilets. Table 2 delineate that about 41.43% children defecated in the latrines and about 30% of them used plastic pots and 20% children defecated in the open places or nearby bushes. Therefore, in this respect, about 9% of the children defecated in other places such as floor.

Table 1: Hygiene Practice (mother and child)

Hygiene Practice	Mother (%)	Children (%)
Only Water	30	55.71
Soap	44.29	31.43
Soil	4.29	-
Ash	12.86	-
Clean with Cloth	-	8.57
Others	8.57	4.29

Table 2: Shoe Use Practice (Mother) and Defection Place (Child)

Shoe use practice	Percentage (%)	Defection Places	Percentage (%)
Yes	52.86	Plastic pot	30
No	15.71	Latrine	41.43
Sometimes	31.43	Beside home	20
other	0.00	Others	8.57

Source: Questionnaire Survey, 2018

Correlation Analysis among Different Diseases of Mother and Socio-Economic and Environmental Variables

Diarrhea was closely related with different socio-economic variables. Table 3 delineate that there was a very low and negative correlation between education and diarrhea where r = -0.054 diarrhea and income of the family (r = -0.042), diarrhea and distance between water sources and kitchen from latrine (respectively r = -.105 and r = .164). It was observed that increases in educational qualifications, family income, and distances from water sources and kitchens from latrine decrease the probability of occurrence of diarrhea. Table 3 exposes the fact that there was moderate and negative correlation between dysentery and income (r = -0.362), means that with the increase of income the probability of dysentery decreases because higher income people can practice good sanitation facilities.

Table 3: Correlation Analysis among Different Diseases of Mother and Socio-Economic & Environmental Variables

Socio-economic and Environmental variables		Diarrhea	Dysentery	Typhoid
Education	Pearson Correlation	-.054	-.028	-.031
	Sig. (2-tailed)	.057	.017	.802
Income	Pearson Correlation	-.042	.362*	-.033
	Sig. (2-tailed)	.072	.028	.785
Shoe use frequency	Pearson Correlation	.114	-.101	.029
	Sig. (2-tailed)	.347	.405	.081
Hand wash practice after defecation	Pearson Correlation	.363*	.301	.192
	Sig. (2-tailed)	.028	.097	.448
Personal hygiene Practice of mother after children cleanup	Pearson Correlation	.156	-.007	.324
	Sig. (2-tailed)	.198	.051	.306
Distance between water sources and latrine	Pearson Correlation	-.105	-.061	-.160
	Sig. (2-tailed)	.389	.363	.185
Hand wash practice before eating	Pearson Correlation			.490*
	Sig. (2-tailed)			.015
*. Correlation is significant at the 0.05 level (2-tailed).	**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Questionnaire Survey, 2018

Table 3 delineate that with the increases of educational qualification and income levels the probability of typhoid decreases where r = -0.031 and r = -0.033. There exists moderate to almost high correlation between hand wash practice before eating and typhoid where r = 0.490 means that only water uses other than soap increases the probability of typhoid significantly.

Regression Analysis among Diarrhea and Socio-Economic and Environmental Variables

Table 4 delineate that one-unit can increase of hand wash practice after defecation (respectively soap, soil, ash, only water), personal hygiene habit of mother after children cleaning (respectively soap, soil, ash, solely water) and hand wash practice before eating (soap, only water, do not wash hands) increases probability of diarrhea diseases respectively. This table also delineate that increasing educational qualification decreases the probability of diarrhea where B = 0.036.

Table 4: Regression Analysis among Diarrhea and Socio-economic & Environmental Variables

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.243	.229		-1.062	.292
	Hand wash practice after defecation	.130	.053	.299	2.468	.016
	Personal hygiene Practice of mother after children cleanup	.120	.071	.206	1.693	.095
	Hand wash practice before eating	.039	.053	-.089	-.734	.466
	Education	.036	.036	.120	.985	.328
a. Dependent Variable: Diarrhea						

Source: Questionnaire Survey, 2018

Regression Analysis among Typhoid and Socio-Economic & Environmental Variables

Typhoid is highly dependent on hand wash practice. Table 5 delineate that one-unit change of hand wash practice after defecation (respectively soap, soil, ash, only water) increases 0.012-unit probability of Typhoid and it is statistically significant where p = 0.034. Hand wash practice before eating also increases the probability of pneumonia diseases.

Table 5: Regression Analysis among Typhoid and Socio-economic & Environmental variables

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.295	.256		-1.154	.253
	Personal hygiene Practice of mother after children cleanup	.081	.078	.128	1.038	.003
	Hand wash practice before eating	.126	.059	.264	2.122	.038
	Latrine structure	.039	.066	.071	.590	.058
	Hand wash practice after defecation	.012	.058	.026	.211	.034
	Education	.016	.040	.051	.414	.080
a. Dependent Variable: Typhoid						

Source: Questionnaire Survey, 2018

Correlation Analysis among Diseases of Children and Socio-Economic and Environmental Variables

Table 6 delineate that there is a moderate and positive correlation between typhoid with latrine structure (*pucca*, ring slab with fence, tin shade, *kucha* made with mud) and dish cleaning (with tub well water, pond water and others) practice. Ventilation system is an important factor for pneumonia and table 6 shows that there is moderate correlation between pneumonia and ventilation system (where r = .517).

Table 6: Correlation Analysis among Typhoid and Socio-economic and Environmental Variables

Socio-economic and Environmental variables		Typhoid	Pneumonia	Diarrhoea
Education	Pearson Correlation	-.113	-.221	-.151
	Sig. (2-tailed)	.353	.062	.211
Income	Pearson Correlation	-.097	-.113	-.095
	Sig. (2-tailed)	.427	051	.432
latrine structure	Pearson Correlation	.541**	-	-.277
	Sig. (2-tailed)	.044	-	.027
Shoe use frequency	Pearson Correlation	-.356	-	.200
	Sig. (2-tailed)	.642	-	.097
Hand wash practice after defecation	Pearson Correlation	.270	-	.393*
	Sig. (2-tailed)	.566	-	.044
Child hygiene practice after defecation	Pearson Correlation	-.012	-.119	-.018
	Sig. (2-tailed)	.920	.085	.884
Personal hygiene practice of mother after children cleanup	Pearson Correlation	-.165	-	
	Sig. (2-tailed)	.595	-	

Socio-economic and Environmental variables		Typhoid	Pneumonia	Diarrhoea
Hand wash practice before eating	Pearson Correlation	.372	-	.339
	Sig. (2-tailed)	.155	-	.051
Dish clean	Pearson Correlation	.453*	-	-.062
	Sig. (2-tailed)	.034	-	-.062
Ventilation	Pearson Correlation		.517**	
	Sig. (2-tailed)		.007	

Source: Questionnaire Survey, 2018

With the increases of age pneumonia decreases where r = -0.084. 1-12 month age's children more suffered with pneumonia. Hand wash practice after defecation (with soap, ash, soil only water and others) and before taking food (with soap, soil only water and others) are positively correlated with typhoid (r = .393* and r = .339). Therefore, there is a low and negative correlation among education, income, typhoid, pneumonia and diarrhoea.

Regression Analysis among Pneumonia and Socio-Economic & Environmental Variables

If another variable is constant then one unit increases of income will decreases –2.073 unit probability of pneumonia where Beta = - 0.209 but it is statistically not significant as p > .05 (p = 0.98). Table 7 illustrates that one unit increases in ventilation system (1 = yes, 2 = no) increases the probability of pneumonia 0.370 unit (where p = 0.001). House structure also influenced pneumonia. One unit increases of house structure (1= pucca, 2= Adha pucca, 3 = Kuccha with mud, 4 = tin shade) increases 0.105 unit probability of pneumonia. (p = 0.080).

Table 7: Regression Analysis among Pneumonia and Socio-economic & Environmental Variables

Coefficient						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.263	.248		-1.059	.293
	Income	-2.073E-5	.000	-.209	-1.677	.098
	ventilation	.370	.111	.431	3.325	.001
	House structure	.105	.059	.248	1.778	.080
a. Dependent Variable: Pneumonia						

Source: Questionnaire Survey, 2018

Regression Analysis among Diarrhea and Socio-Economic and Environmental Variables

The table 8 delineate that if another variable is constant then one unit increase in dish cleaning (pond water and tub well water), children defecation place (beside home, pot, and latrine) decreases the probability of diarrhea respectively (– 0.200 unit and – 0.068 unit).

Table 8: Regression Analysis among Diarrhea and Socio-economic and Environmental Variables

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.602	.337		1.787	.079
	Education	-.045	.029	-.194	-1.542	.128
	latrine structure	-.038	.048	-.099	-.795	.043
	Child bath	.027	.054	.063	.506	.061
	Water quality	-.068	.086	-.100	-.793	.431
	Dish clean	-.200	.238	-.105	-.840	.000
	Children defecation place	-.035	.041	-.105	-.850	.399
a. Dependent Variable: Diarrhea						

Source: Questionnaire Survey, 2018

Regression Analysis among Typhoid and Socio-Economic and Environmental Variables:

Table 9 delineate that if another variable is constant then one unit increase of children hygiene practices after defecation (soap, soil, only water others) and hand wash practice before eating (soap, soil, only water, don't wash) increases the probability of diarrhea respectively to 0.093 unit and 0.118 unit.

Table 9: Regression Analysis among Typhoid and Socio-economic and Environmental Variables

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.181	.416		.435	
	Children excreta disposal	-.060	.081	-.092	-.750	.046
	Children hygiene practice after defecation	.093	.093	.138	1.005	.032
	Personal hygiene Practice of mother after children cleanup	-.112	.082	-.169	-1.364	.018
	Hand wash practice before eating	.118	.068	.237	1.744	.086
a. Dependent Variable: Typhoid						

Source: Questionnaire Survey, 2018

Conclusions

Children are the future assets of the country and to get healthy children the country needs healthy mother. Mother's knowledge and education about themselves and their children are insufficient as a result they suffered from different types of infectious diseases. Pneumonia, diarrhea, typhoid, hookworms, headache, anima, measles are common diseases of children in the study area. These diseases are directly related to sanitation systems and hygiene practices. Socio-cultural and physical environments also have great impacts on mother and child health. Poor hygiene practice makes unhealthy environment which spreads different types of infectious diseases. It is clearly evident that there's an imperative need for especial attention to the health services for the inhabitants of rural areas particularly for children. Our health policy applicable for the entire country might not work for vulnerable areas. Therefore, particular health policy must be designed in the national level health policy. After analyzing different socioeconomic and environmental variables it was gathered that there exists an in-depth relationship between health and sanitation system. To avoid sanitation related diseases of mother and their children, there is a need to conscious people and disseminate the benefit of appropriate health and hygiene practices. To address the scarcity of qualified medical professional's rural adolescent having some deficient level of education will be trained as rural medical practitioners. The concepts associated with good practices can be preached within the study area through seminars, group discussions and mass sanitation and hygiene related education. Native governments and local people of the area may work hand in hand to extirpate contagious diseases from the study area.

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Impact of Immunization on Life Expectancy: Evidence from Bangladesh

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Abstract: This paper inspects the impact of immunization on life expectancy in Bangladesh. Bangladesh is one of the most successful least-developed countries implementing the immunization program that is supported by the World Health Organization (WHO). In this study, we are trying to examine whether or not this is true. For this examination, we are applying the multiple regression approach to estimate the impact of immunization, particularly Measles, DPT (Diphtheria, Pertussis and Tetanus) and Hepatitis B3 on the life expectancy in Bangladesh. We are using data extracted from the World Bank data indicators over the period from 1973 to 2017. After performing the test using R package, the results show that all three vaccinations had a positively significant impact on the life expectancy in Bangladesh. Finally, this research suggest that policy makers should immediately take action to implement all other necessary vaccines in Bangladesh.

Keywords: Immunization; Life Expectancy; Measles; DPT; Hepatitis B3, JEL category: JEL: I10

1. Introduction

Bangladesh gained independence on December 16, 1971, from Pakistan by a liberation war. In the first decade of after independence, it was a pro-socialist economy, then it shifted to a free market economy in the 1980's. In 2010, the United Nations conceded Bangladesh for achieving its Millennium Development Goal (MDG) 4, which is to reduce child mortality rate, and MDG 5a, which is to reduce maternal mortality. Between 1990 and 2011, child mortality (under 5 yrs.) per thousand live births decreased from 151 deaths to 53 deaths. This declining mortality rate causes for improving coverage of essential conciliations to restrict the root of child mortality. Between 1990 and 2010, maternal mortality per thousand live births decreased from 5.74 deaths to 1.94 deaths in Bangladesh (WHO, 2015). Many forces work behind these achievements. The main force is the kosher accomplishment of the immunization program in Bangladesh.

According to Institute for Health Metrics and Evaluation (2015), over the past twenty years' expenditure on immunization programs has substantially spread both developed and developing countries. There are two reasons: one is the invention of new vaccines at odds with the utmost diseases (Plotkin, 2005) and another is the justification of the importance of the value of investing in immunization (Kim & Goldie, 2008).

Over the last thirty years, UNICEF implemented the Expanded Program on Immunization (EPI) all over the world. World Bank (1993) recognize it is the one of the most cost-effective program in health sector and also it can prevent average 3.2 million child death in each year. EPI was established in the year of 1974 to ensure infants, children and mothers access to necessary vaccines. Black et al. (1980) suggest to improve of EPI delivery, that can ensure to prevent more child death.

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Andre et al. (2008) calculated the yearly return on investment (ROI) in vaccination, they found it was 12 percent to 18 percent. They also identified, life expectancy also increased. Today in the USA, life expectancy is 78.7 years, whereas it was only 47.3 years in 1900. Since vaccination helps decreasing morbidity and mortality, so that it helps to boost economic growth all over the world.

Vaccine related adverse impacts are rare. Many newly invented vaccines are developed using complex technologies. It is very important for effective monitoring after approving the vaccine to get proof of the general people are safe from any adverse effect from the vaccines. WHO introduced the Global Vaccine Safety Blueprint to help reduce adverse impacts from vaccination for all countries in 2011. For this reason, vaccines are administered anywhere in the world (Amarasinghe et al., 2013).

Most of the developed countries are expanding their immunization umbrella. Now, they are including diphtheria and tetanus toxoids and acellular pertussis, Haemophilus influenzae type b conjugate, hepatitis A, hepatitis B, inactivated poliovirus, measles/mumps/rubella, 7-valent pneumococcal conjugate, rotavirus (Rota) and varicella (VAR) with other regular vaccines (Zhou et al., 2014). But unfortunately the least developed countries are not introducing all of the necessary vaccines because of high cost.

In the year of 1979, EPI was introduced in Bangladesh, though it was not working effectively before 1985. In fact, the United Nations sets a target for Bangladesh to attained 100 percent child immunization by the year of 1990. At that time, EPI was not only supported by WHO but also multiple agencies: Non–Government Organizations (NGO's), donor agencies and community volunteers helped to implement EPI. Various clinic based activities also helped to implement EPI in Bangladesh. To motivate the general public for immunizations, immunizations were provided during household visits by the family planning assistance workers. National radio and television broadcasters were also playing a great role to gain the attention of the general people and motivated them not to abstain from the EPI activities. Bangladesh has been an impressive achievement of the immunization program. According to the WHO (2017), Bangladesh is one of the top-rated successful countries that implement the EPI. More than 97% of children ages 12-23 months were covered under the immunization program.

Bangladesh implemented the Measles, DPT (Diphtheria, Pertussis and Tetanus) and Hepatitis B3 vaccine programs in 1989, 1990 and 2003 respectively. The main purpose of this research is to calculate the impact of these vaccines on life expectancy in Bangladesh. This research find all three vaccinations had a positively impact on the life expectancy in Bangladesh and these positive impacts are statistically significant. It will help policy makers to take further initiatives for implementing all kinds of vaccines. It is expected that policy makers will agree to include additional vaccines to increase life expectancy in Bangladesh.

This paper is arranged as follows: I summarize the literature review in the section 2. In the section 3, I specify the research model and discuss the data. In the section 4, I present the research estimation results and finally section 5 provides conclusion of this research.

2. Literature Review

A lot of literature is available in health science journals related to the impact of immunization, but only a few of them use econometrics tools. Clemens et al. (1988) state that, vaccine can increase life expectancy by two ways. One is directly preventing the disease that causes for death and another is implicit positive effect to prevent the other causes of death. Their study finds that, for the measles immunization, many countries experienced declining the death due to the diarrhea.

Koenig et al. (1990) conducted a study based on longitudinal data from one specific rural area in Bangladesh from March 1982 to October 1985. They found that the MMR having a great positive impact on survival. Up to 36 months old children, there are 46% less probability of death who are vaccinated than who are not vaccinated.

According to Bonanni (1999), Bangladesh experienced almost 50 percent declining children mortality by the proper execution of EPI vaccines. He also stated that present advancement of vaccines will be effective to expedite decline mortality in the developing countries.

Most of the time policy makers counted health benefits and direct medical cost for the cost-effective medicine, but Bloom, D.E., Canning, D., & Jamison, D.T., (2004) assert that immunization has a lot of indirect benefits too. They also argue that economic growth can be possible by improvements in the health status of the people through a longer-term mechanism such as the decreasing mortality rate.

Lozano et al. (2012) explored that communicable diseases worldwide decreased from 33% to 25% between 1990 and 2010 due to immunization. A study conducted by the World Health Organization (2013) reports that vaccines prevent yearly deaths for more than 2.5 million children around the world.

Barnighausen et al. (2014) propose two types of benefits of immunization programs including narrow and broad benefits. Decreasing health care costs, gains in health, and increased care-related productivity are considered as narrow benefits. The development of human capital by improving child health represents the broad benefits by implementing immunizations.

There is a vast body of literature that relates to the health status and macroeconomic variables, though they are not directly related to immunization but some are directly related to life expectancy. Becker (1962) develops an empirical model within the theoretical framework about human capital investment. According to Becker, an improvement in the lifespan of someone's activity helps to boost up the ROI in any period. Mortality and morbidity rates are always directly related to the number of periods.

Soares (2005) develops a model where he finds life expectancy and the accumulation of human capital are the positively related. Conducting a longitudinal cross-country study, Alsan et al. (2006) find that average 9 percent FDI inducing if the life expectancy increases by the one year. It may also help to increase the economic growth of any countries.

A study funded by the GAVI alliance for 73 countries, Lee et al. (2013) find the positive impact of immunization on the reduce mortality rate for the African, Southeast Asian and the Eastern Mediterranean countries.

Zhou et al. (2014) using 2009 US data for their study and they find, immunization can prevent early death of children's and also reduces of many diseases. They also calculate the benefit-cost ratios for vaccinations are 3.0 for early deaths prevention and 10.1 for prevention of diseases.

3. Model and data

In this study, we are the using multiple linear regression model to find out the impact of immunization on life expectancy in the context of Bangladesh. The main reason to use classical multiple linear regression model in this study, it is very easy to calculate and understandable for the policy makers. Mainly this model explains how the two or more explanatory variables and a response variable fitted by a linear equation for the observed data. Here every dependent variable *y* linked with every regressor variable *x.*

The classical multiple regression model can be express as follows:

$$\mu y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta p\ xp$$

The above equation explains how the mean response μ_y changes with the independent variables*x*. Here, the regress or values for *y* vary about their means μ_y and are assumed to have the same standard deviation σ. The fitted values b_0, b_1, ….,*bp* estimate the parameters β_0, β_1 , …. , β_p of the population regression line. The multiple regression model includes variation, since the regressor values for y vary about their means μ_y. In words, the model is expressed as Data = Fit + Residual, where the "Fit" term represents the expression $\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p$.

In general, the model for multiple linear regression, given observations:

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_p x_{ip} + \varepsilon_i \quad \text{for i=1, 2, …, n}$$

At present, Bangladesh is implementing the Measles, DPT (Diphtheria, Pertussis and Tetanus) and Hepatitis B3 vaccine programs. Therefore, in this study, our dependent variable is life expectancy in years [LE] and independent variables are immunization of measles [IMM], immunization of DPT [IMDPT], and immunization of hepatitis B3 [IMHB3]. We also include some explanatory variables; they are GDP per capita growth in percent [GPCG], percentage of children of total population [PC], infant (under 5 years old) mortality rate [IMR], and adult literacy rate [ALR]. In this study, we used data from World Bank's data indicators over the period from 1973 to 2017 for all three vaccines.

Table 1: Descriptive Statistics.

Variables	Description	Mean	SD	Min	Max
LE	Life expectancy in year	61.54	7.6658	47.29	72.81
IMM	Immunization of Measles	52.62	39.4192	0.00	97.00
IMDPT	Immunization of DPT	55.84	41.5965	0.00	99.00
IMHB3	Immunization of Hepatitis B3	26.80	42.4321	0.00	98.00
GPCG	GDP per capita growth	2.81	2.4354	-6.00	7.721
PC	Percentage of Children	38.80	5.5801	28.37	45.18
IMR	Infant mortality rate	12.05	6.2941	3.24	21.96
ALR	Adult literacy rate	41.64	12.8956	24.89	72.89

Notes: N=45

Mainly we use regression analysis in this study to differentiate the relationship between each exposure variable and outcome variable for every cases. A regression coefficient estimates the average change in the outcome variable for each one unit change in an exposure variable when all other exposure variables hold unchanged. But if exposure variables in a regression model are correlated, then multicollinearity exists in the model. There is a possibility of wrong forecast, if high correlation between exposure variable exists. The variance inflation factors (VIF) and the correlation matrix of the exposure variables are most popular method to detect multicollinearity. In this study, we are using R software to create correlation matrix.

Table 2: Correlation Matrix

Variables	IMM	IMDPT	IMHB3	GPCG	PC	IMR	ALR
IMM	1.0000						
IMDPT	0.9950	1.0000					
IMHB3	0.6395	0.6222	1.0000				
GPCG	0.2579	0.2517	0.2916	1.0000			
PC	-0.2861	-0.2859	-0.2588	-0.0382	1.0000		
IMR	-0.9461	-0.9502	-0.7563	-0.5926	0.9696	1.0000	
ALR	0.8745	0.8694	0.8177	0.6073	-0.9761	-0.9405	1.0000

From the correlation matrix, it is clearly observed that some variables are highly correlated with each other. In this study, we are considering low coefficient (less than 0.3) for regressions model. So that, we have three separate regressions model for three vaccines and including GDP per capita growth and percentage of children. It is expected that, infant mortality rate and adult literacy rate are highly correlated with the implementing of vaccinations.

4. Estimation Results

To estimate regression model, we are using R software and find the results as follows:

Estimation result for Measles:

Regression model: $LE_i = \beta_0 + \beta_1 IMM_i + \beta_2 GPCG_i + \beta_3 PC_i + \varepsilon_i$ for i=1973, 1974, 1975, … , 2017.

	Estimate	*Std. Error*	*t value*	Pr(> |t|))
Intercept	96.76286	4.51704	21.422	< 2e-16 ***
IMM	0.06242	0.01288	4.847	1.83e-05 ***
GPCG	-0.15099	0.12550	-1.203	0.236
PC	-0.98163	0.09805	-10.011	1.42e-12 ***

"***'', "**'' and "*'' are Significant at 1%, 5% and 10% level respectively.

Here the IMM estimator is 0.06242 and it is significant at the 1% level. Here, we find a positive impact on life expectancy in Bangladesh for the measles vaccine.

Estimation result for DPT

Regression model: $LE_i = \beta_0 + \beta_1 IMDPT_i + \beta_2 GPCG_i + \beta_3 PC_i + \varepsilon_i$ for i=1973, 1974, 1975, … , 2017.

	Estimate	*Std. Error*	*t value*	Pr(> |t|))
Intercept	95.66667	4.40966	21.695	< 2e-16 ***
IMDPT	0.06210	0.01184	5.245	5.08e-05 ***
GPCG	-0.13927	0.12182	-1.143	0.26
PC	-0.95895	0.09561	-10.030	1.34e-12 ***

"***'', "**'' and "*'' are Significant at 1%, 5% and 10% level respectively.

Here the IMDPT estimator is 0.06210 and it is significant at the 1% level. Thus, we find a positive impact on life expectancy in Bangladesh for the DPT vaccine.

Estimation result for Hepatitis B3

Regression model: $LE_i = \beta_0 + \beta_1 IMHB3_i + \beta_2 GPCG_i + \beta_3 PC_i + \varepsilon_i$ for i=1973, 1974, 1975, … , 2017.

	Estimate	*Std. Error*	*t value*	Pr(> |t|))
Intercept	126.68041	3.97416	31.876	< 2e-16 ***
IMHB3	0.04435	0.01188	3.733	0.000575 **
GPCG	-0.08108	0.13774	-0.589	0.559339
PC	-1.64248	0.09284	-17.691	< 2e-16 ***

"***'', "**'' and "*'' are Significant at 1%, 5% and 10% level respectively.

Here the IMHB3 estimator is 0.04435 and it is significant at the 5% level. Here, we find a positive impact on life expectancy in Bangladesh for the Hepatitis B3 vaccine.

5. Conclusion

Bangladesh is one of the most successful countries which are implemented the Expanded Program of Immunization (EPI) effectively. Almost one hundred percent of the children were immunized by this program. In 2010, the United Nations also recognized Bangladesh for achieving to reduce the child mortality rate. Bangladesh achieved this goal in terms of both vaccine coverage and disease reduction. Immunization is one of the most effective programs to prevent diseases and it also helped to decrease the infant mortality. Immunization prevents the disease from developing, or reduces the severity. It is a very simple and cost effective way to save children's as well as adult's lives. Immunization, not only saves people's life, but also helps to build human capital by ensuring quality health, which may lead an economy to achieve sustainable development.

The premier goal of this research is to inspect empirically the impact of immunization, particularly Measles, DPT, and Hepatitis B3, on life expectancy in Bangladesh. For this purpose, we are applying multiple regression model using World Bank data indicators over the period from 1973 to 2017. In this paper, we are trying to include some variables like GDP per capita growth, percentage of children of the total population, infant mortality rate, adult literacy rate and female literacy rate. With the exception of GDP per capita growth and percentage of children of the total population, other variables are highly correlated with the immunization rate of Measles, DPT and

Hepatitis B3 in the context of Bangladesh. To avoid a multicollinearity problem, we do not include highly correlated variables in our model. In this study, we find all three vaccination programs have a positive impact on the life expectancy in Bangladesh which supports the existing literature and policy makers' perceptions. Bangladesh has improved its implementation of childhood immunization, but there is a lot of room for further improvement. Most of the developed and middle income countries are continuously expanding their immunization varieties to maintain their future generation's health status. They are investing a significant portion of their annual budget into the health sector. They thought that the expenditure on immunization is one kind of human capital investment. Based on our research, we recommend that Bangladeshi policy makers should immediately take action to implement all other necessary vaccines like hepatitis A & B, 7-valent pneumococcal conjugate (PCV7), rotavirus (Rota) and varicella (VAR), which are excluded now from the existing immunization programs.

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China's Stance on the Rohingya Crisis of Myanmar: A Geo-strategic Study

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Abstract: The paper intends to examine the strategic role of China to resolve the Rohingya refugee crisis. The Rohingya people are the most maltreated and victimized refugee groups in the world. They have been facing all kinds of state-sponsored oppressive policy in Myanmar. The humanitarian catastrophe has broken all others records relating to human crisis which is termed by the UN as "the textbook example of ethnic cleansing." In spite of having international condemnation of military-led ethnic cleansing, China is defending Myanmar on the global stage. In this circumstance, the paper aims to explore China's stance on Rohingya crisis in terms of geo-strategic perspective. The study is qualitative in nature based on descriptive and narrative method. The major findings of the study illustrate that Myanmar's geostrategic location bears great significance for China. China has massive financial investments and strategic interests covering the Rakhine state of Myanmar. Hence, China takes Myanmar aligned soft policy regarding Rohingya crisis to secure economic investments along with strategic interests in Myanmar.

Keywords: Myanmar, Rohingya refugee, China, Economic, Geo-strategy

Introduction

Myanmar is one of the largest countries in Southeast Asia adjoining the Andaman Sea and the Bay of Bengal. Geo-strategically it is located among three regions- South Asia, Southeast Asia and East Asia. It shares borders with the countries-Bangladesh, India, China and Thailand. China is situated toward the north and northeast of Myanmar, Laos and Thailand toward the east and southeast, India toward the northwest and Bangladesh toward the west. Myanmar is encircled by the Andaman Sea and Bay of Bengal toward the south and southwest.

Myanmar was a part of British India until 1937. After the World War II, the decolonization of the British Raj gave birth to the independent nations of India and Pakistan in 1947 and Burma in 1948 (Maung, 1989). Since the independence Myanmar followed parliamentary form of government which lasted for 14 years (Rashid, 2015). After that the country was ruled by many military rulers and became military controlled federal union with ethnic Burma dominancy. As a result, Myanmar has been suffering from ethnic insurgency within the country. Civil war and ethnic conflict is an ongoing issue in Myanmar which led thousands of people victims of torture, sexual violence, death penalty and forced millions of people to flee the country as refugees to the neighboring countries. In the year 2017, following border post attacks by rebel group, the Myanmar military has launched an ethnic cleansing operation against the Rohingya Muslims of Rakhine State including mass civilian killings, torture, rape, burning villages which are termed by the United Nations as "textbook example of ethnic cleansing." The

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atrocities on Rohingya people perpetrated by the Myanmar authority have captured international condemnation due to its inhumaneness whereas China is mostly silent supporting Myanmar. In this perspective, the paper intends to examine China's stand regarding Rohingya crisis based on geo-strategic factors.

It is mentionable that in recent years Rohingya refugee crisis has gained ample attention from the International community. Concerning on Rohingya ethnicities, the international world has condemned the action of Myanmar government for violating human rights. The International Court of Justice (ICJ) has urged Myanmar to take instantactions to stopviolence against its Muslim Rohingya minority (The Daily Star, 2020, January 24).[1] The US has imposed economic sanction on several Myanmar military commanders and urged the UN to form a fact -finding team for conducting investigation into the Rohingya region. But, China has taken Myanmar aligned soft approach regarding the issue. China has protected Myanmar from United Nations Security Council (UNSC) sanctions for military actions against Rohingya ethnic cleansing (South China Morning Post, 2017). Some authors like Regemortel (2019), Hilton (2013) and Shee (1997) examined the strategic importance of Myanmar to China with a focus on security and economic issues, but there are few articles regarding China's stance on Rohingya crisis with mainly focus on strategic issues. This paper fills the gap by examining China's response towards Rohingya crisis through the prism of geo-strategic factors.

Study Objects and Method

The Study has been designed to examine China's stance on Rohingya crisis through exploring China's geo-strategic interests in Myanmar which fueled China to keep support for Myanmar. Following the aim the paper is conducted based on two core questions- How China has responded towards the Rohingya crisis? And Why China has taken Myanmar aligned soft approach in terms of Rohingya crisis?The study is qualitative in nature based on analytical and narrative approach. The paper is mostly dependent on the secondary data. Most of the data has been collected from the secondary sources like books, newspapers, e-journals, articles, thesis papers, international organizations reports, government reports. And the data has been analyzed in a qualitative and descriptive manner. As a theoretical tool, the study takes the geo-strategic theory to understand the response of China regarding Rohingya crisis.

Conceptualizing Geo-strategy

Geo-strategy is meant the usage of a nation's possessions to attain strategic goals having geographical significance like acquiring access to trade courses, waterways and landmasses.

[1] On January 23, 2020, The Hauge –based United Nations top court International Court of Justice (ICJ) forced emergency temporary measures on Myanmar concerning its operation against Rohingya minority. These are (1) to stop genocidal acts (2) to ensure that the security forces of Myanmar does not commit massacre (3) to preserve proof of genocidal acts and 4) to provide report within four months (Khin, 2020).

Brzezinski (1986) defines Geo-strategy "as a particular approach to foreign policy which merges strategic consideration with geopolitical ones".

Grygiel (2006) defines geo-strategy "as the geographic direction of a state's foreign policy which describes where a state concentrates its efforts by projecting military power and directing diplomatic activity".

Actually, the provision of geo-strategic theory denotes that geographic location, physical environment and natural resources provide a primary basis for a country's strength in international relations as well as determine the behavior of other states. In the paper, the study will be revolved based on geo-strategic theory. The study explains how the geostrategic location and natural resources of Myanmar influences the policies of China in terms of Rohingya issue. The study explores that the Asian rising country China has geostrategic interests in Myanmar which led the country to take soft and Myanmar's supportive policy regarding the crisis.

The Rohingya Crisis

It is believed that the source of conflict in Myanmar is the diversity of ethnicities, nationalities and religion. The country bears ethnic diversity with 135 ethnic gatherings endorsed by the public authority and around 108 ethno-linguistic groups. According to the 1983 census -the Bamar represent around 69% of the populace, whereas the Shan (8.5%), Karen (6.2%), Rakhine (4.5%) and abroad Chinese (3%). Other ethnic gatherings incorporate the Mon (2.4%), Chin (2.2%), Kachin (1.4%) and 1% as Wa (South, 2008).

The Rohingya are an ethnic minority group living in Myanmar. They are discovered 1% of the all-out populace of Myanmar and 4% of the number of inhabitants in Rakhine, a state of western Myanmar (Tripathi, 2019).The Rakhine Buddhist communityis the leading group in the state, who constitute about 60% of the state population(Tripathi, 2019). But the Burmese historians and academics deny the historical origin of Rohingyas and term these people as Bengali immigrants. They are not considered Myanmarese citizens as per the 1982 Citizenship Act.[2] In fact, they have their own language, tradition, and culture that had been built up in Arakan by their long and historic settlements (Parnini, 2013). But after independence in 1948, the Government of Burma has refused the Rohingya's historical claims and denied their recognition as ethnic group (Holliday, 2014). In 1978, a brutal military operation called 'Nagamin Operation' or 'Dragon King Operation' was conducted by the armed forces and immigration officials of then Burma in the Kachin and Arakan states, to register citizens in the States and to oust alleged immigrants from the area before national census (Sultana, 2019). As a result, in the years 1977- 1978, about 200,000 Rohingyas entered Bangladesh to escape arbitrary arrest which was the first exodus of Rohingyas in independent Bangladesh (Ahmed, 2008).In 1991-1992, another Rohingya exodus occurred following brutal military atrocities against the group. After that in 2017 the Rohingya humanitarian crisis has broken all other records of military atrocities in Myanmar which led to the exodus of a huge number of people across the boundary to Bangladesh. On August 25, 2017, the Myanmar

[2] This act defines that according to the treaty of Yandabo, signed on 24 February 1826 which brought to an end the First Anglo Burmese war(1824-1826), anyone who was not a part of Burmese Kingdom, he/she and his/her descendants would not be provided the citizenship of Myanmar (Desai,1939, p.1).

military dispatched an assault on Rohingyas in the Rakhine state in light of severe conflicts between Rohingya radicals and the public authority powers along the northwest line to Bangladesh. During the violence at least 6,700 people were killed (MSF, 2017) and about 200 Rohingyas were drowned through capsizing boats while escaping the country (Alamgir and Islam, 2017). The military also scorcheda huge number of structures in 288 villages and enforced many Rohingyasto leave their homes (HRW, 2017). Since August 2017about 7, 50,000 Rohingyastook shelter in Bangladesh to escape violence (The Daily Star, 2020, January 24).At present the Rohingyas are perhaps the most victimized minorities on the planet.

Historical Background of China-Myanmar Relations

The political relations of the countries began on 8 June 1950 following Burma's acknowledgment to the People's Republic of China (Shee, 2002). After that both the countries signed friendship treaty and propagated a Joint declaration on June 29, 1954 centered on five standards (Than, 2003).[3] However, Burma preserved a neutral foreign policy in the 1950s and 1960s. In the 1970s the Anti-Chinese riots which were erupted in 1967 and the exclusion of Chinese communities from Burma engendered hostility between the countries. In the late 1970s the bilateral relations of the countries began to improve significantly following two events. First, following the military crackdown on pro-democracy demonstrations which was erupted on 8 August 1988 known as 8888 uprising, the newly formed State Peace and Development Council of Myanmar faced international pressure and censure which motivated Burma to promote robust relationship with China and second , in 1989 due to the military atrocities on the Tiananmen Square protests by the Chinese army, China faced international isolation which fueled to deepen the bilateral relations of the countries. After that both the countries enjoyed warm relations for the last 10 years. In October 1989, Than Shwe, the Vice-administrator of the State Law and Order Restoration Council of Myanmar visited Beijing and in December 1989 both the governments negotiated monetary and technical collaboration accord (Bolesta, 2018). At the time, the bilateral trade of the countries increased quickly. Since 2001 China has been the chief wellspring of Myanmar's import. In the 2000s, many Chinese backed infrastructure projects were introduced in Myanmar. One of the giant projects was the 3.6 billion USD Myitsonedambased on the Mali, the N'Mai and the Irrawaddy waterways (Bolesta, 2018). However, in 2011 the development of Myitsone dam was deferred by President TheinSein expressing environmental alarms. However, since 2011 China-Myanmar relations encountered a difficult period following Myanmar's financial advancement toward the western nations. Although China invited Myanmar's political progress; it misconstrued Myanmar's engagement with the western nations particularly the US. But, in 2016 after assuming power by Aung San SuuKyi, the reciprocal relations of the nations improved following numerous prominent visits between the nations. During the 2016 China visit, Aung San SuuKyi consented to build up three border trade zones as a component of China's Belt and Road Initiative (Yhome, 2019). In May 2017, Memorandums of Understanding (MoU) were also signed that incorporated Cooperation inside the Framework of the Silk Road Economic Belt, the

[3] The Five Principles, as stated in this treaty, are – " Mutual respect for each other's territorial integrity and sovereignty , Mutual non-aggression , Mutual non-interference in each other's internal affairs, Equality and mutual benefit and Peaceful co-existence"(Than, 2003).

21st Century Maritime Silk Road Initiative and the foundation of the China-Myanmar Border Economic Cooperation Zone (The Irrawaddy, 2017). Furthermore, since 2016 China has expanded its role in Myanmar's ceasefire process through monetary and political help. China's role was encouraging in motivating ethnic armed gatherings to participate in the 21st century Panglong Peace Conference started by Aung San SuuKyi (Yhome, 2019). On 27 July 2016, Sun Guoxiang who was the China's unique delegate for Asian dealings joined the Mai Ja Yang summit of ethnic armed gatherings that was billeted by the Kachin Independence Organization (KIO) (Yhome, 2019). At the same time Sun Guoxiangvisited the United WA State Army (UWSA) and the National Democratic Alliance Army-Eastern Shan State (NDAA-ESS) to affirm their cooperation in the peace conference (Yhome, 2019).Again in late 2017 the military atrocities against the Rohingya ethnic minorities in Myanmar were condemned by the international community which has created opportunities for China to increase its leading role in Myanmar through defending from international condemnation and providing material and political support for Myanmar.

China's Response towards Rohingya Crisis

From the year 2016, China has expanded its part in Myanmar's peace course by providing finance and political support. The first formal rule started through hosting a peace talks between delegates of the Kachin Independence Army and the government of Myanmar. At the stage China failed to play the mediatory role but the Rohingya crisis has provided opportunity for China to regenerate its dominance on Myanmar's foreign relations and to assert its leadership as regional leaders. The Rohingya crisis has provided opportunity in the sense that whereas the western countries especially the US and the EU provoked condemnation demanding the Myanmar's government's handling of alleged human rights violation, China has come forward to defend Myanmar from international pressure and punitive measures in the United Nations Security Council that reflects China's chiefdom on the global stage. Actually, from the period August 2017, a severe humanitarian predicament has been unfolded in Myanmar's Rakhine state following border post violence by the ArakanRohingya Salvation Army (ARSA). The attack has been responded quickly by the Myanmar Military which sparked ethnic cleansing operations against the Rohingya population in Rakhine state. It is reported that around 700,000 Rohingya have escapedto Bangladesh to avoid the large scale ethnic cleansing campaign of the military (Human Rights Watch, 2018). This humanitarian crisis receives ample attention from the global community. The United Nations marked the situation as "textbook example of ethnic cleansing". The western countries like the US, the EU and many organizations of the Islamic conference countries provoked condemnations demanding the Myanmar's government's human rights violation. In contrast, China, the closet neighbor and trading partner of Myanmar has supported the Burmese government to maintain warm relations with the country.

China has secured Myanmar from the sanctions of the United Nations and has provided material and political support to tackle it's so called radicalism. On 6 November 2017, the UN Security Chamber recognized a presidential statement condemning the circumstance of Rakhine, China refused to deal with the potential resolution demanding that the resolution was not the appropriate measure to the crisis (Joy, 2018). Again, On 16 November 2017, the UN General Assembly approved a resolution on the

circumstance of human rights violation in Myanmar by 135-10 votes, with 26 countries refrained, within 193-strong house in New York. The resolution urged the Myanmar government to guarantee the practical return of Rohingyas to their birth places with protection and reverence. China voted against the adoption of the resolution, drafted by the Organization of Islamic Cooperation (OIC) while India abstained from the vote (The Daily Star, 2017, November 17).On 19 November 2017, during the visit of Chinese Foreign Minister Wang Yi to Myanmar, China recommended three plans regarding Rohingya crisis-

a) Promoting ceasefire and repatriation of Rohingya refugees;

b) Financial advancement in Rakhine State;

c) Demanding international efforts to emphasize on investment in the Rakhine state (South China Morning Post, 2017).

On 25 December 2017, again China and Russia opposed the UN General Assembly resolution which was put forward by the Organization of Islamic Cooperation to urge Myanmar for ending the military atrocities against Muslim Rohingyas (The Daily Star, 2017, December 26). As the western nations increased pressure andre-imposed sanctions, China took the stand of protecting Myanmar considering its interests in Myanmar.

In August 2018 following the release of a UN fact-finding mission report that called for senior Tatmadaw generals to be inspected for ethnic extermination, China defended Myanmar by referring it as Rakhine's "complex background." Against setting up tribunal to refer the perpetrators to the International Criminal Court (ICC) of Hague, China took this stand that one-sided condemnation would not be effective to resolve the crisis. This approach of China reflects china's supportive role for Myanmar government and the Military regarding Rohingya crisis. Actually, China's stance on the Rohingya issue is enclosed with the facts of inconsistency of political jargons which has been revolved with strategic concerns. Firstly, it viewed the Rohingya problem as a respective issue between Myanmar and Bangladesh (Irrawaddy, 2018). Secondly, it emphasized on repatriation and expressed that Rohingya should be expatriated from Bangladesh to their birthplace Myanmar. And thirdly, it was against "approaches that tend to complicate, worsen, and internationalize the issue" (The Irrawaddy,2018).

Factors Influencing China's Position

The above discussions demonstrate that China stood beside Myanmar regarding the Rohingya issue. The country not only defended Myanmar from UN sanctions and international condemnations but also provided material and political support to tackle the so called radicalism in Myanmar arguing that the military is trying to maintain domestic stability. It is noteworthy that both Myanmar and China have age-old economic interaction due to their geographic proximity. Myanmar's geostrategic position at the tri-intersection of East Asia, Southeast Asia and South Asia is significant in respect of strategic and economic interests of China that are mentioned below-

Border Security and Stability: Both China and Myanmar share a total of 2200 km border with each other of which about 1640 km border are not fenced (Zhao, 2018). One of the significant interests of China is to ensure border security and steadiness. From the

security and economic perceptions, China's stability with shared border of Myanmar is vital. For a long time, the borders of China and Myanmar have been working as a source of strain following the linkage of ethnic armed groups with China. The borderlands of the countries are occupied by the ethnic groups sharing social and cultural affinities. For instance- the Kachin in Myanmar and the Jinphos in China are of a similar ethnic stock. Similarly, the Wa are found on the two sides of the boundary. As a result, China is concerned about the potentiality of spilling over conflict to its border side. China is playing a major role in managing internal ethnic conflicts of Myanmar which greatly influence the border security of China.

Access to the Indian Oceans: Myanmar is strategically important for the People's Liberation Army Navy (PLAN) of China to arrive at the Pacific and the Indian Oceans via the Myanmar –controlled Coco Islands. Myanmar's location at China's southwest will make it easy to reach the Indian Ocean via Myanmar controlled Islands. In the sphere of transportation, Myanmar is the solitary route for China to arrive at South Asia and Indian Ocean. Through gaining access to the Indian Oceans the PLAN would have the option to curtail the remoteness and reliance on South China Sea and the Strait of Malacca.

Developing Western region of China: Myanmar is central to China for developing its western region. Since 1990s China is trying to develop the western region through different development structures like Greater Mekong Sub-region (GMS) development scheme and the Bangladesh-China-India-Myanmar (BCIM) regional financial collaboration. Specially, Kunming will be benefitted economically through trade and investments by linking up with Myanmar.

Protecting Economic Schemes: China is the biggest investor as well as biggest trading partner in Myanmar. China has considerable infrastructure projects in Myanmar. It has special economic zones, power plants, oil and gas fields and Khaukphyu deep sea port in Rakhine State. The Rakhine State, where most of Rohingya live, is being industrialized to excerpt its natural resources like oil and gas and China is the leading player of that. For example, the Swhe gas pipeline scheme, a project to import gas from the Indian Ocean to the southwest of China is mentionable. The Construction of the project began in 2010 and the gas pipeline was done in 2013 (Al-Adawy, 2013) while a corresponding pipeline for oil was placed into operation in 2017 (Tahilramani, 2018). Besides, the construction of the pipeline, other infrastructural mechanisms like railways, highways, organic plants and different types of framework are necessary in the area and China is investing heavily for that. In terms of geo-economic interest, Myanmar is important for China to recover its 'Southwest silk road' from Yunnan region to Myanmar and Bangladesh and India toward the west. The linkage with Myanmar would support China to expand trade with the developing economies of South Asia and India.

Securing Energy Supply from Myanmar: Myanmar is full of natural resources like oil, gas, timber and stones which are significant to China to meet up its growing energy needs. Many Chinese companies have started oil and gas exploration projects in Myanmar and major Chinese based investments contain the Sino-Myanmar oil pipeline and the $ 3.6 billion Myitsone dam (Smith, 2018). On 10 April 2017, Chinese President Xi Jinping and his Myanmar partner, HtinKyaw, negotiated to activate the oil pipeline which is about 770 km long from Kyaukpyu city of western Myanmar to the Chinese boundary (Kodaka and

Nitta, 2019). It is assumed that the Pipeline can transmit maximum 22 million tons of oil every year (Kodaka and Nitta, 2019).In fact, Myanmar is tactically significant for China particularly with regard to its Belt and Road Initiative. Chinese companies are building a deep water commercial seaport at Kyaukpyu's natural port and also developing special economic zones and power plants which would ensure not only China's energy security but also connect the country to the Bay of Bengal, Indian Ocean and beyond. So it is clear that in terms of both geo-strategic and economic interests, Myanmar is significant to China and hence to secure economic and strategic interests China aligned its position with the Myanmar government regarding Rohingya crisis.

Map 1: China-Myanmar Oil and Gas Pipeline

Source: Adapted from Hilton (2013).China in Myanmar: Implications for the Future, Norwegian Peace Building Resource Centre, Oslo, p.6.

It is noteworthy that China is also maintaining a close relation with Bangladesh through financing mega projects and delivering rhetoric speech regarding Rohingya repatriation. In July 2019, during the visit of Prime Minister Sheikh Hasina to China, both the countries signed nine bilateral agreements in the fields like economy, investment, Rohingyas aid, power, culture, tourism and technical cooperation (*The Daily Star,* 2019, July 5). During the visit the Bangladesh Prime Minister expressed deep concern regarding the Rohingya repatriation and sought Chinese assistance to resolve the crisis. The Chinese counterpart Li Keqiang assured that China would induce Myanmar to resolve the crisis through bilateral dialogue and made an agreement to provide 2500 tons of rice for the Rohingya refugees in Bangladesh (Ibid). Although over the past two years (2017-2019) the Chinese officials have mediated three meetings between the heads of the two nations and made several visits to the refugee camps of Bangladesh, there is no progress concerning the Rohingya repatriation. Actually, China is not doing enough to persuade Myanmar resolving the crisis. China is tied up attaining key economic interests in Rakhine rather than creating conducive environment there.

Conclusion

The paper has been designed to examine China'sstance on Rohingya crisis through the prism of geo-strategic factors which influence China to take Myanmar aligned soft approach regarding Rohingya crisis. Following the objective, the paper finds that China has geo-strategic and economic interests in Myanmar and its intervention on Rohingya crisis is motivated by strategic factors. China not only declared its open support for Myanmar, but also expanded financial and political influence in the country. China has protected the Myanmar's military in the UN by trimming down a Security Council statement drafted by the UK. China has also endeavored to halt Security Council session on the Rohingya issue and diminished the funding allocated for inspecting the occurrences in Rakhine State which is the manifestation of China's Myanmar aligned supporting policy on Rohingya issue. Additionally, China is maintaining cordial relations with Bangladesh which is the largest investor for Bangladesh. China is addressing that the country is trying to persuade Myanmar to start early repatriation considering Bangladesh's concerns. In fact, both Bangladesh and Myanmar are significant to China for its strategic ends. So, it is expected that China is the most capable actor of playing a constructive role in finding solution to the crisis. Having close economic interaction and diplomatic leverage with Bangladesh and Myanmar, China can play a vital role in finding amicable solution to the crisis. But in the respect China should decide whether its involvement would be driven to solve the crisis or to meet its own strategic affairs.

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Rohingya Crisis in Bangladesh: Socio-Cultural Issues and the Challenges of National and Regional Security

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Abstract: The *Rohingya* people comprise an ethnic Muslim minority group who are deprived of their basic entitlement and citizenship by the government of Myanmar. From 1970s, significant numbers of *Rohingya* people have been forced to flee across the border to Bangladesh because of religious belief, cultural values and political discrimination. Ethnic persecution and violent confrontation continue to significantly undermine the human security of the *Rohingya* Community. Nevertheless, their migration is perceived as a considerable threat to the host community in South East border area of Bangladesh. This research aims to understand the socio-cultural dimensions and cultural paradigm of *Rohingya* community. Study focuses on the perspectives of the participants regarding the issue of customs, norms, lifestyle and values intend to know socio-cultural behavior of *Rohingya* and provide solid argument based on historical evidence and try to identify the socio-cultural differences between *Rohingya* community and the local community of Bangladesh. Following a qualitative approach, the research conducted participant observation, focus group discussion, in-depth interview and key informant interviews as data collection tools to identify the complex connections in terms of socio-cultural aspect between the prolonged community presence and the local community. This research attempts to predict the major challenges in the context of national and regional security that host community may face in near future. The preliminary findings suggest that the inclusion of *Rohingya* people has some positive socio-cultural impact, but adverse consequences of the crisis are greater than the positive impacts, causing in local instability and conflicts. Building strategies in conglomerate with the international community to force the Myanmar Government to begin repatriation of the *Rohingya* people will be a pressure-release strategy for Bangladesh Government. Finally, some suggestions are addressed to improve the situation in near future.

Keywords: Rohingya Crisis, Socio-Culture, Challenge, National and Regional Security.

Introduction

The refugee problem is one of the most challenging issues in this contemporary globalizing world (Noor et al., 2011). The problem is more complex as it is seen from both safety and security as well as a humanitarian point of view. The safety and internal conditions of the host nations become susceptible as the refugee or asylum seekers involve and/or participate in many criminal practices that contribute numerous social and safety problems to the host states (Abedin, 2018). Moreover, host and/or compelled country capability may not allow the migration of this overwhelming population due to their economic, resource and safety constraints and restrictions. From this point of perspective, the extended *Rohingya* crisis in Bangladesh is no exception since the

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enormous and ongoing flow of *Rohingya* from Myanmar to Bangladesh since 1978 created many social, financial and safety issues (Abedin, 2018). After independence in 1971, Bangladesh began to experience the ongoing expulsion of *Rohingya* intruders from its neighboring nation of Myanmar, the perpetrators of both religious and ethnic persecution. *Rohingya* intruders are liable for destroying Bangladesh's global reputation as they commit numerous offences and involvement in illegal activities by means of false Bangladeshi passports (Imran and Mian, 2014). It is a matter of sadness that Bangladesh faces a major dilemma about this problem between human rights and national security issues at the same time (Abedin, 2018). As a result, Bangladesh formulated and enforced rigid domestic laws to avoid the flow of *Rohingya* from Myanmar (Chakma, 2016).

The *Rohingya* is a separate racial, cultural and religious group from Myanmar's northwest Rakhine region (Noor et al., 2011). In culture and religion, it varies considerably from other ethnic groups in Myanmar, especially the Buddhist majority, and somewhat from Bangladesh (Milton et al., 2017). However, Similarities comprise certain elements of culture, shared common religion and Bengali (Bangla) vocabulary, but with different dialects (Albert, 2017). It is sensible to suggest that there is more compatibility than many other types of refugees and host. It is high time to identify *Rohingya*'s culture, norms and values otherwise they will mix up with the host community's culture and this is already happening nowadays. We should do, not only to differentiate from the host community but also to protect the *Rohingya*'s literature and culture as well.

From a humanitarian perspective, the Bangladeshi people showed considerable empathy and tolerance for the *Rohingya*s, and the state made substantial attempts to provide fundamental requirements with of UNHCR (Mayat, 2018). The problems are why the status quo is an inappropriate option to repatriation; it is asserted (Mayat, 2018).

Research Aim and Objectives

The broad main of the study is to identify the cultural diversity between Rohingya and the host community and attempt to address the national and regional security issues that may raise a possible threat to Bangladesh in the future. The specific objectives of this study are…

- To identify the socio-cultural practices of *Rohingya* migrants.
- To differentiate the cultural aspects between *Rohingya* Community and the Host Community.
- To address the challenges of national and regional security that may incur in future due to the ongoing *Rohingya* crisis in Bangladesh.

Study Area

The *Rohingya* refugee camps are spread at different locations in Cox's Bazar District, and the Bangladesh government has been disappointed that the international community has not exerted sufficient political and diplomatic stress on Myanmar to address the root cause of the *Rohingya* issue. The crisis in *Rohingya* did not begin in August 2017. More than 200,000 refugees have already settled at Cox's Bazar semi-permanently. The

sensitivity of the problem and the current issues are the few strategy choices with results that are appropriate to both Bangladesh and the *Rohingya* and it is crucial to know how the local community and national government reacted to the post-August 2017 recession. However, the research team conducted the study in Camp 4 (extension) refugee camp in Ukhia, Cox's Bazar, Bangladesh. It is one of the mostly populated camps by Rohingya refugees who fled neighboring Myanmar from ethnic and religious persecution. This is one of two refugee camps run by the Government in Cox's Bazar. Balukhali, Ghumdum and Thangkhali are the surrounding camps. The expansion site had a total population of 6,172 and there were 1492 households on September 2019 (Iqbal, 2019).

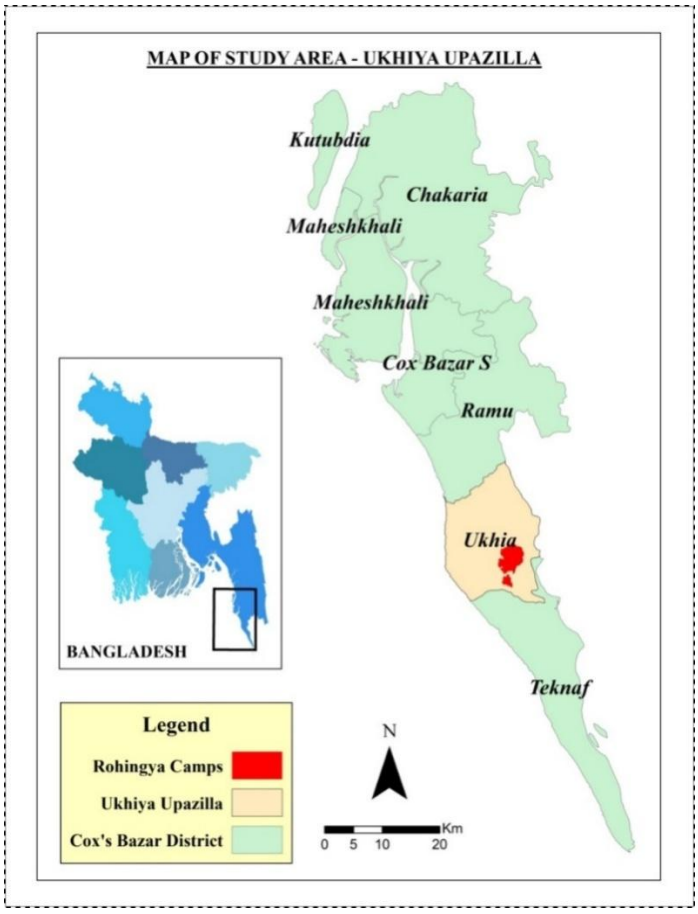

Figure 1: Location of the Study Area in Cox's Bazar District.
Source: Google Map (Modified by Authors)

Cox's Bazar District, as presented in Figure 1, is situated in the Southern and South-Eastern part of the Chittagong Division, consisting of 2,491,85 km^2 of primarily low-lying coastal soil with big tracts of mixed agricultural fields and rough forest slopes inland (Lewis, 2018).The climate of Cox's bazar is influenced by its monsoon zone, which creates heavy rainfall (averaging 4,285 mm per year), high temperatures, and different wet and dry seasons (BBS 2017). Cox's Bazar's tropical, coastal condition exposes it to regular natural disasters for instance storms, tropical cyclones, hurricanes,

and tidal bores, combining with the impacts of climate change, soil degradation, deforestation, and erosion to create many difficulties (Lewis 2018). Following 2010, tourism over-development has taken its toll on the coastal setting and limited assets available to the inhabitants (Shahzalal, 2016). The local economy is mainly focused primarily on tourism, fishing, hospitality, aquaculture and small-scale farming (Lewis 2018). The majority of the population here are Muslim, some of them are Buddhist, Hindus and Christian and a comparatively tiny but varied number of distant, native ethnic groups. The complete district population of 2,655,000 (BBS 2017) has nearly increased since the 1990s, owing at least in part to the flow of *Rohingya* migrants, but it has also grown as a result of internal migration in pursuit of job in the flourishing tourist center of Cox's Bazar City.

Data and Methodology

The methodology of this research covers some sequential steps including study area selection. Primarily, secondary data from various websites and published journals have been used in this study. Then, following the study objectives, the analysis and arrangement of the information have been done. Not all humanitarian problems influencing the *Rohingya* are covered by this evaluation. It focuses on the dimensions of socio-cultural practices which seem to play a vital role to identify the cultural differences between host community and *Rohingya* Community and this is one of the main concerns of this research. The data collected in this quick assessment is not a blueprint for intervention, but rather a conversation of the *Rohingya*'s social and cultural variables that can play a part in addressing humanitarian objectives. This research also focuses on the national and regional security threat that may face host country in their near future because influx of *Rohingya* migrants.

In the refugee Camp 4 (extension) in Ukhia, Cox's Bazar about 1492 families are living there. On that area host community and *Rohingya* community are living together. Primary data have been collected from the field survey (from 19th March,2019 to 27th September, 2019) through applying Participation Observation, FGD (Focus Group Discussion), IDI (In-depth Interview) and KII (Key Informant Interviews) techniques while secondary data have been collected from online databases such as Humanitarian Responses, UNHCR, World Bank, Bangladesh relief website, and search engines such as Google Scholar. Ethnographic methodology has been applied during the field survey. Authors tried to become integrated into the participants‟ environment while taking down notes and recordings. This method helped us to decide which questions are relevant and what language to use. Total four FGD**s** were conducted in the study area. Two were conducted with the host community and *Rohingya* community. And another two were conducted teachers, union parishad representatives. Authors have been conducted 10 in-depth interview**s** with *Rohingya***s** and local people and 10 key informant interviews with Government Officials, personnel from NGO, INGO & development partners, religious leader and principal of the local high school. In order to avoid the imbalance of information by the respondents, the authors took the same number of people from two different communities (Rohingya and the Host Community).

Respondents were spontaneous to give their information and opinion. Through applying the ethnographic research technique, it was possible to find the present trends of

Rohingya culture easily and it was possible to identify the cultural differences between local and *Rohingya* community and to observe the changes over time. Considering the inflow of *Rohingya* migrants, the Analytic Induction (AI) method has been used to predict the threats of potential national and regional security that may impact the host country in near future. Finally, 'Narrative Analysis' has been applied to get the peoples' voices which helped to find the ground realities. A snapshot of the used methods in this study is outlined in **Table 1.**

Table 1: Methods and data analysis procedures and their application in the research

Data Collection Method	Application
Ethnography (Participation Observation, IDI, KII and FGD)	To identify the culture, language, norms, values, religious believes literature, sports and songs that belong *Rohingya* community.
Data Analysis Procedure	Application
Analytic induction (AI)	To analyze the predict national and regional security threat that may face host country in near future because inflow of *Rohingya*
Narrative Analysis	Capture the story of *Rohingya*s and explore the facts related to conflict, threats, security, concerns and issues.

***Rohingya*: Status and Dilemma**

Rohingya crisis is a very complex problem in Bangladesh. International community referred to this community of *Rohingya* as "Refugee" (Mayat, 2018). But the Government of Bangladesh is reluctant to grant *Rohingya* people the 'refugee' status, who fled Myanmar since the brutal military repression and identified them as temporary migrant. The term 'migrant' and 'refugee' are used simultaneously. Yet, they have definite meaning. A refugee is someone who has been forced to flee his or her country because of persecution, war or violence. A refugee has a well-founded fear of persecution for reasons of race, religion, nationality, political opinion or membership in a particular social group. Most likely, they cannot return home or are afraid to do so (UNHCR, 2018). On the contrary UNHCR defined migrant as any person who moves, usually across an international border, to join family members already abroad, to search for a livelihood, to escape a natural disaster, or for a range of other purposes. These distinctions carry a significant importance considering the complex problem of the *Rohingya* crisis.

***Rohingya* Diaspora**

If there is a persistence of displacement and individuals are consolidated in their refugee areas, complicated situation may arise between those distinct areas which can be defined as 'refugee diaspora' (Van Hear, 2006). When people escape from war or persecution, it is most prevalent in other areas of their nation to seek protection. The concept of "Diaspora" among social researchers has risen in the recent years. Initially, the diaspora concept referred to the dispersal of Jews from their country of history. Today it is used to describe several well-established communities with 'geographical displacement'

experiences, such as the Palestinian refugees (Clifford, 1994). Traditionally it defines the dispersion of a community from their homeland. Diaspora can play a major part in positive way by sharing cultural heritage and sending out remittance to family as well as in negative way by creating conflict in their homeland from their country of origin. In practical terms, as scattered communities with a sense of common identity, diasporas provide an important connection between their host nations and their countries of origin. They have local awareness, as well as the knowledge of Myanmar's context and perspective that can help the stateless group finding the alternatives for accountability and regaining citizenship.

Historical background of *Rohingya* community

This paper focuses on socio-cultural practices of *Rohingya* community which could appear to be a significant fact determining as a threat of national and regional security in the host community. Therefore, there is a necessity to understand the historical dimension of *Rohingya* community. The *Rohingya*'s roots in Arakan, Myanmar have been identified in literature dating seventh Century AD. They are a community with a unique culture and their own civilization (Ullah, 2011). Their origin can be attributed to Moghul, Arabs, Pathan, Moor, Bengali and Indo-Mongoloids who have inhabited in the region for many centuries (Hookway and Mahtani, 2015). This section explains the history of *Rohingya* and provides a context behind the conflict in their homeland. Prior to 788 A.D. Islam entered Arakan and local people were drawn to come in mass throughout Burma to the fold of Islam. Ever since then, Islam had played a significant role in the development of Arakan's civilization. During British rule, The British played 'divide and rule' game in Arakan, resulting in that many of the Buddhist Arakans started to hate and threaten the *Rohingya*s as 'Kalas' which means foreigner (Tha, 2007). Despite being an indigenous race, the Rakhine Maghs purposefully labeled *Rohingya*s as illegal immigrants from their neighbors, particularly from the South-Eastern Bengal region of India, which later became East Pakistan in 1948 and later became Bangladesh as it achieved independence in 1971. (Tha, 2007). Since Myanmar gained its independence from Great Britain and became an independent republic in 1948, the government has not treated *Rohingya* as one of the country's listed ethnic minorities and denied them from giving citizenship and fundamental human rights (Siddiquee, 2012). *Rohingya*s were not subjected to any legislation as complete citizenship. During 1962, when military government of Ne Win adopted Burmanization Policy, the scenario altered dramatically. The *Rohingya* didn't support the Rakhine political party in the new policy after these events which resulted in a conflict situation between two parties (Shams and Wolf, 2015). The central government in the state encouraged anti-Muslim perception which excluded them from getting political, social and basic human rights.

Rohingya Influx: Origin to Crisis

The Muslim *Rohingya*s talk in Bengali, unlike majority Theravada Buddhist Burmese and most Rakhine, who talk in either Burmese or Rakhine. The *Rohingya*s are therefore an ethnic, cultural and religious minority in Myanmar and Rakhine, formerly recognized as Arakan. The *Rohingya*s argue to have come from Moorish, Arab and Persian traders and troops and refugees from Moghul, Turkish, Pathan and Bengali (Ahmed, 2009). Huq and Karim (1935) mentioned that Islam started to spread to the Eastern bank of the

Meghna to Arakan from the eighth and ninth centuries AD soon before the Muslim empire was established in the border region. Between the fifteenth and nineteenth centuries, the spread of Islamic influence increased strongly across the border region of Bengal-Arakan, especially in Northern Arakan. Following the military coup in 1962, which led the present government of Myanmar to authority, the *Rohingya*s were systematically refused their civil, political, financial and cultural human freedoms, culminating in the 1982 Burmese Citizenship Act.

Bangladesh has been the largest destination for the *Rohingya*s as a neighboring country of Myanmar and eventually received the *Rohingya*s in four phases. The first phase was in 1978 when more than 2,00,000 *Rohingya*s arrived in Bangladesh from the fear of persecution in Myanmar (Yesmin, 2016). At that time, Bangladesh dealt with it as a humanitarian crisis, providing shelter and other aid. In the year 1991-1992 was the second time when another Rohingya exodus occurred with 2,50,000 *Rohingya*s fleeing from the state repression in the northern Rakhaine state of Myanmar (Ullah, 2011). For the first time Bangladesh government called on UNHCR (United Nations High Commissioner for Refugees) for those *Rohingya*s. Some diplomatic steps had also been taken to resolve this issue, in particular the MOU (Memorandum of Understanding) signed on April 28, 1992 between Bangladesh's Foreign Ministers and Myanmar (Farzana, 2017). No refugee status was granted to the *Rohingya*s after 1992, but they were called Illegal Immigrants. Bangladesh had been trying to adopt a realistic *Rohingya*s deportation strategy since 2008-09 (Khan, 2016). The third phase was during a clash between the Buddhist and *Rohingya*s in Myanmar in June 2012 that caused 1,00,000 people to be displaced (Khan, 2016). This time, Bangladesh did not allow humanitarian agencies to assist the unregistered *Rohingya*s and followed the push-back policy. The fourth phase which took place in 2017 is perceived to be the world's most severe refugee crisis. In less than a month, more than 4,20,000 *Rohingya*s were fleeing from Myanmar into Bangladesh and created massive pressure on Bangladesh (Gibbens, 2017). As stated by United Nations, up to 6,00,000 *Rohingya*s have fled Myanmar for Bangladesh since the Myanmar army started a crackdown on the ethnic minority group on August 25, 2017 (Gibbens, 2017). The figure now reaches more than 8,00,000 and can reach more than 1 million if the situation continues.

Socio-cultural Aspects of *Rohingya*

By culture, a specific class, group has a common way of life and the complex ideologies that are formally adopted as moral choices or values (Eley, 1995). Culture is not inherited biologically but learnt socially by human. It is often called “learned ways of behavior”. Untaught conduct such as closing the eyes while sleeping, rubbing the eye reflex and so on, are purely physiological and not cultural. Shaking hand, conveying “Salam” or “Thanks” are part of culture (Rubin, 2002). Similarly, dressing, cooking foods, singing, dancing, worshipping are all ways of behavior learnt by men culturally. Culture is capable of being transmitted from one generation to the next. Culture is transmitted not through genes but by means of language. Language is the main vehicle of culture. There are many examples of the transmission of culture (Eley, 1995). For Example: nowadays, *Rohingya*s adopt a different communicational language by their religious education (Arabic, Urdu and Parsi) (Rafique, 2012).

Culture exists as continuous process. “Culture can therefore be conceived to be a kind of river that flows from one generation to another down the ages”. Some sociologist like Linton called culture “the social Heritage” of man. As Robert Bierstedt writes, Culture is “the history of the Humans”. Ethnic persecution and violent confrontation continue to significantly undermine the human security of the *Rohingya*. Nevertheless, their migration is perceived as a considerable threat to the socio-cultural aspect of *Rohingya* in the South East border area of Bangladesh (Azis, 2014). Most of the Bangladeshis thought in future, *Rohingya* culture will create problems with regard to their life and livelihoods. One cannot draw the right conclusion in the matter of socio-cultural life of *Rohingya* without in depth studies of the contemporary histories of Arakan. Religious architecture, language and indigenous literature of Arakan form a strong core of historical proof that shows mostly the Buddhist nature of Arakan. Historically, most *Rohingya* people were farmers. Many *Rohingya* farmers in Burma are landless due to discrimination and legislation which restricted them from owning land. *Rohingya*s are the main followers of Islam in Burma, a conservative type of Sunni Islam (Azis, 2014). Older males develop bears and females generally wear hijab and the participation of females in some sectors and civil life is limited (Ripoll, 2017).

Polygamy is still cultural practice in the *Rohingya* community, although forbidden by the Burmese government. Many women, especially those with higher access to education and heads of families, look for work outside of home. The status of women in the home is not homogenous because it depends on age and status (Boutry et al, 2015). *Rohingya* females usually dress in traditional dress, such as ‘sarong’ and men wear ‘longy’. When females go outside of their home or workplace, they wear hijab or a niqab (Rafique, 2012).

The *Rohingya* language is significant to describe feelings, emotions and ideas but most of the words influenced by Urdu, and many *Rohingya*s do not know the word. *Rohingya*'s popular diet is made from rice, potatoes, fish, vegetables, milk, chicken, and chillies (Boutry et al, 2015). *Rohingya* is an Indo Aryan language closely linked to the Chittagonian dialect and it is not internationally acknowledged and uniform written script. *Rohingya* has no surnames and when people get married, the names don't change. The application of names is custom-driven (Rafique, 2012)

National and Regional Security

There has been an increasing concern of the need to expand the notion of security and the distinction between traditional and non-traditional security since after the cold war (Swanström, 2010). Non-traditional safety threats have gained attention, especially in the developing country. It threatens societies by addiction, crime and illness and undermines the financial and political operation of the community (Swanström, 2010). It is obvious that safety is still regarded in military terms and, above all, an enemy is certainly defined. As human rights violations caused *Rohingya* to be displaced from Myanmar and they are hardly protected in Bangladesh, the present literature deals with *Rohingya* as a humanitarian problem, but not as a threat of internal instability inside Bangladesh. Though many studies illustrate how and why insecurity generates refugees, it is equally important that how refugees generate dispute, crisis and insecurity in their host nation (Rahman, 2010). Following many constraints, tens of thousands of *Rohingya* migrants

have been sheltered in Bangladesh. The cheap labor of *Rohingya* workers has affected the working conditions of local workers negatively. It has created hostility and conflicts and turmoil in the area that the *Rohingya* are ready to work for less wages than the workers of Bangladesh (Rahman, 2010). In addition, anti-social activity in the unregistered *Rohingya* refugee camp has been on the increase. Moreover, Bangladesh Government shouldn't be entirely ignorant of the fact of human security of the *Rohingya*s despite its national security concern.

Result and Findings

Socio Cultural Identification of the '*Rohingya* Community'

Each human society has its own form, its own meaning and its own purposes. These are expressed by every human society, in formal and informal institution, in arts and education. Making a community is discovering prevalent meanings and instructions, and its development is an engaged discussion and change under the pressure of knowledge, interaction, and exploration, writing themselves into the land (Rubin, 2002). These are the conventional developments of human societies and human thoughts, and we see through them the nature of a culture: that it is constantly both traditional and creative; that it is both the most common senses and the finest individual meanings. Use the term 'Culture' in these two senses: meaning a whole manner of life — popular meanings; meaning arts and learning — that means process of unique discovery and creative activity (Rubin, 2002). For identifying the socio cultural practices of *Rohingya* community, this study sheds light on the following socio cultural aspects i.e. language, custom, food, music and poetry, sports, marriage and religious values.

a) Language

The *Rohingya* language (Ruáingga or *Rohingya*) is an Indo-Aryan language strongly linked to the Bengali (Bangla) Chittagonian dialect spoken by the host population of Bangladesh around Cox's Bazar. The *Rohingya* language is mainly an oral language and has no standard written script that is globally acknowledged. From **figure 2**, we can see different languages are used in written type to record the *Rohingya* language: Arabic, Urdu, *Rohingyalish* (a streamlined *Rohingya* script using Latin letters), and Hanifi named after its founder Maulana Mohammed Hanif.

Figure 2: Language Script (Arabic and Latin).

Source: Uddin, c2018

Figure 3: Rohingya Character Set (Roman Script.)

A a	B b	C c	Ç ç	D d	E e	F f
G g	H h	I i	J j	K k	L l	M m
N n	Ñ ñ	O o	P p	Q q	R r	S s
T t	U u	V v	W w	X x	Y y	Z z

Source: Uddin, c2018

After that, E.M. Siddique's strategy was distinct, using only Latin letters. The outcome is a writing system recognized as *Rohingyalish* consisting of 26 Roman letters, five accented vowels, and two extra Latin characters for nasal and retroflex sounds. The language of *Rohingya* may also sometimes be transliterated using the Burmese alphabet, but even native speakers who are proficient in Burmese and English still strive to write *Rohingya* in this way. Many *Rohingya* who have low level of education and even those who can read and write continue to experience difficulties in *Ruáingga* learning and writing owing to inconsistencies and distinctions between distinct language structures.

b) Clothing

Typically, traditional clothing of *Rohingya* ladies are *sarong* (also called *ta-mi*, *ta-ine*, or a female *longyi*), which is a big fabric cut that is often tied around the neck. *Rohingya* men often dress in *longyi* (a piece of cloth covered around the waist extending to the feet that is generally worn in Myanmar). Many *Rohingya* women use *Burqa* that seems a black dress worn over the *longyi* and *blouse*. Women wear this outside their home or workplace, but regional variations are significant (Farzana, 2015). *Rohingya* in pastoral areas in the Northern settlements of Rakhine State tend to be more conformist than those in the central townships which are more developed and have easier access to greater educational facilities. Few humanitarian employees have noted that this practice has shifted quickly since the camping of internally displaced persons in 2012 in that conservative principles are increasing within groups that are now restricted within in the camps for Myanmar's internally displaced individuals (Rafique, 2012). *Rohingya* females decorate their skin with henna paste or *'Mehendi*' for marriage or spiritual celebrations as part of their traditional cultural exercise. Sandal wood powder is used by *Rohingya* girls and women on the other hand as a religious practice. Older men use henna to color their beards. Henna can also be used as a traditional remedy to cure fragile bones, headache, back pain, stomach pain or burning (Rafique, 2012).

c) Food Habit

Rice, frozen meat, potatoes, fresh fish, rice dishes, chicken, dairy and chilies are the prevalent *Rohingya* food. Sometime people eat meat (beef, chicken and mutton) at their religious holidays. They use three meals a day if they can afford it. The family generally eats at home; males and kids eat first and the females and younger girls eat after male. People use betel leaves (*Paan*) with areca nut and tobacco extensively for recreational reasons. They normally offer *Paan* (betel leaf) and areca nut, when they meet each other or make a home visit. Many men smoke *Biri* (handmade tobacco), some females smoke as well. Normally *Rohingya* people don't take alcohol because it is prohibited by Islamic law (Boutry et.al, 2015). People in this area still prepare a variety of rice cakes that are

popularly recognized as *Pitha* on some particular occasions. In the time of *Manrique*, *Sidol* (decomposed fish), *Xaga* (*hak*), dried fish, etc. were some of the popular meals of the indigenous individuals of the region of Arakan-Chittagong. With its geographical location, the Arakan inherits a mixed culture of Indian cuisine, Rakhine dish. "*Modhu Vat*" is another familiar food in the *Rohingya* community.

There are considerable nutritional constraints during pregnancy and especially during lactation. Many *Rohingya* think that pregnant females should not consume beef and have no contact with cold water, especially rain water, and should only drink warm water or tea. A female eats primarily plain rice and chilies for 40 days after giving birth and frozen fish if the household can afford it. It is believed that dry meat, especially dried chilies, will fasten the recovery of the mothers. During this time, vegetables and beans are forbidden. In reality, in the six months after giving birth, there is a lot of nutritional limitation for females. These constraints differ from family to community and are largely idiosyncratic. Parents genrerally keep breast feeding until the age of two (Boutry et.al, 2015).

d) Music and Poetry

Music and song represent people's life in their way of thinking, feeling, expression and what they belong. Similarly, the lives of *Rohingya*s are influenced with one of the most significant aspects of culture; music and song. In the combination with contemporary musical instruments, *Rohingya*s use many traditional tools such as *Tobla* and *Juri*. Song plays an oral medium to convey *Rohingya*s' emotions, feelings and sentiment in order to preserve their history alive among the majority of uneducated community through spiritual, philosophical and country songs (Farzana, 2015). Howla is a kind of popular song performed by females followed by dancing at almost every wedding ceremony. Some of the melodious popular songs among the *Rohingya* society are *Bitayali Geét* (song), *Jari Geét* and *Gazír Geét* (Farzana, 2015).

e) Sports and Games

Kéla literally means sport or game in the language of *Rohingya*, and there are many native *Kéla* that take place depending on seasons, genders and ages. Although there are some in the rainy season, many are held in summer and winter. *Gáñthi Kéla* (Rowing) with 10 to 20 rowers on a boat that is larger than modern rowing boat is one of the most popular sports. *Boli Kéla* (wrestling), *Qundha Kéla* (Rounded Stone Lifting), *Dooóp Marani Kéla* (Diving and Swim-ming), and Paddy Transplant sports are some of the most common and popular games in the *Rohingya* community. Youths of both genders are also very interested in playing numerous types of games for instance *Bosgya Buri Kéla* (Bag Jumping), *Saws Sa Rani Kéla* (Slippering), *KutKut Kéla* (Hopscotch), *Rosi Fal Doní Kéla* (Rope Jumping), *Moól Kéla* (a kind of Bounding crossing), *Gíla Kéla* (Monkey Ladder Bean Throwing), *Dhudhu Kéla* (Chasing Calling Dhu) and *Dhang Kéla* (Batting of cylindrical piece of wood).

f) Religion and Belief

Rohingya are Islam's predominant believers in Myanmar, practicing a conservative type of Sunni Islam centered on the Hanafi mazhab. Older males grow beards and generally females wear *hijab* when they (female) go outside their home. Women's participation in

some areas of public and civic lives is limited (Albert, 2017). Every settlement in *Rohingya* used to have mosques and madrasahs (religious institutions). To pray together, men visited the mosque, while females prayed at home. In 2012 a governmental meeting prohibited the gatherings of more than four people in Muslim-majority areas that made it hard for *Rohingya* to pray together (Albert, 2017). In the communities, *Rohingya* traditionally has processes for maintaining a powerful sense of solidarity and collectivism, a tradition called "*Samaj*". In general, *Rohingya* also makes obligatory Muslim donation (*zakat*) to the community's poor. While most Rakhine State refugees are Muslim, the number of Hindu religious people are very small proportion of population. There were about 21,000 Hindu people living in Rakhine State who are not acknowledged in Myanmar as an official ethnic group (Gaynor, 2017). They speak the same dialect as the *Rohingya*s do, but they don't generally identify themselves as *Rohingya*. A few numbers of Hindu migrants were accommodated in distinct refugee settlements in Bangladesh.

Cultural Differences between Host Community and *Rohingya* Community

In this section, an attempt has been made to demonstrate the cultural differences between host community and *Rohingya* community to identify *Rohingya* community's behavior, attitude, customs and pronunciation. It could be easily identified when they came to Bangladesh as a mass exodus in 2017. However, most of the *Rohingya* people are trying to adapt the local Bengali culture nowadays. Therefore, an extensive field survey through ethnographic methodology has been carried out to deeply observe and identify the *Rohingya* individuals and the community as a whole. **Table 2** shows the basic cultural differences between two communities.

Table 2: Cultural differences between host Community and Rohingya Community

Aspect	Host Community	*Rohingya* Community
Influence of the languages (for oral communication)	The people of host community (Chittagong) speak a local dialect, which is Bengali in the main with admixture of Arabic, Persian, Arakanese, Portuguese, and several indigenous words (Hookway and Mahtani, 2015).	The people of *Rohingya* community speak a *Rohingya* language, which is based on Urdu in the main with admixture of Arabic, Persian, Arakanese, Portuguese, Bengali, Pali, English and several indigenous words (Hookway and Mahtani, 2015).
Accentuate	The most noticeable feature is the tendency to slur over consonants, to chip syllables and to substitute aspirates for sibilant.	The most noticeable feature is the tendency to their word in Arabic language pattern and huge influence Arabic, Urdu and Persian Word.
Pronunciation	Most of the host community person pronounce their word differently e.g., Doijje (Sea) Buijje (Old Man) Goijje (Done by others) Foijje (Fall Down)	Most of the *Rohingya* community person pronounce their word differently e.g., Doirje (Sea) Buirje (Old Man) Goirge (Done by others) Foirje (Fall Down)
Writing Standard	About 90 percent of people of Chittagong (host community) including Muslims, Hindu, Buddhist, Maghs and others speak local language, but they write standard Bengali.	The *Rohingya* community only Muslims and Arakanese speak *Rohingya* language, but their writing standard are not so clear.

Aspect	Host Community	*Rohingya* Community
Cultural Influence	Host community is the inhabitant of Chittagong who practices Bengali culture.	*Rohingya* Community are not inhabitant of Chittagong who practice only their Muslim culture.
clothes	Host community wear different types of cloths like, Sharee, Duthi, Panjabi and all available in their hand.	*Rohingya* Community wear also different types of cloths but lungee, Thamee, Fatua, sharee etc are popular.
Festivals	Host community celebrate almost every Muslim and Bengali cultural customs like, Eid, and all Muslims occasions, side by side they also celebrate Puja, Maghi Purnima, Buddo Purnima, Boishaki festival, and Christmas etc.	*Rohingya* Community celebrate only Muslims cultural customs like, Eid, Shob-A- Barat, Shob-A- kadar, Shob-A- Meraj, Moharram. They are not celebrating any Puja or Christmas. Few people celebrate other religious customs.
Legacy	Most of host community people are looking mix descend (Rajbanshi, Arya, Indian, Afgan, Mughal and Persian features), they live in the plains where they have settled down.	*Rohingya* community indication of their Mongolian descends has been obliterated by inter-marriage with Non-Aryan Bengalis of Chittagong.
Identity	According to host community, they have large influence of Bengal and Arakanese in their homeland. They have negatively called them "Baa'nl" or "Boingya" (Half breed of Bengali) "Roaingy" (half breed of Arakanese). They also called them proudly "Chitaaingya" (original inhabitant of Chittagong).	According to Rakhine, most of the *Rohingya*s are mixed descent, and they have a large proportion of Portuguese, Mugh or Muslims blood in their vein. They are called negatively "Kala" (Half breed Portuguese), "Bengalis" (half breed Bangladeshi Muslims).
Devotional Rite	Host Community maintain every ritual like which observed by their ancestral legacy. Their culture is now mixture with Hindu and Buddhist culture, e.g. Kadambuchi, Gaye Holud, Bashor, etc.	*Rohingya* community maintain only those rituals which maintained by their ancestral legacy. They follow only Muslim rituals such as: Kolakuli by announcing Azan when a new baby born, Praying Salath during holy days, etc.
Food Habit	Host community e.g. Muslims eat almost everything halal. Those who are Non-Muslim, most them are vegetarian and some of them take meat and vegetable. There have different types of Pita, food habit like, Dui pita, Puli pita, Pakkhon pita, Modhubhat, etc.	*Rohingya* Community also takes meat and vegetables. There also have different types of pita and food habit, which is now they fail to recall like Fakkon pita, shainne pita, Modhubhat, goijja pita, Gura pita, etc.
Religious Rituals	Host community maintains some rituals such as fasting in Ramadan, giving Zakath etc. Hindu and Buddhist maintain their rituals too.	*Rohingya* community maintains only those rituals which are according to Quran and Sunnah, some rituals they maintain by their folk rituals like pairing Nose and Ears.

Source: Field Survey, 2019

National and Regional Security Concern for Bangladesh

National security can be understood as the security of a country, with its peoples, economy, and organizations. According to Harold Brown (1983), "national security is the ability to preserve the nation's physical integrity and territory; to maintain its economic relations with the rest of the world on reasonable terms; to preserve its nature,

institution, and governance from disruption from outside; and to control its borders." Thus, National security encompasses its various dimensions including political, economic, social and environmental security. Although *Rohingya* crisis has created the biggest forced displacement in human history, it raised a question against Bangladesh's internal stability. The following sections highlighted the concerns related to national and regional security.

a) Geo-political Crisis: The problem of *Rohingya* is one of the bilateral challenges between Bangladesh and Mayanmar, which is still unresolved. The problem also carries geo-political importance as the worldwide and regional power focuses on this strategic region. Over the previous few decades, the oppression of *Rohingya*s in Rakhine has resulted to regular exoduses of refugees into Bangladesh (Rahman, 2010). Surprisingly, bilateral trade between Bangladesh and Myanmar is very limited (Parnini et al, 2013). Although these two neighbors are not as near and interactive as they should have been, the problem of *Rohingya* is very complicated and this problem is no longer a bilateral problem between Bangladesh and Myanmar and it also includes global and regional power. Bangladesh and Myanmar's distinctive geographic position make them the center of global politics. Since the beginning of this crisis, the Chinese government has remained with Myanmar in favor of the argument that the *Rohingya* exodus was a natural result of safety problems (The Dhaka Tribune, 21st September 2017). In this crisis, the Indian government has also backed Myanmar while attempting to fix its tracks in Bangladesh. Because, India justifies this issue as a threat to security and the formation of Islamic fundamentalism. Chinese's intention is to build 'Belt and Road project' at Rakhine creating a very large facility for transportation and manufacturing. The *Rohingya* crisis will lessen Myanmar's attractiveness as an investment spot but will boost Chinese influence.

b) Arms, Drug and Human Trafficking: The *Rohingya* camps of Cox's Bazar are a prime territory for Islamic extremists to recruit and execute their operation (Rahman, 2010). The ARSA (Arakan *Rohingya* Salvation Army) militant group has already proven its capacity to hire *Rohingya* jihadist militants from refugee camps to combat and smuggle weapons and drugs across Bangladesh-Mayanmar borders (Haque, 2016). The illegal trade in small arms, a lucrative business, is also one of the safety and security concerns for Bangladesh. Moreover, *Rohingya* activists raise funds with the assistance of local and global Islamist groups (Lintner, 2009). Ullah (2011) has claimed that Harkat-ul-Jihadi and Jaamat-i-Islam have been involved in financing the illegal operations of *Rohingya* migrants, both inside and along the boundary of the territory of Bangladesh. Past experiences of already existing *Rohingya*s in Bangladesh have boosted the strong potential to be enlisted in various extremist organizations for *Rohingya* refugees in Bangladesh which suggest a potential risk to create instability and conflict between borders. From the interview it is found that the *Rohingya* people and local criminal networks are working together on robberies, mostly small theft of household items such as solar panels and pots. The respondents felt that many refugees from *Rohingya* were involved in the use and smuggling of methamphetamine (yaba) and had motivated youth from the host community to become addicted to it. It is well recognized that Myanmar is a yaba producer country; respondents felt that Bangladesh was victimized by its neighbor's drug trafficking problems. Also, some unregistered refugees from *Rohingya* have been found using passports from Bangladesh to travel overseas. The field survey

team also found the presence of unethical practice of some host community who are helping the Rohingyas to get the Bangladeshi passport. Legalization of Rohingyas and increase the vote bank are the hidden issues for such help. The fact is, Bangladesh does not have or strictly practice any law, legislation or official refugee confinement policy.

Human trafficking has been a worldwide phenomenon over the last few decades. There has been a well-entrenched network mixed with local Bangladeshis, newly arrived *Rohingya*s as well as those who have been staying in refugee camps for a long period (Modern Diplomacy, 2017). And limited earning options within camps increased the chances of refugees becoming the targets of human traffickers. Sometimes refugee families reach to people who smuggle in order to give their daughters early marriage as a type of security. Bangladesh has direct air, sea and highway connections with almost all drug-producing nations, and Naf River between Bangladesh and Myanmar is used as a major pathway by global drug traffickers and weapons smugglers, particularly by Myanmar drug traffickers (Haq, 2003). This suggests that the *Rohingya* refugee crisis is now no longer just a humanitarian concern but a potential danger to Bangladesh's internal safety and security.

c) Conflict around Labor Markets: The biggest problem for host communities is the fall in wages for daily workers. Refugees move to the host community to seek work at the lowest wage rates, thereby dominating the local labor market and losing job opportunities for the poor in the host community. Many women reported before influx of the *Rohingya* their husbands earned 500 BDT (6 USD) per day, but now only earned about 300 BDT per day. This was very worrying and for many it was the root of a deep sense of injustice. The women complained that refugees were receiving assistance and have far less expenditure than local people. The women said Rohingya were ready to work for 200 BDT a day, which makes it impossible for local people to survive. The fact is, *Rohingya* people take almost half wages compare to local people which are one of the main reasons of job scarcity for the local poor people. A young woman clarified that *Rohingya* have a better knowledge of agriculture and are able to prepare bamboo products. Others respondent told that *Rohingya* people also good at heavy labor like road construction. Even some residents of the host community themselves were keen to hire refugees to staff shops and road-building activities as their work is cheap and they are willing to do work that local people do not want. A representative from Community Development Centre (CODEC) stated,

> *"Several NGOs are recruiting volunteers from Rohingya refugee youth to do low-cost work instead of employing host community workers at higher wages. The refugee youth of Rohingya were unqualified and less educated than the host. Many Rohingya refugees are engaged in the work of the host community and are hired because of their willingness to accept low wages."(Interview, Field Survey, 2019).*

Economic security can be ensured by meeting constant supply and demand of product in a society. *Rohingya* crisis has pushed a huge number of unemployed refugees to seek a means of livelihood. Within 2 years of the influx they have come to learn the local language of the host community as the *Rohingya* language and Chittagonian language are very similar and this allowed them to go beyond the refugee camp for employment and engaged in conflicts with the local community. Moreover, it has been found that the

price of the daily commodities, such as vegetables, chicken and meat in the local markets are comparatively higher than the other parts of the area resulting a decline in lifestyle of the host community.

d) Risk of Community Conflict and Social Insecurity: Findings indicate that the host community generally perceives the *Rohingya* as aggressive in nature. It has repeatedly found accounts of disputes with the *Rohingya* in FGDs with the host community and the fear of the local people being attacked and beaten by the *Rohingya*. The local people are also fearful that the *Rohingya* will outnumber them. During a FGD a middle aged man said

> *"There are uncountable problems that arose after their arrival. We suffer from 1991, but in 2017-2018 this pressure had increased. If there's any conflict between Rohingya and Bangladeshi, then we will have to suffer and we can't retaliate". (FGD, Field Survey, 2019).*

Some respondents from the host community claim that girls from *Rohingya* engage in transactional sex with men from Bangladesh in and around the camps. Respondents often believe that local boys and men have increased risk of HIV.

> *"In the locality, there are many girls engaged in sex business for monetary benefits. Many of our area's married and unmarried men engaged with them in physical relationships. These girls belong to the Rohingya community of the area." (FGD, Field Survey, 2019)*

The host community feels that it is a security concern for their unmarried daughters to live next to a large number of *Rohingya*. Respondents say that there is a strong possibility of local women being sexually harassed on the street by *Rohingya* boys and young men. Participants also told they were anxious about the work of local girls inside the camps. Host community respondents stated that the risk of illegal activity in the area has increased with the *Rohingya* offering young boys money for smuggling and drug trafficking.

> *"After the recent arrival, the risk for young people to engage in illegal activity in exchange for money has increased. In exchange for money, local boys engage in drug peddling." (FGD, Field Survey, 2019)*

Like any other humanitarian crisis, the *Rohingya* refugee crisis has opened the door of prostitution in Cox's Bazar region. Ferris (2007) claims that humanitarian assistance is usually food and therefore current insufficiency in fulfilling other necessities encourages females and girls refugee to go for prostitution. Most importantly, women and girls need some additional money to meet their requirements, which they never reveal. And the inadequacies in money in refugee camps lead to the involvement of females and girls in prostitution in the expectation of receiving cash money. Sometimes parents also give pressure to their female children for prostitution in order to safeguard their needs and demands.

e) Gender-Based Violence: Benjamin and Fancy (1998) outlined gender-based violence as violence targeted at an individual because of their gender, which threatens them because of their unique social positions or duties. It has been found from the study area that young *Rohingya* females in the refugee camps frequently experience sexual assault

and even conflict from people of their own community. Premature and forced marriage among *Rohingya* women is also a concern. Violence and turmoil in cases of conflict lead men to pain and frustration which can be expressed and reflected through domestic violence. Women living in refugee camps have few income-generating opportunities. Most refugee females work at home, such as net weaving and tailoring and UNHCR and World Food Programme offer training for this work (Wiggers, 2000). However, most women choose to work inside their homes because of their cultural practices. On the contrary, *Rohingya* males are often prohibited from obtaining a work because of restrictions on moving away from the camps. This can lead to unhealthy relationships because of gender stereotypes. Generally, the culture in the society of *Rohingya* is that males earn for the family while females work for the household (Akhter and Kusakabe, 2014). This stereotype led to domestic violence. Women refugees also face sexual harassment at the place they work because of their socio-economic status.

f) Change in Marriage Practice: A majority of the respondents from *Rohingya* stated that the *Rohingya* do not want to marry outside their community and denied the incidence of marriages between the *Rohingya* and Bangladeshi. FGDs with the host community, suggest that men in Bangladesh want to marry *Rohingya* girls living in the camps. Most of respondents from the host community stated that the practice of polygamy in the area has increased following the arrival of the *Rohingya*. This is happening both married and unmarried men in the host community, but most of the cases married men, marry *Rohingya* girls as marriages can only be accomplished by verbal agreement without any formal registration within the camps. During a FGD, women from the host community said

> *"Even when they have wives and children, Bangladeshi men marry Rohingya girls. Registration of marriage in camp is not mandatory. Marriages take place on the basis of verbal consent. In our area, multiple marriages have increased as Bangladeshi men take multiple wives from various camps. As Rohingya girls are entitled to ration, they don't have to bear their expenses." (FGD, Field Survey, 2019).*

> *"My husband has relationships with two separate Rohingya women who live near our home. Once I found out about the affairs of my husband, I told them to stay away from my husband. I have two kids; I don't know what's going to happen in the future. My husband often acts badly nowadays. In our country, I don't want to see Rohingya anymore". (FGD, Field Survey, 2019).*

Respondents think that displacement and crisis of *Rohingya* girls are responsible causes for this vulnerable condition. *Rohingya* families therefore arrange marriages with men from Bangladesh regardless of their marital status. Respondents from the host community retorted, Bangladeshi men marry *Rohingya* girls because they are beautiful and it does not incur any costs. *Rohingya* families have the legal right to food assistance so men don't bear extra expenses; instead, Bangladeshi men can take benefit of a share of the *Rohingya* girl's family's relief and other assistance.

g) Challenges of Landscape Ecology: The environmental and natural resources impact of the refugee crisis in the host community has now become a rising issue (Imtiaz, 2018).

Refugees often remain for a long period of time in their host countries, with a significant environmental impact (Shepherd, 1995). According to the department of forestry in Bangladesh, the existence of *Rohingya* has resulted in the extraction of 4,000 acres of forest fields. The continuous extraction of forest by the *Rohingya* could bring a long-term environmental effect and become a potential threat against the biodiversity of that area. Ahmed *et al* (2018) stated that improper latrine installation and adjacent tube-wells have contaminated groundwater and threatened the lives of people with illnesses such as Dysentery, Cholera and other water borne diseases.

Concluding Remarks

Bangladesh should adopt some pragmatic measures to tackle more prudently the problem of *Rohingya* intruders. Addressing the problems first, the action of the government should be realistic and meet the needs and fulfill the gaps that will be significant and sustainable. History, geo-politics, diplomatic power, etc. should be taken into consideration when discussing the problems and formulating the strategy. Several initiatives could be taken into account to reduce the crisis which may include the following…

a) Based on the agreements and local and global status legislation, the identity and position of the *Rohingya*s should be explained.

b) A complete registration of the *Rohingya* refugees should be carried out to observe their mobility.

c) Law enforcement issues should be established with particular emphasis on controlling the political, social, economical, environmental and cultural dimensions.

d) Creating international pressure for the Myanmar government so that they start the process of taking all *Rohingyas* back to their origin.

Since *Rohingya* refugees have been staying the very first priority ought to be to resolve tensions between refugees and the host communities, to improve stability and foster social cohesion. Suggested approaches may include,

a) Mapping areas of stress that may lead to dispute;

b) Strengthening community cohesion and measures to create trust;

c) Develop and execute a comprehensive conflict prevention strategy.

Now, Bangladesh is not in a good position to deal with this prolonged condition of refugees. But it is a reality that many *Rohingya*s are being incorporated into Bangladeshi society despite confrontation from the state and local host community. Employment is also an important inclusion method and they gradually have become economically self-reliant as many *Rohingya*s are engaged in informal employment. Considering the current situation the government of Bangladesh should think more about the situation. Which path will they choose in future?

Now it appears that the crisis is becoming a severe issue as Myanmar gives its ultimate push. The *Rohingya* crisis involves safety concerns that are more in line with human

security problems that local, regional and global organizations should address correctly. The UN, ASEAN, and other main players like the US, China, and Russia must put pressure on the government of Myanmar to halt the country's mass crimes and render the nation worthy of the victim's peaceful life. As Myanmar's approach is not pleasing in dealing with the matter, Bangladesh should proceed with the assistance of other nations, especially the large powers in this regard.

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A Hybrid Approach of Adolescent Education for the Rohingyas in Bangladesh: A Way Forward for Sustainable Future

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Abstract: Rohingyas sought shelter to Bangladesh for over four decades now. Some of them went back to their ancestral land; however, because of ongoing genocide, many of them were again forcibly displaced. In a current estimate, nearly 1.3 million of old and new Rohingyas live in the Southeastern part of Bangladesh, of which overone-third are children. Although education is considered as a fundamental human right, for the Rohingyas, they often were denied such a right wherever they lived so far. In view of this, we conducted a qualitative study in 2018 and 2019 in four camps in Bangladesh and learnt that the adolescent Rohingyas (within which the females mostly) are significantly left out of education. Two approaches of education exist in the camps: non-formal and formal; the government of Bangladesh approved the latter since the end of 2019 and early 2020. Our research team observed that while non-formal education is widespread and available to many yet formal educations helps them to gain meaningful sustenance and livelihood measures in the future whether they live in Bangladesh or repatriated to Myanmar. This paper highlights the need for a hybrid approach. The plethora of agencies and personnel not only in Bangladesh but also in diaspora which are involved in the delivery of education can acknowledge that harnessing the strength of all these sources might be the best way forward for the sustainable future of Rohingyas in the camps.

Introduction

Rohingyas fleeing Myanmar is not a recent phenomenon. This heavily persecuted ethno-religious group had been subjected to brutal persecution at least since 1962, when the then Burma slid into a military dictatorship. Observers noted that since late 70s Burmese junta orchestrated a regime of genocide against helpless Rohingyas resulting into initial exodus of nearly 75000-80,000 of them in 1978. Although bi-lateral negotiation between Bangladesh and Burma resulted into a repatriation whereby majority Rohingyas went back, analysts credited it to Bangladesh's hard stance against the then Burma. Despite their return to Burma, they were relentlessly persecuted and as Rohingyas lost their citizenship in 1982 that put the last nail in the coffin. Eventually, they were made stateless. As expected, second round of exodus took place between 1991-92 where about 200,000-250,000 Rohingyas again took shelter in Bangladesh. By 2003, a majority returned yet since 2012 systemic persecution continued that resulted into smaller waves of exodus. In all these movements back and forth, children suffered the most because they were not only the most vulnerable group among the Rohingyas but also, they were uprooted regularly.

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Although Bangladesh is not a final safe zone for them since it is not a party to the 1951 Refugee Convention, Bangladesh has been accepting this population on humanitarian grounds (Babu, 2020). Since the latest round of exodus on 25 August 2017, over 700,000 Rohingyas from Myanmar have taken shelter in the southeastern part of Bangladesh. International humanitarian organizations including the United Nations (UN) thus termed it as the largest, fastest movements of people in the recent history. According to the World Vision's 2020 report, as of today, about 860,000 stateless Rohingya refugees live in the world's largest and most densely populated refugee camp, Kutupalong. About half of the refugees are childrenand they live inthirty-four refugee camps in Bangladesh(World Vision 2020). Some of them accompanied their parents; some only had a single parent, while some were orphans. Approximately 60 children are being born each day in the camps adding the child population in the camps in an astronomical pace. Those who sought refuge were subjected to trauma and brutality on the eve of their departure from Rakhine, Myanmar.

This huge migration has obviously resulted in a multi-dimensional crisis for Bangladesh itself. As a host country, it is not prosperous enough to accommodate this population (Babu, 2020). Basic conditions in the camps are far from optimal which obviously makes provision of education a huge challenge. Since there is no agreed unified method defined to provide education to this group, we propose that a hybrid approach, comprising of both home-schooling and classroom learning (formal and informal methods) needs to be designed for the long run. Hybrid approach means a combination of two or more ways of delivering the education for the children. For the children in emergency situations, no conventional method actually works for two reasons: the children cannot follow a structural (i.e. formal) education system since they were displaced from another system (i.e. Burma) and there is host country restriction (i.e. syllabus, medium, and pedagogy). Currently, although, the host country has authorized some sort of education, it totally ignores the existing ones which is faith based and home schools that are being run in the camps and totally owned by Rohingyas. Our suggestion is to gradually incorporate these into the ones that is supported by UNICEF and other players in the educational sector.

Aims and objectives

Although basic education is the right of every child, it has been seen that in emergency situations, education has always been provided as a stop-gap measure, only until things return to normalcy. (Pigozzi, 1999). This notion definitely needs to change, since education can be a tool to equip these vulnerable people for a brighter future. Also, since the Rohingya crisis is an ongoing crisis, without any definite foreseeable timeline, it is imperative to look into effective measures of education for the long run.

The main aim of this paper is to explore the key gaps in the current education status and recommend suitable strategies for a more sustainable model of education. Our research shows that there is a parallel education system ongoing in the camps and all stakeholders, both policy and delivery must acknowledge it. The objective is to explore what the parallel system is about and then incorporate these into the current system. Thus, we call it hybrid approach, making it more inclusive of the non-formal channels which are present.

Background

If we look back, it is seen that even in the Rakhine state, as per reports of 2009-2010, it had the lowest pre-school attendance among children aged 3 to 5 years. A similar trend is also seen for primary schools. Existing data suggests that either a large population of the Rohingya children did not have access to education in the Rakhine state or they did not have access to formal accredited education before coming to Bangladesh as a refugee (Shohel 2020).

Until 2015, there was no approved education provision forRohingya children in Bangladesh. Then the Government of Bangladesh decided that basic education can be provided to Rohingya children in their temporary settlements (Shohel 2020). Since August 2017, access to quality education for the Rohingya children became a concern for the international community. This was mainly for two reasons, firstly the huge volume of migrants meant the makeshift settlements could not cope with the numbers and secondly, not all these settlement spaces had the space for child- friendly facilities to provide education (Mahruf 2020). Asper World Vision's 2020 report, "Nearly half of the 540,000 Rohingya children aged 3 to 14 years in Bangladesh don't have access to any formal education, which is restricted in the camps. This means children cannot sit for exams or pass a grade level recognized either in Bangladesh or in Myanmar. As reported 97% of all youth aged 14 to 24 also lack access to any form of education or vocational training" (ibid). Althoughdata shared by the education sector shows that 315,000 children and adolescents study at over 3,200 learning centres(Reidy 2020), on ground observation confirms that mostly young children receive some sort of education in these centersonly. Additionally, only 4% of adolescent (aged 15-18) girls were found attending some sorts of education compared to 14% of adolescent boys in the camps. Given the lack of services on secondary level and vocational training, it is nearly impossible to find out what type of education these adolescents were accessing; although, on ground observations confirmed that these secondary aged children attended primary learning facilities.

In the refugee camps of Bangladesh, Non-Government Organizations (NGOs) set up Temporary Learning Centers (TLC), which provide some basic education for children upto the age of 14. Religious education is also imparted by mosques run by the Rohingya community. NGOs recruit both Bangladeshi and Rohingya people to run the TLCs voluntarily. In case anyone has had prior education in Myanmar, they have no scope of continuing the education (Shohel 2020). In general, Rohingya children have poor amenities to receive education and some Rohingya families send their chidren to Maktab (Islamic education institute) in the camps (Babu 2020). UNICEF- the lead agency at Cox's Bazar, currently provides informal education opportunities to 220,000 Rohingya children aged 4 to 14 years based on a tailor-made curriculum called the Learning Competency Framework and Approach (LCFA) which is being implemented since April 2018. This LCFA document was developed in cooperation with a diverse group of stakeholders[1] with government support(Beigbeder, Gupta, and Kucita 2018). In addition,

[1] The stakeholders were: Ministry of Primary and Mass Education (MoPME), DPE, NAPE, Education Local Consultative Group (ELCG), Education Cluster and Cox's Bazar Education sector, IER-DU, CAMPE (network of NGO coalition), BRAC the biggest NGO other relevant UN agencies such as UNHCR and UNESCO. In collaboration with UNICEF Myanmar Country Office, technical assistance

the education sector that deals with education matters also suggest that UN's Sustainable Development Goal (SDG) especially "number 4 (ensure inclusive and quality education for all and promote lifelong learning)" must be taken into consideration(United Nations Department of Public Information 2015).

However, now, it is pertinent to identify the limitations that exist for the Rohingya adolescent children to access education in the camps. One study found out the following "access barriers" to education: who is saying that these are the limitations?

a. "Lack of available learning centres" - since these are running at capacity and are unable to enrol more children. For adolescents, lack of overall services is the main barrier.
b. "Distance to learning centres" – it is also linked to challenging terrain condition during monsoon as well as other threats pertaining to abduction and harassment of young females.
c. "Safety threats at learning centres" – linked to adolescent female abuse. Most females reported that for not having gender-segregated classrooms and learning centres being unsecure from intrusions (for example, spaces are not secure from intrusion by people who should not be able to enter the space, such as men from the immediate community physically entering or observing activities inside learning facilities) generates 'social stigma' for them who received education. This is again tied to conservative faith practices among the Rohingyas.
d. Children ought to work either at home or outside to earn some sorts of livelihood that again discourages adolescents to receive education at a sustained pace in the learning centers.
e. Lack of appropriate level of education as per age group was also identified as an access barrier."This is likely linked to conservative social norms constraining mixing with the opposite sex and restricting movement outside the household after the onset of puberty, as well as the belief that education is of limited use for girls who will grow up to fulfil primarily domestic responsibilities".
f. Psychosocial trauma linked with displacement caused deterioration of mental health and some form of disability (Reliefweb 2018).

Nonetheless, our research team identified that since arrival, some of the young children only received non-formal education through local and international NGOs as evidenced from a number of learning centers, yet, the adolescents (age from 13 to 18) are mostly left out. Keeping this finding in mind, education of adolescent children is determined as

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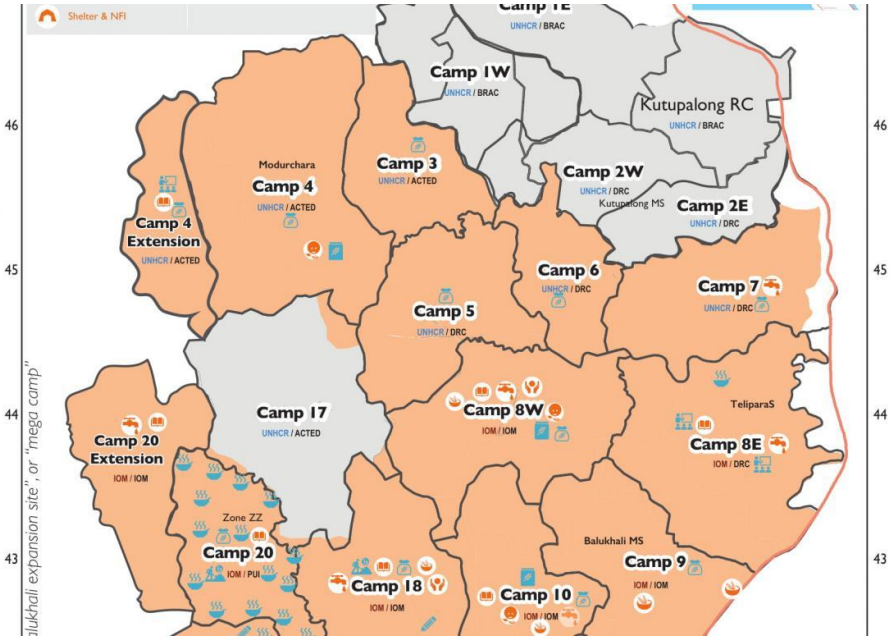
has been made available from Myanmar for the Myanmar language, medium of instruction and related methodological aspects.

LCFAsets out the competencies to be met and guide teachers and education stakeholders on how to achieve the competencies. This framework also addresses sensitivities related to the language of instruction. Considering the written instructions from the National Task Force on Undocumented Myanmar Nationals and written feedback from MoPME not to use Bangla language in the teaching learning process for Rohingya children and also considering the education system and arrangement in Rakhine state from where they came from, in consultation with all stakeholders including Cox's Bazar education sector members, it is decided that the mode of verbal instruction will be Rohingya mother tongue. English and Myanmar language will be taught as subject and written instruction and text will be bilingual, both English and Myanmar languages. The implementation of the initial levels of the Framework will be undertaken in year 1 in parallel with development of the advanced levels. The LCFA is aligned with standards from the Ministry of Education (MoE), MoPE, and the Education Sector.

one of gaps in the overall education initiative that had been undertaken by various agencies in the camps.

Study Area



Methodology

Data for this research paper was gathered from two fieldworks conducted in 2018 and 2019 in three Rohingya camps. Initially, a'needs analysis' was conducted to determine which specific groupsare most neglected. The 'needs analysis' is a tool to mainly gather insights and identifying the gaps. Our analysis indicated that two groups are not being served yet.

The Rohingya camps are supervised by Majhis, who are camp leaders elected by Bangladesh Security Officers and they report to the Camps in Charge (CICs). These leaders are not elected by the community (Sullivan 2020). For obtaining information from the camps, it was therefore imperative to make contact with the Majhis.

Three Majhis from Kutupalong, Balukhali, and Shamalpur camps, one local NGO (Prantik), 30 youth peacebuilders from Centre for Social Integrity (CSI- A Myanmar based Rohingya NGO), and 5 elders (faith leaders in the camps) consultation. Thirty-five female adolescents also took part in the dialogue who are the beneficiaries of several funded programs run by a few grassroots level NGOs. Fifteen, one-on-one interviews with faith leaders, Rohingya teachers, and elders were also carried out. The research team recorded interviews in Rohingya language which were transcribed into Bengali at a later stage. nVivo1 software was used to analyze qualitative data.

Table 1: List of Key informants

	Participants	Number	Type
	Majhis	3	In depth Interview
	Youth Peacebuilders from Centre for Social Integrity (CSI- A Myanmar based Rohingya NGO)	30	FGD
	Adolescant female Rohingyas	35	FGD
	Faith Leaders, Rohingya teachers, elders	15	One on one interviews
Total		83	

Non-formal Education Approach for Rohingyas

Findings from several previous researches such as, Save the Children 2016, Education in Rakhaine (Rayburn 2019); Amnesty International(Amnesty International 2019), Literacy and Skills Development: SDG4; Ai Tam Pham Le 2017 MA Thesis(Le 2017); Ahsania Mission 2018(Dhaka Ahsania Mission 2018a), Unique Intervention for Quality Primary Education UNIQUE II(Dhaka Ahsania Mission 2018b); suggest that education, especially for the female child is a supreme priority of the Rohingya community sheltered in Bangladesh camps. It is also understood that there are many gaps of non-formal programs delivered.

Rohingya especially deserve non-formal service at an extended level in the camps. Rohingya children generally are unfamiliar with formal institutional education, except very limited access to religious schooling at homes and religious centres. With assistance of UNICEF, local NGOs are running about 2200 NFPE centres in all twelve-refugee centres. They are expected to serve nearly 35000 children aged between 5 to 12 each year. According to available information, about 3500 children are being benefited at present. While the model serves well, it is neither adequate in scale, nor futuristic towards sustainability and life-skill generation. Any emergency education program must be a development program and not merely a stop-gap measure that will stop when the situation is no longer being covered by media (Pigozzi 1999). Hence having a sustainable model that will serve the purpose is imperative.

In Myanmar, "UNICEF Education in Emergencies (EiE) activities supported 13,563 IDP students to access quality education in temporary learning classrooms (TLCs) in IDP camps and host communities during the academic year 2017-2018. Of these, 11,340 primary students participated in the government end-of-year examinations in February 2018. UNICEF also supported 500 students with non-formal primary education (NFPE), of whom 164—including 62 girls—participated in the NFPE Level-2 final examination in April 2018." [UNICEF 2018, Myanmar Humanitarian Situation Report #2, page 5].

It is considerably challenging to address the public health and demographics features in low-cost intensive non-formal programs. Households and families are prejudiced, and conservative to such an extent that they tend to conceal the 'disability' features of their children. Parents tend to disagree with the fact-based advises that their 'special children' need specially customized education programs. Adolescents undergo considerable psychosomatic changes, and complex emotional transitions that exacerbate due to

livelihood strife and stresses in camp environments. Therefore, they deserve to be brought into specially customized non-formal education programs.

The current camp administration and education sector conveniently undermine the parallel system because they think it is counterproductive. Also, they underestimate the subscriber of the parallel system which is huge (although there is no definite statistics). Ignoring such a system is therefore counterproductive according to our research. Our current camp administration also does not accept the fact that during the night many camp activities are run by a group which is often known as Al-Yaqin. Beside administering street justice to resolve inter-personal problems, one of the things this group does is to run hundreds of makeshift schools in mosques and at homes. Camp administration's ignorance is understandable because if they admit, it undermines Government's control in the camps, which is the last thing they would like to admit. For example, our research shows that a massive gathering that took place on 25 August 2020 was organized through the network of Al-Yaqin group and its affiliates and camp administration had no clue about it. So, this is the power of the parallel system that educator sector policy makers must not overlook, hence, our argument of naming the proposed model as 'hybrid'. In the aftermath of the 25 August event, federal government had to sack the RRRC commissioner since he and his group totally failed to realize the power and influence of the parallel system.

This system thrives and functions because Rohingyas trust them. They require minimal resources and does not need any office and space to run the schools. Our research shows that a lot of this work can be done over the phone. This trust is a crucial point for education delivery (whatever you may want to deliver), and through the hybrid approach, this trust may be leveraged.

Non-formal Primary Education in Emergency-Relevant for the Rohingyas

Non-formal Primary Education (NFPE) is a UNICEF approved model widely applied in grassroots educational development context in Bangladesh and 39 countries of the world (Brookings Institute, 2016, "Millions Learning: Scaling up quality education in developing countries"). BRAC (Bangladesh Rural Advancement Committee), Grameen Bank and their partner NGOs are leading Bangladesh NGOs administering NFPE programs throughout the country. The NFPE model is popular, as well as cost-effective and resource-efficient for visible advantages—customizable, affordable, low-resource-intensive, and friendly to local needs. The model is also adjustable to linguistic diversity and knowledge and cultural differences in marginalized community settings.

Female child are specially benefitted through NFPE. This is because they are more used to a domestic setting, , and remain more attached to household chores than the boys. Female enrolment since 1991 in slightly better in older camps in Kutupalong and Ukhia [Ref: SARPV, inclusive education, CARE's SHOUHARDRO project]. UNESCO and UNICEF Reports [See Australian AID & Save the Children Report 2016 titled 'Myanmar Education Sector Snapshot for Comprehensive School Safety and Education in Emergencies'] from 2012 to 2017 depict that enrolment of girl child is much less than boy child—44% girl child and 48% boy child below age 13. This calls for attention toward efforts for greater progression in girl child's NFPE enrolment.

A Novel Approach of Formal education

In the aftermath of International Court of Justice (ICJ's) monumental decision that not only acknowledged an ongoing genocide of Rohingyas but also explicitly asked the Myanmar government to take 'interim measures' to stop it, observers found a significant change in the mindset of Bangladesh policymakers(International Court of Justice (ICJ) 2020). Thereafter, in January 2020, the government of Bangladesh declared that it would allow some sorts of formal education in the camps. The Guardian, quoting a report from "the UN and humanitarian community," stated the following:

> We believe this is a positive step and a clear indication of the commitment by the government of Bangladesh to ensure access to learning for Rohingya children and adolescents, as well as to equip them with the right skills and capacities for their future and return to Myanmar when the conditions allow.
>
> In line with the government's decision, the education sector for the humanitarian response in Cox's Bazar now plans to pilot the introduction of the Myanmar curriculum in the Rohingya refugee camps starting in April which year ?, initially targeting 10,000 Rohingya students in grades six to nine. The use of the Myanmar curriculum will be expanded to other grades in a phased manner.[2]

In this year, the UNICEF will enter a major new phase for education of Rohingya refugee children living in camps in Cox's Bazar, Bangladesh, together with other humanitarian actors. Following a landmark decision by the Government of Bangladesh, UNICEF will further expand access to education by introducing the Myanmar curriculum pilot in the first half of the year.The pilot will initially target 10,000 Rohingya students from grades six to nine. We will then expand it to other grades in a phased manner. The pilot targets older children, who have less access to education compared with their younger counterparts. [3]

A Hybrid Approach of Education

Data gathered from our research shows that an urgent need for education particularly among the female adolescents in the camps exists. Because of such a high demand, an accounted number of faith-based schools sprung up in the camps and these are supported by numerous charitable organizations. Although the government agencies closed some schools that ran openly during the day in 2019, our sources reported that many of these schools now operate at night. Even a few home schools also started offering classes, particularly to the young women. Getting this access to education gives these children a higher chance to recover from their past traumatic experiences, especially girls who are more vulnerable to sexual and gender based violence (Mackinnon 2014). Additionally a study by Oxfam showed that half the women and three-quarters of adolescent girls said they did not have what they needed to manage their periods, and many women said they were unwilling to leave their shelter due to lack of appropriate clothing alongside concerns around dignity and safety (Sang 2018).At this point, we suggest due attention

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[2] Bangladesh grants Rohingya refugee children access to education, for details see https://www.theguardian.com/global-development/2020/jan/29/bangladesh-grants-rohingya-refugee-children-access-to-education

[3] https://www.unicef.org/rosa/stories/expanding-education-rohingya-refugee-children-bangladesh

must be paid to the faith-based groups that offer faith education and also to the home schools that run in individual homes because of two reasons. These schools are run by legitimate teachers (according to the Rohingyas) therefore they yield lots of influences among the students and their parents and these schools also have created a network in the camps that can reach out to a student who otherwise does not report to formal schools and education programs (again mostly females). This local network is important because they can also help children develop life skills like conflict resolution, addressing grief and psychological stresses, health and safety lifestyle, decision making and assertiveness and safe leearning environment (Pigozzi 1999).

In addition, various Diaspora Rohingya groups send donations to run camp-based schools, which are not under the control of local authorities. These schools use Myanmar and English lesson materials for their student as revealed during the study. Some of these schools have their bases established in Chittagong.

Notwithstanding the fact that Rohingya adolescents either have had some or no education at all, through a focused and hybrid-approach that combines both the formal and non-formal approaches, Rohingyas can be made confident imbued with self-esteem. The strength of this approach lies in the joint collaboration of various stakeholders who are directly and indirectly involved in delivering education to the children in the camps. Government agencies should not ignore the inherent advantages of non-formal model of education as well as many agencies that unofficially or semi-officially are already involved in education. The five pillars of such a hybrid- strategy are discussed here:

One, a focused and flexible education curricula development befitting to three groups of children in the camps. It helps in countering radicalization in the camps. Online contents will help in exposing children to the outside world and enable them to access varieties of educational materials. Peace education should equip children to mitigate conflict non-violently.

Two, utilize existing NGOs resources and pool of educators in the camps (i.e. community ownership).

Three, training teachers from within the refugee camps (i.e. a relational approach).

Four, mainstream the education with recognition in line with Bangladesh and Myanmar formal education system.

Five, provide scope to continue education after the end of five years term (i.e. sustainability planning).

Providing quality education in emergencies and ensuring educational continuity for the Rohingya children is challenging due to the lack of agreed or approved curriculum, limited supply of teachers and absence of an accredited prior learning (Mahruf 2020). In essence, the core idea of the proposed ‘hybrid approach’ is to get maximum stakeholders on board in terms of education service delivery, especially when adolescent female Rohingyas do not want to go to the learning centres due to several social and psychological barriers. Although we agree with the government of Bangladesh’s decision to impart education either in English or Myanmar language, yet it is emphasized that if all these diverse stakeholders are motivated to come under one umbrella (such as education sector), a sustainable way to educate these adolescents would emerge. The

readers should be aware at this point that Rohingyas are in a long haul in Bangladesh and many adolescents might grow up as an adult in these camps, leaving out the only option to educate them meaningfully because education germinates the seeds of hopes and dreams hope for the future.

Conclusion

Over 90% Rohingyas are displaced from Myanmar and they live in eight countries including Bangladesh now. Those Rohingyas, who once came as young people in early 90's are middle aged now. Among them, many of whom the research team had met during the fieldwork never went to any school. They all are parents now and have 4-5 children of their own. Once asked, they agreed unanimously that they should have tried to get education while it was available (at whatever extent it was). They felt that education is the piece they missed out on, and it has resulted in their continuous misery. Thus, they did not want their children to go through the same vicious cycle of misery.

In this brief research report, we provided the context for Rohingya adolescent education in the camps along with identified access barriers. Then, we laid out both the informal and formal approaches to education that prevail in the camps and supported by a variety of stakeholders. We argued that we should undertake a hybrid approach of education for the Rohingyas in the camps in order to cope up with the sheer number of un- and semi-educated Rohingya children. Especially, due support should be rendered to the most neglected female adolescents in the camps. A hybrid approach, suggested in this paper might be taken into consideration while running the pilot program in 2020 in the camps.

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Pandemic, Lockdown and Nature's Revival: An Overview of Ecological-anthropological Perspective

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Abstract: This paper argues that the lockdown situation due to the pandemic creates a scope for nature to repair and rebuild itself. The discussion was done from the light of ecological-anthropological perspective. The relationship between human and environment is as long as their existence on earth and adaptation to the natural environment. Humans organized their society and developed it from simple to complex. They extracted resources for living and later took access and control over the resources. They dominated the environment with their knowledge, innovation, and technology. The industrial revolution is the key event that empowered humans to control and reshape nature. The consequences of their destructive activities are environmental degradation, ecological imbalance, global warming, etc. Thus, the industrial revolution is considered as the base of new geologic era -Anthropocene which explains that the future of the earth, its environment and ecology came under threat due to the destructive activities of its own creation. Sometimes strike back from nature exposes through disasters that breaks down the usual life. COVID-19 disease created a pandemic situation all over the world at this moment. In response to this, a collective efforts have been observed such as lockdown, travel restriction, work from home, shutting down the industries and business besides following health safety guidelines. As a result, nature is gaining its momentum through repairing itself and observing a trend of ecological revival and balance. This paper focuses those issues from an ecological-anthropological perspective in the light of relevant works.

1 Introduction

COVID 19, a disease created by the Coronavirus, has exposed and affected 215 countries of the world. Since its inception in December 2019, it infected more than 13 million people in first six months (Worldmeters.info, 2020a). It is estimated that a significant unknown number of people in different countries have been infected but they were not recorded due to the unavailability of testing kits and test facilities. In first six months, more than a half million people were died of COVID 19 disease. It generated a greater threat to human life and a panicked situation has been created in the countries it hit. Most developed countries such as USA, UK, Italy, France, Germany, Canada, and Spain were affected severely after China. Countries like Iran, Turkey, UAE, Qatar, were affected moderately in first few months. Many underdeveloped countries were affected in March 2020 and onwards such as Bangladesh, Chile, Columbia, Indonesia and Pakistan. Some of the poor countries in the world did not get rid of this virus such as Burundi, Congo, Djibouti, Gambia, Sierra Leone and Uganda. Even the isolated and separated islands countries were not out of its invasion such as Maldives, Iceland, Falkland Islands, Fiji, Seychelles, Bahamas, and Malta (Worldmeters.info , 2020a, 2020b). COVID-19 created a stressful life for the human population on earth. There are examples of similar pandemics in every century throughout history. The symptom tracking app detected six types of COVID 19 disease each of which have distinctive cluster of symptoms, level of severity of infection, risk level, and possible treatment (Aljazeera 2020).

COVID 19 has been identified in Wuhan, China in December 2019. First case was confirmed on December 8th 2019 in China, January 13th 2020 in Thailand and January

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16th 2020 in Japan. This queue was followed by South Korea (20th) and Taiwan, Hong Kong and USA (21st), Macau and North Korea (22nd), Singapore (23rd), and Malaysia, France, Vietnam and Nepal (24th January, 2020). Chaolin Huang, a medical doctor and his team claimed that symptoms of COVID 19 onset by December 1, 2019 as pneumonia-like symptoms (Huang, et. al. 2020). Qun Li and others (2020) claimed the sickness was onset between December 10thand January 04th, 2020 (WHO 2020).

Gradually, the virus spread out in other countries. A total of 11,950 people were infected and 259 deaths by January 31st. The virus started to spread out in number and in countries, and the monthly acceleration of its spreading rate was surprising and devastating. It created a panicked situation all over the world as the death toll increase day by day. Since the beginning of February, new names of countries were added as patients were found. The number of patients in February was 74,656 and death was 2718. These numbers were increasing continuously. In March, 776198 were new patients and 41250 deaths. In April these number raised to 2394985 new patients and 191063 new deaths. In May 2985614 new patients were affected and 142664 were died. In June, the number of newly affected people was 432921 and 136240 deaths (Worldmeters.info, 2020a).

1.1 Methodological consideration

This paper is based on the secondary sources. The sources covered two interconnected methodological considerations; conceptual and evidential. Both were based on secondary sources such as published ethnographies, books, journal papers, electronic and print media, and research documents. A conceptual understanding of the pandemic has taken into consideration as the concurrent catastrophic event worldwide. Recent publications are indicating an upward trend in the improvement of global environmental indices. Before the lockdown come into action, it was observed that a gradual deteriorating of the global environmental condition. Debates and encounters are continued simultaneously. Those features were widely analyzed and discussed in the mainstream academic arena. Knowledge of global environmental features has been increased over the decades and centuries. After the lockdown, the literature claimed a sudden improvement in the environmental condition. The conceptual understanding of this paper is framed on the basis of that recent indication.

The evidence or information of this paper is based on diversified sources. Primarily an observation was followed on the trends of spreading the COVIC 19 disease around the world and the responses of the national states to tackle the situation created by the virus. The news sources of several electronic and print media became the initial sources of information. Secondly, the mainstream intellectual and policymakers were expressed their opinion on the pre-impact situation, treatment and recovery process of the affected persons, and prevention methods. Besides, this study followed the continual publicity by the health departments of the government of the states, respective international organizations such as the World Health Organization (WHO), border agencies and port authorities took initiatives to keep a safe and healthy situation and to stop spreading the disease through personal contact or traveling. Those were considered sources of shreds of evidence.

2 Development of Human Society: Evolutionary Schemes

It is five billion years that the planet earth formed in the universe. The Germanic word 'earth' denotes 'the ground'. The name was given approximate a thousand years ago (NASA, 2020). Twenty million years ago, the first biosphere ecology has been emerged on the earth. The human history has begun just two million years ago (EBI, 2020a). Considering the age of the earth, human history is relatively a short moment. More remarkably, human beings spent a long time within it's' history to reach to the civilization. Before reaching to early savage period, there were several steps from Neanderthal man to *Homo erectus* to *Neanderthals* to *Homo sapiens*(Modern human beings (Morgan 1857, Darwin 1859 & 1871, Tylor 1871, EBI 2020a).

Archaeological evidence shows the settlement of early man in the African continent. Debates created by the scientists since the discoveries of artifacts in several places. Human traits had been identified as early as four million years ago. Other characteristics including the capability of language and ability to make tools achieved later (SNMNH, 2020:1). Social organization and cultural diversity emerged latterly. Evidences showed that humans occupied the planet gradually. Since their presence on earth, they have taken control of nature through intellectual capability, gathering experiences and transmitting knowledge through generations. Organizational status changed from band to state through tribes, chiefdoms in pre-state societies (Engels 1884, Brumfiel, 2001,). Family, marriage and kinship systems have been adjusted. Economic activities diversified and political institutions grew. The planet has observed changes by its own creation using its resources. The nature lost its ecological features with the development of human social and economic systems. The extraction of natural resources created versatile ways of livelihood and economic growth. Economic systems were prioritized over other systems. Wealth positioned at the center of human targets. Economic growth and 'wealth of nations' became vital (Adam Smith, 1776). This line expanded to the accumulation of capital, class difference and characterized society based on the 'mode of production'(Karl Marx, 1867).

The founder of scientific Anthropology, Lewis Henry Morgan (1857) comprehended social progress in evolutionary scheme. His hypotheses elaborated the transformation of human society from savagery period to the civilization through three stages included seven sub-stages. In contrast, British naturalist Charles Robert Darwin (1859) had the most influential work in the 19th century on evolution of species. Sir Edward Burnett Tylor (1871) explained the evolutionary scheme that all societies passed through the stages of savagery and barbarism to reach to civilization. Sir James Frazer (1875) elaborated the progress of human society in the line of cultural evolution emphasizing three stages- magic to religion to science.

The first human social organization was identified as band. Band is a group where an average of 10 to 25 persons lived. Their prime mode of subsistence was hunting and gathering. Smaller groups were organized for easier hunting, make up consumption with gathered food and move around conveniently. Five different patterns of subsistence activities was indicated by Morgan, i) Natural subsistence upon fruits and roots on a restricted habitat, ii) fish subsistence, iii) Farinaceous subsistence through cultivation, iv) Meat and milk subsistence, and v) Unlimited subsistence through field agriculture (1857: 20-26).

The contemporary family system emerged through five different phases (Morgan 1857): i) The consanguine family was the basic form of primary social organization. It was based on the intermarriage between brothers and sister in a group. ii) Group marriage was founded upon the intermarriage of 'several brothers to each other's wives in a group and several sisters to each other's husbands in another (1857: 27). iii) The *Syndyasmian* family, based on pairing a male with a female, iv) The Patriarchal family was established as polygamous form; one man to several wives, and finally, v) the Monogamian family which is based on marriage between a man and a woman (Morgan 1857: 27-28). The Monogamian form is widely practiced in today.

The humans faced a countless challenge to survive in nature which has been overcome with the help of technology. Leslie White (1943, 1959) explained culture in terms of using technology to produce energy. Technology created enough energy in human needs. The societies that become able to use more energy can survive better than others. The advancement of society has been indicated by the intensity of using technology on and energy harness. A comparative position of the societies takes place based on this method of evolutionary process. Societies will pass through the same line but in different ways. The development occurs based on survival activities on nature with the help of technology and outcome as energy harness. Here, a common theme has been exposed, Humans will use technology to extract natural resources and produce energy to fulfill their own needs of a comfortable life. The sophistication in technology denotes level of comfort. Technology ensures the availability of energy. Finally, these indicators define the culture of the particular society (White, 1943).

White (1959) described the first layer of energy from human labor or muscle. This was the preliminary stage of hunting and gathering based subsistence activities. It was overcome by the energy used from animal domestication. Animal energy has been used for agriculture and food. The old and new world had this stage in a different period. With the advancement in agriculture and irrigation, humans started to use energy from plants. According to White (1959), it is the agricultural revolution. The next step was the use of natural resources such as minerals and mines such as coal, gas, oil, metals, and chemicals. The scientific development and technological innovation had a vital role in this stage. The final stage of energy is from modern technology such as hydroelectric, windmill, and nuclear power.

Ecology is a complex relationship of all biological species living in a given environment (Hussain, 2003:147). It includes the physical and biological features and every sociocultural phenomenon. The concept cultural ecology (Julian Steward, 1955) elaborates on how humans adapted to the environment early ages with the help of tools, technology and social organizations. This is how people adapt to their environment in associated with subsistence activities such as hunting gathering, pastoralism, early or modern agriculture etc. Steward considered culture as the unit of analysis tied culture to the ecology. He argued that there could be similarities of cultures in different environmental settings as well as difference between the cultures of similar environments. The cause behind these similarities and differences are the adaptive process of the inhabitants and the cultures. Adaptive process could be change due to short or long term change in environment and a new form or an elaborated form could be emerged (Steward 1955: 5-30). He rightly observed that biological and cultural aspects

of human ecology are interconnected and intertwined and focused on groups of people adapting to their environment for a longer time.

3 Ecosystem and the Importance of Political Ecology

'Ecosystem' (Moran 1982) and 'new ecology' (Rappaport 1968, 1979) approaches bridged the adaptive mechanism to political ecology. Ecosystem consists of living plants, animals and other biotic organisms and nonliving materials in a given physical environmental settings. It requires energy from external sources (for example, the sun). It is the complex whole of the relationship among those living species and nonliving materials and their interdepended relations for survival of each other. In a given environment, plants, animals or organisms need other species or organisms and nonliving material for their survival. For example, beyond food cycle, all species and plants depend on soil, sunshine, light, air or other nonliving element of the nature. The living elements of the ecosystem are characterized by reproduction, adaptation, and response to the environment and for some species movement is the ability (except plants). There could be a debate about the moving capability of plants. Plants cannot move, But considering the occupying space by a species, it then is clear that a plant is not static as a nonliving material. It grows, reproduces, expands in volume, occupies space to get access to sunlight, air and open space. It does not have dynamic movement and could be termed as static movement.

The political ecology is emerged to synthesis the relationship between power relation and access and control over resources (Wolf 1982, Greenberg and Park 1994, Bennett 1976, 1996). John Bennett (1976) has shown that ecological setting is influenced by external forces through its own social organization. His model of human-environment relationship gave an interactive approach to explain this relationship on a single platform. The extraction of natural resources can be done up to its level of capacity. The environment has changed positively and negatively by humans. On the contrary, environment affects human life in different ways. This change happens in foods, habitats, disease, and lifestyle. In some cases, there is impact over occupation, medication, general immunity, and disease pattern. It also affects the leisure, exercise, entertainment, and work. Nature sometimes strikes back through natural disasters if there is any a severe anomaly or imbalance. The organisms living in an ecosystem depend on each other, For example, changes in population of a particular species have a definite impact over the other species and ecological balance. Deforestation can change the climate. Climate affects the life of species such as migration from one area to another, lifestyle and changes in coping mechanism.

A balanced ecosystem denotes healthy systems for its inhabitants. Living plants, animals and aquatic organisms and nonliving elements create a balanced ecosystem. Nonliving portions of the ecosystem has definite impact over living parts. For example, rainfall, temperature, changes in soil quality, air pollution, seasonal variation, etc. influence the lives of the organisms and sometimes determine their adaptive strategies and lifecycle. Usually, organism bases their adaptive strategy focusing on the ecological stability. An unstable ecological condition does not approve any organic body to settle there. The organisms grow itself in a place where there is no chance of unexpected disruption.

Any changes in environment influences the natural ecological process, biotic and a biotic community. It may start with natural disasters and end with ecological imbalance. The balance ecosystems denote a 'harmonious coexistence of organisms and their environment' (UN 1997). The ecological imbalance resulted in the number of population in different species, changes in the habitat of certain species, interaction among the species, outnumbering or endangered condition of some species community, aggressive or hibernated condition of one or more communities, changing pattern of the interaction between the species and human being. This is very crucial and is a marked change in the ecological system which produces, consumes and decomposes (Science hub 2020). Thus, interaction and a continual change occur in the environment.

4 Role of the Industrial Revolution

The industrial revolution is considered as a milestone for economic development which was a target for European nations for a long time. It has taken place for more than a half century from 1760 to 1840 AD (EBI 2020b). It was the consequence of the transformation from physiocracy to mercantilism in Europe. The impact of industrial revolution is enormous. It is responsible for depletion of natural resources, water and the beginning of air pollution. The uses of chemicals and fossil fuel were increased during this period. Labor market saturated, and the world observed a huge economic growth. Rapid industrialization popularized, as beneficiaries were both factory owners and laborers. The industrial labors get higher wages than the agricultural labors. Steam engine, telegraph, power loom and sewing machines were the remarkable invention of this time. It increased the trade and business, and transformed the agricultural and handicraft sectors into medium and large industry. New machineries, infrastructure, entrepreneurship had been taken place. Changes in land use pattern were visible. The traders and factory owners started their profit and accumulate capital quickly and became able to reinvest in production sector again. The factory owners found the process very efficient (History.com, 2020).

The working condition of the factories was risky and sometimes unhygienic. Smoke and dirt created health hazards though skilled labor uses became common. Labor union upraised. Due to the higher wages than agricultural sector people were willing to work in the industry. A long queue for labors gave the benefit to the owners to apply more conditions. After the growth of industries and infrastructure, another flow of industrialization took place. It was called the Second Industrial Revolution which was accompanied by electricity, steel and petroleum (EBI, 2020b). These products instigated and triggered industrialization as more powerful event. Industrial revolution had greater impact over the state and government.

5 Anthropocene and the Recent Trends

Anthropocene (literary meaning is '*the recent age of man'*) denotes a new geologic time unit characterized by dominant role of human being over the climate and the environment (EBI 2020c). The world is in the Holocene period which has been started approximately 12,000 years ago. The scientists believe that the Holocene epoch entered into a new era where the human are the prime actor on the environment. With development of technology, human beings obtained more access to the natural resources

of the earth. Mining has a great impact on human control over resources. Urbanization, deforestation, and industrialization played a vital role to change the ecological feature of the earth. The inception of human being on earth to the industrial revolution was mostly characterized by urbanization, deforestation, development of machineries and settlement in new horizons. It changed the biosphere of the earth, but it was not too harmful to the ecology.

It was estimated that the change occurred in that time was doubled within a hundred years from the industrial revolution to 1950s. Human beings controlled and accessed coal, oil, gas, and metals through mining. They became capable of using power to generate more energy to produce industrial products. Two World Wars took place in this period. Innovation and execution of technology was not limited to the surface of earth, but rather extended to the sky, water, land and biomes as well. From pesticides, fertilizers, medicine to the atomic weapon were developed in this phase. Industrial smoke, greenhouse gas, chlorofluorocarbons (CFC) and hydro-chlorofluorocarbons (HCFCs) emission, etc. started to destroy the ecological feature of the earth severely. The environment of the world became vulnerable to human dominance. Mark Maslin and Simon Lewis (2020) gave an estimation of 1.4 billion motor vehicles, two billion personal computers and mobile phones belonged to 7.8 billion people in the world. The authors claimed that Anthropocene began from the European Colonialisation in 15th and 16th century. Other scientist (Walters et. al. 2016) claimed the beginning of Anthropocene sometime in the mid-20th century. A great acceleration of population growth and rapid industrialization has taken place since the 1950s. In 2016, Anthropocene Working Group (AWG) agreed that the year 1950 is the starting point of this epoch Anthropocene (EBI, 2020c).

The 1950s has been considered as a beginning of a new era with diversified technological development and massive destruction to the environment. Human beings built enough concrete to cover the planet's entire surface with two millimeters thickness (Walters et.al., 2016). The new additions are production of plastics, chemical and biological weapon, supersonic fighters, atomic weapon carrier submarines, military equipment, artificial city and parks, skyscrapers, high energy consumption machineries, etc. Simultaneously, human consumption has also increased. Intensive industrialization in food production technology and luxurious items had taken place. Unfortunately, care to nature and ecology have been ignored at same level of those development. The world faced a severe environmental degradation including ozone layer depletion, global warming, sea level rise, glacier melting, emission of CFCs and greenhouse gases, severe air, water and soil pollution, etc. On the other hand, ecological imbalance created several diseases caused by the viruses and bacteria, loss of quality in aquatic ecosystems, extinction of several organisms from the biosphere, endangered species from the animal kingdom, etc. That is why human control over the nature became more powerful than ever and the influence doubled or multiplied further than all previous eras. The change of the Earth's ecological features up to 1950s has been overcome at a double or multiplied rate in 50 years from 1950s. This pattern shows a geometrical rate of destruction of ecological balance. It created an uncertain destination for humans and where to take the ecology and their existence in future.

5.1 Recent Trends

In 'Facing Gaia' (2017) Bruno Latour argued that the human activities on earth is not limited to themselves only caring and creating a comfortable life on earth, but also destroyed the natural ecological phenomena of the planet. The planet is now under a threat of hazards, pollution, toxicity, etc. The water, air and soil are under the threat and an unknown number of species are endangered. If such situation continues, then Mother Nature herself will be under threat. The question is who will save it from human invasion and destruction. Latour borrowed a mythological character Gaia, a single organism, and a complex system through which living phenomena modify the Earth. Latour extended his concern in his further writing 'Down to Earth' (2018). Here he accused human beings directly for multifaceted activities on one hand and ignoring measures for saving the earth. He strictly criticized the new policy taken by the United States and the exclusion of earth's future.

His other hypothesis, the 'critical zone' (Latour 2020),goes further. The ecological landscape of the earth has a limited space. Humans have no other option to live elsewhere or on any other planet. If it is locked down then it becomes a 'critical zone'. Lotour (2020) clearly stated that '…*we cannot endlessly extract resources and discard or waste. In the critical zone, we must maintain what we have because it is finite, it's local, it's at risk and it's object of conflict*'' (Latour, 2020:1). In compare to the development activities, insignificant attempts have been shown to save the earth by human beings. Latour (2018) accused the left movement and environmentalist for their consecutive failure in this regard. He downloaded the term 'Anthropocene' in this context. Anthropologist and linguist, Noam Chomsky (2014) also emphasized 'Anthropocene' to make sure that human are not safe on the earth if they continue their environment destructing activities. He warned the human civilization for over execution of technology and military weapon and tend to an uncertain future through their work for certain, controlled and confortable future (Chomsky, 2019).

Humans are caring about development, industrialization, and accumulating resources for the sake of their comfort, profit and affluence. They are extracting resources from nature and consume or use those directly and produce byproducts from extracting raw materials. With the technological innovation, they produce tertiary product from the byproducts. Now, they intend to produce multiple levels of tertiary products with their innovated hi-tech equipment. Gradually nature is losing its originality and encapsulated by the tertiary products on it. It is not limited to create artificial parks and lakes or city, but rather extended to massive changes on skyscrapers, weapons, equipment, and remote access technologies. On the other hand, a huge amount of plastic goods, chemicals and toxic materials in the river, sea and oceanic beds, and ground evidently shows the access of human on nature. The world is using more energy day by day. The year 2020 is the hottest year as recorded in human history and 2019 was the second hottest year while the present decade is the hottest decade in history (Newburger, 2020). The number of air-conditioning units and other cooling equipment has multiplied every year. in the world. The more uses of energy sources emits more gases in the air, pollutes the environment and warms the earth's atmosphere.

6 Collective Response to the Pandemic and the Nature's Revival

The COVID-19 disease by Coronavirus started in December 2019. The first patient went to hospital on December 8th, 2019 in China with pneumonia like symptoms. Local hospital reported to the Hubei province on December 29th after finding four similar cases. Considering the source of the virus, it closed asea-food market on January 1st, 2020 and reported to the World Health Organization (WHO) on January 3rd. The reported first death from novel Coronavirus was on January 11th, 2020, in China. The country implemented screening process at passengers' terminal in Wuhan. For the first time, it was reported for human to human transmission of the disease on January 20th (WHO, 2020c)

Measures against the Coronavirus have been taken worldwide accordingly. Following situations, many countries of Europe and North America declared the restriction on air travel and closed border entries. Many airliners cancelled their flights to and from China, and went into lockdown. People all over the world concentrated on updates for remedies and guidelines from WHO and national health departments. Cumulative numbers of affected, recovery and death cases became frontline scroll for news agencies.

From March to June, 2020, it is observed that most countries were in lockdown, hospitals were providing treatment for COVID 19 patient, work from home was implemented, educational institutions were closed, tourist spots were closed for visitors, factories and retail business were shut down, and local and international travel were restricted. The world had stopped in different levels and phases. In this lockdown circumstance, few vehicles moved on road, smoke and toxic materials from the industries and factories were not disposed to the environment, and toxic waste were not disposed as it was done at normal situation. Global consumption of energy reduced due to lesser use of transportation.

It had definite impact on the environment and ecology. Air and marine pollution have decreased; and the air quality has changed at the major epicenters of Coronavirus outbreak. Nitrogen dioxide decreased by 40% in China, 20-38% in over Western Europe and USA compare to that of in 2019 (Bauwens, 2020). Nitrogen dioxide emitted from the burning of fossil fuels in industries mostly. Similarly water is getting clean in rivers, bay and other water bodies. Earlier it was claimed the ozone hole had been repaired due to the air quality on the surface. A debate is ongoing about the cause being either for the pandemic lockdown or as a natural process. But there is no doubt about the reduction of air and water pollution on Earth. A research shows that metallic components in wastewater have been reduced by 42-60% because of shutting down the industries in lockdown situation (Selvam, 2020).

An ecological revival has been observed in most areas where lockdown was imposed. World Economic Forum (WEF, 2020) reported that the natural environment is recovering slowly due to the shutting down of the businesses and factories, moving fewer vehicles on the roads and fewer aircrafts in the sky. Those incidents combined the lesser emission of nitrogen dioxide in the atmosphere. The world observed the slowing down of air pollution, greenhouse gas emission and carbon-density in the air for the first time since 1950s. Experts are also indicating a positive side of during this terrible crisis.

Reduction of air pollution is one of the fundamental criteria. Air pollution is responsible for life expectance, mortality, imbecility, respiratory diseases, mental health, cognition, etc. Guojun He (et.al. 2020) presented that the satellite images ensured a sharp drop of pollution in many cities and industrial areas after the lockdown imposed. They argued that the improved air qualities may enhance the healthy life and provide health benefits to the respective societies. Katherine Burzac(2020) and Zander Venter (et. al., 2020) claimed that the satellite data from more than 10,000 monitoring station showed the improvement of average global air quality due to the decreasing air pollution in lockdown period in compare to the previous year. Burzac (2020) recommended that scientists and policy makers received a guidance to work on the climate change, improve air quality and reduction of pollution.

The ozone layer recovered significantly in the lockdown period than any other time. The Montreal Protocol banned the substances that are responsible for ozone depletion. The air currents, rainfall patterns and the ocean currents were changing due to the ozone depletion since 1980s (Wary, 2020). It was very difficult to execute the banning decision in general but the lockdown has promoted the policy in action. The increase of global temperature did not stop in the pandemic. It will not stop unless the emissions of gases drop to zero. The greenhouse gases stay the atmosphere for long time such as decades and centuries. On the other nitrogen dioxide, sulphur dioxide and carbon, that are responsible for air pollution, stays in the atmosphere for few weeks (Nicholls and Weber 2020). Carbon emission dropped significantly in the lockdown but the emission did not drop to zero. That is why global temperature is not decreasing in the pandemic.

The groundwater reservoirs, lakes, rivers are usually pouted by the industrial waste, chemical disposal, toxics, plastic and many heavy metals. It was one of the features of industrialization and urbanization. I the pandemic, many industries were closed, chemical factories are not draining harmful elements in the canals, rivers and lakes. Even pollution has also decreased in the oceans. Ali (et. al. 2020) claimed that the quality of the surface water in the hydrosphere has been increased.

Natural green returned to the environment and people claimed visibility towards distant landmarks. Improved ecological features get attention of the news and social media. A common understanding seems to taking place that the countries should have lockdown for a while every year.

It should be constructive activities of human organization to keep, according to Noam Chomsky (2020), 'surviving the human society for couple of generations'. He argued that the '*pandemic would have been prevented because there was enough information available to the world*' and '*we are racing to the edge of disaster, far worse than anything that's happened in human history*' (Chomsky 2020). Coronavirus helped us to think about the future world that we want. Due to this pandemic there was a huge problem in the market which was created by the neoliberal economy. Chomsky rightly observed that the world had invested more of the corporate business-oriented product such as cosmetic items rather than life saving vaccines. The pandemic of Coronavirus are going to reshape day activities and lifestyle of the people. Each society must treat it with its own way. It became a global catastrophe but states and societies must face it locally and regionally. A global initiation can create a path for future adaptation to the natural environment.

The lockdown is widely known as staying at home, but it is not limited to only that. More likely, people need to reassess their capability to work for future, they need to reshape their ways and have to think about future adaptive strategy while stuck at home. They see their known world in an unknown feature, especially for the first time, as the same practice took place everywhere over the globe. The world stopped up to a certain level due to the spread out of an invisible virus. When people stepped to travel to Mars, they became quarantined at home instead. They became unable to move outside of their houses, markets, shopping areas, parks, offices, even visiting friends and relatives, going to offices, schools, bars, restaurants and public functions.

Bruno Latour (2020) considers '…*in a few weeks, to put an economic system on hold everywhere in the world*…' 2020). People stuck at home 'powerlessly' (Latour,2020). The network theory of Latour is more applicable here. The spreading ratio of the coronavirus through human contact is a lesson for spreading the idea of nature care. We should convey message to each other, and obey the environment saving rules for our future. The pandemic gave the option to think about priority for job, daily work, time management, friends and family. The state and institution understand the differences of jobs. It was made clear of which jobs are more important than others, and which ones are the most important. Prioritizing is a lesson learnt by everyone. Latour (2020) says '*the pandemic has shown us the economy is a very narrow and limited way of organizing life and deciding who is important and who not important* (2020:1)'. This priority will depend on the basis of the size and sources of the economy.

The earth is different from any other planets in the universe because it has the life on it. (Recently, scientists are claiming another distant planet might have life). The concern is that the humans are holding the only planet for themselves. The process of extracting resources from the physical environment and making development for comfort of life is harmful to the environment. But the pollution and other hybrid systems reduce the immunity and human adaptability to a significant level. That is why, after taking all measures and having all sorts of facilities and technology, the developed world failed to save its citizen from loss of life. In compare to the third World countries, the developed nations lost higher number of their citizens in COVID-19 attack in first six months. This is not nature's 'strike back'. The virus is not created due to the human activities on the environment and ecology, nor is it created by any human being (CDC, 2020). It was in the nature from earlier period and it had the interconnections among the animals. Now, the virus has been transmitted from animal to human at the first stage and copes up in the human body. Later, it's contaminated human to human by close contact through touching, interacting and entering into the new host in several ways such as mouth, nose and eyes. People gained knowledge on the virus, its lifecycle, remedies and the statistics of its level.

Beth Gardiner (2020) argued that the pandemic driven clean air will not be long-lasting. The factories and the machines of the industries might return to its own pace, emit gases gain, vehicles will be on the road and pollute the air, and smoke will cover the sky as it was in the pre-pandemic. Francois Gemenne and Anneliese Depoux (2020) claimed the post-pandemic could harm the environment more. The industries will go for higher production to make up for the lost time, people will drive more vehicles to avoid public transportation, governments will restart the fuel industry, solar and wind energy might be

ignored. A severe competition might be observed among the economies. The economies will be crazy for overcoming its shortage and covering the damage and losses due to pandemic will be an issue on the one hand. On the other hand, there might a desperate target of making a profit and secure an extra balance for the future. Both hand activities will destroy the environment consistently.

Inger Anderson (2020), the Executive director to the United Nations Environment Program, emphasized on the green transition and multilateralism as a vital tool to fix the global crises (climate crisis, nature crisis, and pollution and waste crisis). He suggested levying carbon taxes and ending fossil fuel subsidies as the key factors beside the reinforcement of environmental legislation. He also argued that the pandemic gave an opportunity to recover better from the triple crises and invest in green pandemic recovery will serve economic purposes such as GDP, jobs and livelihoods (Anderson 2020).

7 Conclusive Remarks

This paper started its journey through the description of the beginning of the planet earth and analyzed the challenges of early humans' historical settlement process. Humans had done a tremendous job for themselves in comparison to the other species to take control of all others. A slow development procedure was accelerated by technological development through invention and discoveries by human beings. The multifaceted tasks were completed successfully. The survival strategies are the biggest step towards the future of early humans in the adverse environmental condition. That information and knowledge were transferred to the next generations through sharing and learning. The establishment of social organizations with expanded social networks helped to advance towards the social progress of the society and the formation of the state. Achieving science and technological knowledge and the accumulation of resources made their life comfortable and ambitious. Human civilization entered the phase of the industrial revolution.

The post-industrial revolutionary schemes were two dimensional; resources extraction, growth, capital accumulation, technological advancement, etc. increased competitively on the one hand and changing natural environment and destroying ecological balances through over-extraction and overexploitation, atomic-biological and chemical warfare, releasing and dumping toxic chemicals and harmful gases, etc. on the other hand. The planet did not get any interval since the inception of the industrial revolution rather an increasing trend was visible. Scientists, experts, environmental activists, and policymakers at national and international levels worked shoulder to shoulder for finding a possible way to save the environment by keeping the development project active. World leaders met many times. A climate fund was also collected and spent. The outcome was never satisfactory and meaningful.

At this point and circumstances, the Coronavirus is the carrier of COVID 19 disease transmitted from animal to human body and successfully muted. The disease spread out all countries of the world as quickly as no other diseases were done. The World Health Organization declared it pandemic. The severity of the disease stranded civilization. More than 52 million people affected and suffered intensely and one and a quarter of a million people lost their lives (World meters.info, 2020b). Following the severity of the pandemic, some measures have been executed very quickly such as lockdown and

imposing restriction of air and land transportation and international borders closure, shutting down factories, industries and businesses, closing educational institutions, etc. Besides treatment and recovery help, people were advised to follow public health guidelines including isolation, quarantine, stay at home, work from home, social distance, applying disinfecting materials, and avoid gatherings.

The outcomes of such activities were manifold. The shutting down of many sectors created a huge number of people jobless. Regional and international trade and business fell in crisis for a potential decrease. The impact on education and social life was enormous. The health sector became vulnerable and health workers received an unimaginable challenge. The functional weakness and inefficiency of this sector has been identified and exposed to the public. On the other hand, upward mobility has been observed in communication through social media, work on virtual platforms, spending more time with family, social and communal harmony, etc.

The pandemic is ongoing. Few considerable changes have been observed evidently on the environment and ecological balances of nature. Firstly, it is understandable that everyone is waiting for the post-pandemic new-normal life. Lockdown might be over and there will be no restriction on movement, workplace, business and industry. That might drive into another way. A return to life might be a different story of a different worldview of new-normal life. Governments, policymakers and factory owners might forget the learning from the pandemic. The outcome of the lockdown and other restrictions have sounded positive from the developing to developed countries and are agreed by natural and social scientists, philosophers, environmental thinkers, and activists. The discussion and analysis is a continual process and many opinion and evidence will come gradually.

Secondly, humans took millions of years to reach the peak of civilization. Ironically, they took a few decades to destruct its settings. Most importantly, humans paid a huge effort to find out a way to keep the planet sustainable and habitable. In the last many decades and years, scientists, policymakers and the experts of the government and international organizations were trying to solve the crisis of environmental degradation and ecological imbalances. Many protocols and goals were ratified. The success rate was questionable. Now, the scientists and experts are advocating for lockdown as a certain infrequent interval. Here the pandemic created an open-eye view of the environment and ecological balance to save the earth as humans' habitat.

Finally, a one-year course of the pandemic contributed to the revival of many natural phenomena such as reducing air pollution, repairing the ozone layer, greening the natural environment, and creating guidance for humans to natural habitat. The nature created its own way to revive its own feature naturally. But the pandemic created an opportunity by showing a nature rebuilding process in a year or less by itself. The pandemic has guided us to find out a possible way to keep environmental and ecological balance. Lockdown and restriction give humanity a candle of hope towards environmental sustainability. Withstanding all the above outcomes, this paper recommends humans to learn from nature by observing its features, seeing its actions and watching its way to rebuilding it. That is the greatest learning for humans to survive and sustain on the planet.

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Impacts of Migration and Remittance on Local Development: A Review of the Literature

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Abstract: Impact of migration and remittance on the macroeconomic development of countries is a well-discussed topic. However the impacts may be different on the local development of the migrants' home-country. Households of the migrants can employ modern farming technology and gain higher productivity. Migration can contribute to social changes in the households and localities of the migrants. International migration and remittance can improve the financial condition and wellbeing of the households of the migrants, reduce poverty level and unemployment and improve local and household economy. But their long-run impacts on the local development of home country is highly dependent on the spending and investment attitude of the migrants and their households, and also on the investment atmosphere of the home-country. Contemporary literature reveal that there is a vast gulf among the investment attitude of migrants of developed, developing and Least-developed countries (LDCs). Most of the migrants of developing or least-developed countries prefer to spend significant chunk of their remittance in consumption expenditure. Regarding investment, they prefer to invest in non-productive sectors such as non-agricultural land or house. Similarly, investment atmosphere and ease of doing business are far different in countries residing at different stages of development ladder. In order to ensure optimum local development out of migration and remittance, governments need to provide pro-migrant policy support that can ensure a congenial atmosphere for investment of remittances and can motivate the migrants to invest in local development.

Keywords: labor migration, remittance, local development.

Introduction

Background and Context

International labor migration has been a development strategy both at micro level and macro level ever since people started to cross the border for their livelihood. But the success of such migration depends on what development does it bring to the home country and the localities of the migrants rather than what the migrants actually earn or achieve in their destination countries. MA Rahman and Rahman (2008) stated that for many Bangladeshi households, remittance has become a significant income-source. For labor-abundant countries like Bangladesh, labor migration is a dynamic way of reducing poverty, and it is equally important for local development of those countries as well. Alam et al. (2015) found that for a labor-supplying country, international labor migration is one of the vital tools of microeconomic development. For Bangladesh, it is instrumental in improving the local and household economy in the form of uplift of

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economic conditions, house-ownership, poverty reduction, skill-development, new work-experience, and donation towards different institutes and infrastructure in the locality. Schiantarelli (2005) argued that low-income countries can reduce poverty and grasp net positive development impact by sending workers abroad. M. M. Rahman (2000) mentioned that when the migration process is placed within its local context, the causes and effects of migration can be better-understood. It is because, what may be advantageous at the national-level may prove to be disadvantageous to a community or household-level or vice-versa. In the context of Bangladesh, this study unfolds that labor migration does not gear-up the local-economy from an external pipeline of remittances and acquisition of skill, rather it siphon-off local resources that may hinder the development process. Massey et al. (1993) found that disparities in income and job opportunities among different countries are important consideration in international migration. One of the major motivating factors of international migration is the hunt for better economic opportunities in the destination countries (Pritchett, 2006) (Goldin, Cameron, & Balarajan, 2011) than the localities of their home countries. Regions with higher share of working poor and lower social protection coverage tend to have higher rate migration. Azam (1991); Glytsos (2002); and León-Ledesma and Piracha (2001) have found evidences that regions like India, Pakistan, Mediterranean countries and Eastern Europe could manage to expedite their economic growth and investment with the help of remittances. Dustmann and Kirchkamp (2002) found that the migrants from Turkey to Germany seem to become active entrepreneurs after their return to home by investing their savings from Germany to finance their businesses at home.

Global_Commission_on_International_Migration (2005) concluded that "3Ds", namely: differences in development, demography, and democracy, act as catalysts in driving international migration. Goldin et al. (2011) found other factors such as families and networks, demography, political conditions, government policies, etc. that play important roles in the migration process. Lucas (2005) mentioned that current economic condition play a more catalytic role in temporary migration decision whereas long-term economic prospects usually dictate the decisions to migrate permanently. Vertovec (2007) pointed out that temporary labor migration programs can better-deliver poverty reduction and development benefits more effectively than semi-permanent or permanent one.

However, exploring the role that labor migration and resulting remittance inflows have on the local development throughout the home country of the migrants is essential. Congenial investment atmosphere together with feasible business opportunities can act as catalyst to optimize positive outcomes of remittances to local economy's development by tempting the migrants and their households to invest in their locality of the home country. At the same time, remittance can induce rural people to use banking services if proper policy support can be offered. They can use banking channel to send and receive remitted money, keep the amount in bank accounts of their localities in which case the development impacts may be multiple. O'Neil (2003) thinks that migrants who want to invest in different local projects need policy support in order to establish businesses or keep money in the bank accounts.

However, the role of overall economic policies and availability of required infrastructural facilities are also crucial for more efficient and effective absorption of remittances by local economies. De Haas (2010) argues that more general development

policies are the best policies to maximize remittance impact which make home country more eye-catching for migrants to invest their remitted money in the local economy. Fajnzylber and Humberto (2007) highlighted that educational achievements, institutional quality and targeted macroeconomic policies can play important role in fostering development at the local level.

Summary of the Literature on Migration, Remittance and Local Development

This paper covers literature of fifteen macro-level and twelve micro-level studies. These studies were between the period of 2004 and 2017. We observe that most of the macro-level studies from 2004 up to 2010 use simple or multiple regression analysis with ordinary least square (OLS) method of estimation, instrumental variable (IV) method where the explanatory variable tends to be correlated with the error term, and two-stage least squares (2SLS) method in order to obtain appropriate instrumental variable for the respective models used in the studies. In order to test the validity of the instrumental variable(s) chosen for the model, researchers opted for the "Sargan Test". This is how they confirmed that the instruments chosen for their models are independent of the error term. Apart from these, some macro-level studies used Human Capital Index, Poverty Equation, Counterfactual Simulation, etc. as well. Most of these studies address endogenity issue in their analyses. However, a conceptual shift has been observed after 2010 in the use methods and techniques to conduct research in this field. Macro-level studies during that period use cointegration in situations where two variables have long-term or equilibrium relationships between them. Such studies run cointegrating regression using time-series data. Some of these studies use panel data to reach conclusion. These studies resort to Vector Error Correction Model (VECM) to handle non-stationary series which are cointegrated, and also the Vector Autoregressive Model (VAR) to explore the multivariable causality. Some other studies during this generation use Solow-Swan Model, Augmented Solow Model, Johansen Maximum Likelihood (JML) Cointegration, and Generalized Method of Moments (GMM) in situations where maximum likelihood estimation is not applicable. But in regression involving time series data, there is the possibility of existence of causality among variables, that is, one variable may cause or drive another variable in the model. With this end in view, these studies use the popular Granger Causality Test to explore the direction of influence in addition to their dependence. As a test of stationarity or nonstationarity of the time series date used, some of these studies use Unit Root Test to confirm whether their time series data are stationary or nonstationary in nature.

So, there is a noticeable shift in use of methods and models between studies before 2010 and after 2010 generation. The first generation studies prefer to use simple or multiple regression whereas the second generation studies opt for cointegration regression analysis.

If the micro-level studies under this literature review are focused, we can see that most of those are cross-sectional data-based. Survey is the most-preferred source of data collection. However, the method of sampling vary among different studies. Snowballing technique, stratified cluster sampling technique, Probability Proportional to Size (PPS) technique, etc. are used in sampling. Many of these studies use personal interview technique and case study to gain in-depth knowledge about their respondents, and Focus

Group Discussion (FGD) to confirm their ideas gathered during the interviews or case studies. Path Measurement Model (PMM), Propensity Score Matching (PSM), Probit Model, and Stages of Progress Methodology are also observed to be used in some studies. In disclosing their findings, these studies opt for descriptive statistics, tabular presentation, flow-charting, graphs and pictorial presentation. These studies addressed the potential heterogeneity present in their dataset in applicable cases. However, unlike the macro-level studies, no prominent shift in the use of methodology is observed among all these micro-level studies over the period considered in this paper.

We present a summary of the reviewed literature as follows:

Study	Location	Sample	Objective	Method	Findings
Sunam (2017)	Nepal	170 randomly selected households, 54 in-depth interviews, and ethnographic observations.	To disclose the ways some rural people in Nepal develop their livelihoods through international labor migration and farming.	"Stage of Progress Methodology" with mixed research strategy.	Many poor people have experienced enhanced livelihoods through a diverse range of agricultural and non-agricultural activities including labor migration. Disposition of poor people from land and their adverse assimilation into the local and international labor market perpetuate chronic poverty.
Ngoma and Ismail (2013)	Different developing countries of the world	Cross country data from 90 countries	To examine the impacts of skilled migration rates (brain drain) on human capital formation in migrants' home countries.	Instrumental variable (IV) technique, Two-stage least square (2SLS), regression analysis, Sargan Test, Human Capital Equation.	The explanatory variable "Skilled migration rates" negatively affects the dependent variable (Human capital formation)" at 1% level of significance in developing countries. The long-term incentive effect is statistically insignificant. The results do not support the previously observed ones that the expectation of

Study	Location	Sample	Objective	Method	Findings
					emigration persuades investment in education of the left-behind potential workforce due to higher wage abroad. Highly skilled migration might lead to potential human capital loss.
Mizanur Rahman (2009)	Bangladesh, Singapore	50 returnee Bangladeshi migrants from Singapore	To document the relationship between migration and development by underlining the circumstances which stimulate changes in social and hereditary relations, social positioning, and intergenerational relations within families.	Ethnographic fieldwork, Questionnaire survey (both structured and unstructured questions), Quasi-panel design, Focus-group interviews.	In their own families and villages, male labor migration has contributed to social changes over time that are expected to fuel the long-run macro-changes in Bangladeshi society.
Beine, Docquier, and Rapoport (2008)	Developing countries of the world	Cross-section of 127 countries	To study the impact on human capital formation in developing countries of brain drain migration.	Counterfactual simulations, β-convergence empirical model, Ordinary Least-square (OLS).	Skilled migration prospects have positive effect on gross human capital formation.
Ahsan Ullah (2013)	Bangladesh, Malaysia	70 Bangladeshi migrants in Malaysia	To analyze the Bangladeshi migrants' routes to get to reach Malaysia, and to test whether the network theory is applicable on the routes with empirical reality.	Open-ended and closed-ended questionnaire survey, ethnography, observation, snow-ball technique, Descriptive statistics.	Majority of the Bangladeshi migrants incur exorbitant cost on migration. When the intangibles losses are considered, their decision to migrate end up as a loss of wealth, health, and youth.

Study	Location	Sample	Objective	Method	Findings
Ortega and Peri (2009)	OECD countries	14 OECD destination countries, and 74 sending countries	To compile a new dataset on migration flows and on immigration laws for 14 OECD destination countries and 74 sending countries; To outspread the empirical model of migration choice across manifold destinations; To estimate the impact of immigration flows on productivity, investment and employment in the receiving OECD countries.	Ordinary Least Square (OLS) method, 2SLS.	Per capita income gap between destination and origin are increasing with bilateral migration movement. Migration increases employment. In the short-run, immigration increases the total GNP of the receiving country, without affecting average wages and average per person income.
MAKRAM (2014)	Developing countries of the world	14 countries	To investigate the causality between remittances and poverty reduction.	Co-integration analysis with non-stationary dynamic panel data.	Bi-directional Causal relationship between poverty and remittance is observed. The causal impact of poverty reduction on remittance is stronger than the inverse impact.
Hossain (2012)	Bangladesh	300 skilled and unskilled migrants from Dhaka and Rangpur	To study labor migration (both unskilled and skilled), remittances, and poverty;	For quantitative method, a sample survey with purposive sampling	Skilled migration has higher poverty-reducing impact than unskilled migration. In Bangladesh, remittance plays an

Study	Location	Sample	Objective	Method	Findings
			To evaluate the impact of unskilled and skilled labor migration on poverty-reduction.	conducted among returned migrants and their households through snow-ball sampling technique, and interview were conducted. For qualitative method, case studies were conducted	instrumental role in stabilizing macroeconomic indicators. Skilled migrants have higher capacity to reduce poverty than unskilled migrants.
Alam et al. (2015)	Bangladesh, Malaysia	306 Bangladeshi workers in Malaysia	To pronounce the impacts of international labor migration on local development.	Primary data from questionnaire survey, Path Measurement Model	International human capital migration from Bangladesh instrumentally advances its economy at the local and household levels.
Islam, Parvin, and Kalam (2013)	Bangladesh	Annual data on literacy rate and the growth rate of remittance from 1997 to 2011	To analyze the impacts of migration on the socio-economic aspects of Bangladesh.	Unit-root Test, Co-integration Test, Ganger Causality Test	Co-integration is observed between the growth rate of remittance and literacy rate implying that the growth of remittance can stimulate literacy rate which may lead to socio-economic development.
Ahmed (2012)	Rural Bangladesh		To examine the development impacts of migration on the sending families in Bangladesh	Qualitative methodology using in-depth interviews	Mixed impacts could be observed on migrant sending households.
Sharma and Zaman (2009)	Bangladesh	500 households (251 migrant households and 249 non-migrant households (from 10	To analyze the household-level cost-benefits of migrating overseas from Bangladesh. To discuss the sources of	Propensity Score Matching (PSM) method, assumes the potential endogeneity	Household consumption, level of household savings, and use of modern agricultural inputs can be substantially enhanced through overseas migration.

Study	Location	Sample	Objective	Method	Findings
		randomly selected thanas from 10 randomly selected districts)	financing migration, remittances sent and the restrictions faced by the poor.	of migration status, probit model	
Arif (2009)	Pakistan	138 returnee migrants and 40 prospective migrants from 5 districts	To present different aspects of labor recruitment and migration from Pakistan to the Middle-East region	Survey method, interview, focus-group discussion	Young male who migrated had education level higher than the nation average. About 50% of the migrants has been recruited by Overseas Employment Promoters (OEP), 20% got direct visa from employer, 14% are illegal migrants. Resigning with 8%-10% lower wage on arrival in destination country is common for Pakistani migrants.
Chowdhury (2011)	Banglades h	Annual data between 1971 and 2001 from various data sources	To examine the role remittance is playing in developing the financial system of the country.	Johansen Maximum Likelihood (JML) Co-integration, vector error correction model (VECM)	Remittances have a significant positive effect on financial system of the country. The effect of financial sector's development on remittance-inflow is nonexistent.
(Khatiwada and Samaniego (2014))		68 nations	To identify the development-impact of emigration by estimating its effects on GNP	Augmented Solow Model	Migration has a small positive impact on growth.

If we focus light on the findings of the macro-level studies, we observe that migration and remittance can have positive impacts on growth though there is controversies among the researchers regarding its extent. Migration and

remittance can increase the total GNP of the receiving country in the short-run though a long-run positive relationship is also found between remittance and GNP of a receiving country. Increase in share of remittance to GNP can lead to an increase in the ratio of deposit to GNP. Growth rate of remittance has a positive impact in increasing literacy-rate of a country though it is also found that the net effect of migration to human capital formation is miniscule. Remittance transfer can have poverty-reducing effect at the local levels though it does not have significant inequality-reducing effect on a country. In developing countries, the prospect of migration in the short-run lowers investment in education.

If we focus on the reviewed micro-level studies, we observe that migration and remittance improve local and household economy. Households of the migrants can employ modern farming technology and gain higher productivity. Migration can contribute to social changes in the households and localities of the migrants that can stimulate macro-changes for the country in the long run. Skilled migration has better poverty-reducing capacity than unskilled migration. Remittance-receiving households are usually well-off than the non-remittance receiving households. However, migration-induced remittances have mixed impacts on the households of the migrants. In most of the cases, remittance can help sustain livelihood but its impact on sustainable livelihood solution is difficult to prove and generalize. There are many reasons for this. In developing countries, international labor migration involves significant financial cost of migration. It injects debt-burden for the households of the migrants and consequently impairs their creditworthiness in the home-country. So, they eventually fall into debt-trap and poverty-trap due to migration of the family-members. Though they can enjoy improved livelihood with diversified agricultural and non-agricultural activities, disposition of poor people from land perpetuate chronic poverty. If the intangible costs and losses are accommodated, migration is a loss of wealth, health and youth for many migrants especially of developing countries.

Conclusion

The impacts of international labor migration on local development of the home countries vary from country to country. Such migration can have positive impacts in the form of improving the financial condition of the migrants, increased consumption of their households, and boosting the private business sector when part of their remittance are invested locally. The direct impacts of international labor migration on the local development can also be observed through decreased pressure on the local labor market. Investments of remittance by migrants and their households in their localities can create new local business and services which significantly contribute to the growth of local output and wellbeing of the local citizens by new jobs and locally produced goods and services. The indirect impact of remittance can be seen through increased number of short-term local

jobs creation due to investment of migrants in sectors like house-construction or local entrepreneurship. At the same time, migration of male member of a family can improve woman's role in decision making at the family and community level thereby ensuring gender equality and woman empowerment. Moreover, increased investment in education and health-care by the household members of the migrants can have positive impacts on local economies in the form of improved human capital in the long-run. So, remittance, in deed, can contribute to the economic and social welfare of the localities. However, the extent of such impact largely depends on the investment environment and also on the policy support offered to the migrants and their households by the government of respective countries. In order to grasp the best possible outcome from migration for local development, governments need to create pro-migrants policy both at the micro and macro level. At the same time, governments need to ensure training facilities for the migrants so that they are motivated to invest higher portion of their remittance earnings in the local development process.

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Everyday violence of female garment workers in Bangladesh

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Abstract: The paper attempts to understand the question of workers' rights beyond the legal discourse of rights and voices through an exploration of the practices and experiences of the female garments workers. The practices and experiences of the female garments workers in the factory settings are complex and multilayered. We have shown the discordance of the legal discourses of labor rights and workers' experiences through presenting some micro narratives of the workers' daily life struggle to deal with in (formal) management system of the factory. A commonplace analysis places these discords as exemplars of lack of awareness on the part of the workers and also argues for better enforceability of laws. We argue that in neoliberal settings such as the one where the garment sector of Bangladesh is located, such a straightforward call is simplistic. The discourses presented herein show the practices of workers from their everyday experiences. It proposes a deeper meaning of rights beyond the question of enforceability, and awareness. It brings into fore other discourses and narratives which are often ignored in contemporary labour rights discourses.

1.0 Introduction

The labour act of Bangladesh known as Bangladesh Labour Law (amended in 2013) came into effect in the year 2006. The law can be seen as an outcome of some recent events, especially in the emerging context of labour movement in the readymade garment sector of Bangladesh. Since 2005-06 the sector has witnessed a number of spontaneous movements and unrest. The sector is credited highly by the government and policymakers of the country for earning the much needed "foreign currency" for the country's exchequer. A commonly held view is that the sector has helped to speed up "our" economic growth. Claims are also made that the industry provides a livelihood to a large population of Bangladesh's workforce, 80% of which are women.

In this backdrop, the current paper looks into the question of female workers' rights in the Labour Act of 2006 by looking at issues such as violence against women, maternity rights, and unionization rights, etc., issues which have lately become central to labour rights activism as well as women's rights activism in Bangladesh. It may be said that the labour act and associated policies have come into operation through various transnational networks and organizations. In such a context of transnational "field of force", this paper aims at an understanding of how the current act speaks to the contexts of women rights in Bangladesh by critically engaging with the question of how the issues of rights are conceptualized in legal discourse and what are the practices.

We look into the practices of labour rights from the everyday experiences of the female garment workers in factory floors, especially aiming to look at how they conceive rights as a worker. We focus on the practice and everyday living of the female factory workers and how it varies from the definition of rights in the legal terms and how their everyday negotiations are complex and often cannot be made sense in legal terms of "rights and

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awareness". The analysis we provide in this paper comes from our experience of working and organizing amongst the workers in the garments sector. Incorporation of such experiences in an academic journal calls for new debate on research ethics and the authors are open to such calls and wish to participate in any ensuing debate in the future. We invoke some experiences of interviewing workers in Dhaka and Chittagong. The fieldwork was conducted in two areas in Metropolitan areas of Dhaka and Chittagong in different short spells between October 2017 and June 2018.

2. Framing the legal languages of Rights

The discourse of law and rights have, lately become the central terrains in the contemporary women's rights movement in Bangladesh. It often naturalizes law and its absolute emancipatory power of claiming justice. In the present paper we shy away from a perspective of law and social change which overestimates the potentiality of law and the state's role in triggering social change and instead indulge ourselves in an analytical tradition which underscores the need to untangle the dialectical process in which laws and social policies are embedded. Among other things, this tradition shows that the legal phenomena are not necessarily the central in social change. Rather political and economic constraints and conflict are often the major protagonists (Calavita 1986).

Recent feminist scholarships in South Asia have also posed questions on understanding of law and its absolute emancipatory power. This body of scholarship broadly examines the laws' effect in the post-colonial countries. In India, such critique surfaced in the context of the feminist movement and the indigenous rights movement since the rise of the legal campaign as a strategy. These critiques have brought up various complicacy of law in relation to the marginalized community (i.e. indigenous community, religious minority), the sexual minority rights, and violence against women. There is already a large body of work which is grounded on women's rights and the Human rights in India (Menon 2004, Haksar 1986, Gandhi and Shah 1992, Baxi 2000).

This critical scholarship has expanded the scope to understand law from its absolute power of claiming justice by critically examining the practices of law in a specific context. Menon is one of the important critiques in this field. In her book titled "Recovering subversion: Feminist politics beyond the Law" (2004) she discussed at length how modern form of law has travelled in this part of the world as 'exigencies of colonial administration', pointing to the fact that it may be emancipatory for the people where it emerged as an outcome of the civil rights movement (i.e. Europe) but might not be equally emancipatory for the people in post-colonial countries. She made her argument in the context of India where there are various practices of customary law regarding women and indigenous rights based on religion, and ethnicity. She attaches to the view that the demand for the universal standard of the modern law of the Human Rights discourse is of course empowering for the people of some quarter who belong to an educated middle class. But there remains a large population who might not be benefited from this. To be more precise, her thoughts are on the marginalized sections of society. Referring to Haksar's work, a legal practitioner in the Human Rights field in India, Menon came up with a nuanced view of the limitation of the transnational legal framework of rights when implemented in a particular context. They have argued that the notion of justice did not come with law, rather this contemporary notion of justice is

constructed through the laws and activisms around the law. They also argued that the notion of justice varies in different spaces, contexts, and periods.

It can be said that such critique is absent in the feminist discourse of Bangladesh. Rather law centric activisms have become central and popular modicum for demanding rights and raising voices. Both women's movement and labor rights movement in Bangladesh have taken legal campaign as a strategy for demanding and establishing rights. Hence we provide a discussion of how issues of women's rights are framed in contemporary labor acts in Bangladesh and juxtapose the experiences of the female factory workers in relation to their rights and entitlement (i.e. violence against women, maternity rights and unionization).

In what follows we invoke some micro-narratives of female garment factory workers to argue how the law speaks from an ideal context, whereas the discourses of workers are multifarious and complex. We will discuss how the legal language of rights, which is defined in the law, is far away from the workers' everyday living. To do so we will examine some specific sections of labour law 2006, and juxtapose the workers' experiences in that particular area.

3. Everyday experiences of violence of the female workers

Experiences of sexual violence

There is only one clause in the current labour law on sexual harassment and violation to the female workers in the factory. Clause no 332 of BLA 2006, titled "mohiladerprotiachoron (behaviour towards women)" defines the desired behaviour towards women in the factory setting. These rules and regulations are applicable for women at any level in the workforce of the factory. It says no one can do any vulgar or offensive behaviour towards a woman in the organization. Vulgarism and offensive behaviour are defined as certain kinds of behaviour which goes against the "modesty" and "dignity" of women.

Gender-based violence has been a key issue since the rise of garment sector in Bangladesh. In the 1980s and 1990s, there has been a concern, pervading the public discourses that women are maltreated in the industry. Religious readers in the country often did not welcome the idea too. It is reportedly admitted by the activists working in the garments sector for long that gender-based violence and sexual exploitation has been rampant during the 1980s. A trade union leader in Dhaka who had years of experience of working in the garment sector as a worker said:

> The experiences of violence in the garment sector are entangled with the very nature of work, the informality of management and also the local politics of the owner, especially the way they control workers' bodies. In earlier days there was no scope for voicing up. The workers were totally controlled by the management inside the garment and they were controlled by the paid thugs (mastan) of the owner outside the garments. It was common for workers to be on the recipient end of a good dose of slangs for no good reason from the lower and higher rungs of management. For some activists, the situation has changed of late. Earlier there was no idea of the working hour, the deliberate miscount of

> overtime was seen as normal. For example, if someone did have overtime for 10 hours, she or he used to get overtime for two hours. But now they have working hours and proper overtime counting.

However, we came across very few cases who shared their experiences of sexual violence at workplace. It turned out that sexual harassment is not very uncommon in the factory settings. But sexual harassment within the factory space is not usually reported because of the common perception among the workers that there is no congenial environment of redress in the factory settings. In case of any serious violation, some interlocutors reported that and protested. But often they could not complain as they were not taken up seriously by the management. It was also commonly believed that the perpetrator of the violence is found to be someone from the management. Management staffs were almost always found to be closely related to the owners (via kinship ties or some other form of regionalism). In such cases, workers have to go against the power. Kinship and regionalism often would put the workers in a difficult situation.

Battering, slapping and hitting are commonly practiced in factory floors. Female workers are more often the victims of such corporeal punishment. Male workers reported that the factory management is afraid to beat or slap the male workers, but they often hit and slap the female workers. Female bodies are always subjected, irrespective of whether the slang is used to humiliate female workers or male workers. The workers often said that the young female workers, who were "fair" or "beautiful" often experienced the sexualized behaviour by the management staffs. In the words of one interviewee, sexual harassment is rampant in the garments. But since there is competition for work, people are not keen to talk about these issues openly.

Examples discussed above are useful to understand how the power relation works in a factory setting, where the compliance officer herself is in no position to take up the issue seriously as the management staffs are close to the owners. The Bangladesh High Court's guideline against sexual harassment (2009) is applicable for factories where management is advised to develop a complaint cell for cases of harassment and misconduct. But when the management staffs take advantages (and are involved with wrong doing) then the usefulness of having cells or complaint boxes comes into question. It is also possible to argue that the law cannot work when such complex power relations exist in the factory. A factory worker in Chittagong for example remarked in an interview that just to show the buyers that there are complaint boxes, sometimes we also drop our written complaints over there. In her words: "We drop our complaints inside the box, but the next day the cleaner comes and throws out everything, so see how seriously they take our grievances!"

Experiences of workers during pregnancy and maternity

Pregnancy and maternity rights of the female workers have been considered one of the major areas of female workers' rights in the labour act 2006 comparing to other areas of rights. The fourth chapter of the labour act of 2006 is titled "Proshuti Kollan Shubidha (maternity welfare benefits)'. There are six clauses which discussed the role and responsibilities of the job provider and the rights of the workers during pregnancy. The first two clauses of the act explains the responsibility of employers (i.e. not to employ in any risky task during pregnancy) and the kind of rights the workers are eligible to

demand during the pregnancy period (i.e. flexible timing, taking rest during work). Last four clauses discuss monetary rights and benefits of the workers which include the calculation of the amount of money including salary and benefits and the process of transferring the money. In the current law, four months is considered as maternity leave (though Bangladesh government now declared six months as maternity leave, but it is not in place in the garment industry yet) which is actually 16 weeks, 8 weeks before the birth and 8 weeks after birth of the child.

Though there is a singular law of maternity rights and benefits, in practice the rights and benefits, even the duration of leave provided by the owners varied. The workers' experiences tell us many stories and practices of maternity rights and benefit. The practices vary from factory to factory and even from worker to worker in the same factory. During our fieldwork, we found very few female workers who have experienced pregnancy during their working life. Most of the female workers we interviewed either were unmarried working in the factory just for 3-4 years, or were married and had children, but they joined in the factory after their child's birth, and whom they are continuing their work after marriage and have kid, they have left the job during their pregnancy.

As the job was very demanding, so for them it was difficult to continue the work during pregnancy. Workers who have experienced maternity rights and benefits considered three months as maternity, some workers considered just leave as maternity and getting back to the job after childbirth was also considered as maternity. One worker, a 22 years old woman from Chittagong said, "We get leave during the pregnancy period, but we do not get any salary or money. Even there is no assurance that we will get the job again after returning." The common practice seems to be an assurance given by the management that after child birth, the factory will admit the worker again. This exampleclearly indicates that maternity rights are denied by the management although there may be a clear leave policy (according to government law) in place (Sumon 2019). Practices varied in factories towards the pregnant woman. There were some factories, where pregnant workers were employed for light work, given permission to use lift, permitted to work by sitting. Management of the factory used many "tricks" to remove pregnant women from continuing their job at the factory in order to deny the benefits.

Following is an experience of a twenty four year old mother: She went on for the maternity leave for three months, received half of the financial benefit before going for leave and the factory management told her that she will get the other half of the financial benefit once she returns. But when she joined the factory from her maternity leave, she was completely denied by the management and was told that she already received the full benefit. Anineteen year-old female worker in Mirpur said, when she was pregnant, the factory didn't provide any facility or maternity leave. What's more, the factory authority fired her when she was only four months pregnant and told that she can join after child's birth. She has been out of work since then and was planning to join in factory work again at the time we met. Another worker who lived in Mohammedpur reported: She has worked in the sector for more than ten years. In this long period, she gave birth to two children. But she didn't get any maternity leave. She had to quit job every time she became seven or eight-month pregnant. After delivery, she joined after

six months as there was no one in her family to look after her new-born baby. Her twelve years old younger sister and her elder daughter were taking care of her younger child.

Experiences of unionization

There is a long chapter on the trade union in the factory in the labour law 2006. The chapter is titled "Trade union and industry relation (trade union ebongshilpashomporko)", which contains 30 clauses about the trade union, provides detail about the rules and regulations of trade union. If we reflect on the trade union in the garment sector of Bangladesh, very recently, especially after the Tazreen and Rana Plaza, we may note that the issue of trade union rights in the garment sector has resurfaced in the media and public discourse. The number of trade union has been on the rise.

In Chittagong, many workers shared that union activity was controlled inside the factory and even the workers were closely under the surveillance of the management. A female garment factory worker in Chittagong shared her experience:

> Labour union was helpful to respond to the workers' problems in regard to sexual harassment. When there was labour union in our factory, we often asked help from them, but when the union work has been dissolved, there is no one for us to help; bad behavior and atrocities such as sexual harassment by the management staff has risen. When management finds involvement of workers with any union activity, the workers are sacked from their job.

In the words of another participant, "if any worker is identified with some sort of union activity outside the factory, the next day the gatekeeper would bar him/her to enter into the factory. In the words of the latter worker: "We know, if we openly say anything, we will lose our job the next day and now it is becoming competitive to get the job, even giving bribe is common here to get a job in a good factory."

Another worker in Dhaka, about 30 years of age, told that there is no security of work in the RMG sector. If the management wants they can terminate the worker any time. Furthermore, there is no space for the workers to assert their rights and if the workers did, workers are threatened. "Go to your federation and don't come office from tomorrow" the management would say. He added that if the government wants to do something for us then they have to come closer to us. He thinks every factory should have government service booth and if they can do it this may help the workers in many ways. He also told us that he cannot find his existence in today's reality because he has no rights no opportunities and no space to share his view to others. He, however, strongly believed that only the government can benefit the workers.

4. Conclusion: Looking beyond the legal discourses of rights

The question is how we read these micro-narratives of the workers. There are a few questions that we need to reflect on. Firstly, who are the producers of these legal documents and who are the interpreters of these legal provisions. We discussed three major areas of workers' rights especially female workers' rights i.e. sexual violence in the workplace, maternity leave and benefits, and the rights of unionization. These are

three separate themes and at the same time, these are very connected areas of rights. As we discussed above that provisions of law and rights of the workers are often conceptualized from the top, ignoring the complexity of power dynamics within which the factory and the workers are situated. Mindful reading of the experiences invoked here may help us to understand the power relations among the buyer-state-owner-factory management-paid staff and the workers. Workers are situated in those nexus of power relations and networks.

The micro narratives of the workers renders obsolete the idea of rights and legal provision for the workers and how it is understood and implemented by the management of the factory. It is important to note that these narratives of the workers vary based on factories, region and also skills, strategies and bargaining power. We can elaborate on this from the specific area of sexual abuse and violation. Often interventions of the rights body concentrate on the awareness building of the workers about the sexual abuses. They bring women at the centre stage as a victim who is not 'enough aware' of sexual abuse and legal provisions against those. The experiences workers shared during this research and beyond says that how their experiences are many folded. More importantly, how that abuse and violence are embedded with the power relations of the factory setting.

Workers' micro-narratives provide an understanding of how the situation of forming a trade union is complex, underscoring the everydayness of workers' experiences violation of rights. If we look back on the history of the garments sector, controlling the labor movement and adopting different governmentalities were always a strategy to smoothen the path of the 'economic growth 'of the respective countries (Ong 1999). There were concerted efforts to hold back the trade union activity in many ways in the past; sometimes this was achieved in the name of trade liberalization, adopting World Bank's prescribed formula of Structural Adjustment Programme (SAP) and also in the name of creating trade union free Export Processing Zones for attracting the global market, etc. In these cases, the state's role has been very minimal in the sense that often it implemented policies prescribed by the World Bank and the likes. Now apparently in Bangladesh, there is an encouragement for forming trade unions due to various new regimes of governance (Shifa, Gulrukh and Sumon, 2015).

Due to those factors, systemic labour unions in the garment sector could not grow. But now the sector enforces stringent law of workers' rights and unionization. It gives more power to the state but giving more power may not be a solution. Critiques have argued that law only can work when there is a strong movement. Haksar puts it this way: we should resort to the law only when the movement is strong enough to carry the law reform forward (Haksar 1986).While law's overestimated power have been already discussed in this paper, it is clear that in this global production system, 'agents of power' are more complex and multi-tierded and are always in friction.

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'A woman without a husband is like a boat without a boatman': An Ethnographic Enquiry into the Contemporary Social Life of Gendered Bengali Proverbs

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Abstract: Should a woman worker behave in outspoken way like the legendary *Khona* of *Khonarbochon*, what will be the reaction or repercussion on part of the managerial staff of the Bangladesh's export garment factory that she works in? Although the possibility of her tongue being cut off like the legendary *Khona* might not apparently be there, neither is it expected that a worker would say 'words of wisdom' in presence of her supervisor, let alone directly addressing or advising him. However, proverbs are quite frequently evoked by both female and male-workers, and their spouses in their social settings and in the factory premise. This write-up is an attempt to understand the contemporary social life of gendered proverbs and its changes emanated from ever changing and contested gender roles. By doing so it tries to look into the processes in which the ideologies of masculinity and femininity are attempted to be reproduced, reinforced, or contested and subverted. Most of the proverbs emerged in different contexts in the past and a lot has changed in societal reorganization over the years. The question that becomes pertinent with the passage of time is: Whether the essence and 'wisdom' encoded in the sayings hold relevance for contemporary contexts in the same way? Should the axioms still be taken to represent the social psychology and practices that looks for validation and reinforcement of men's control over women? Particularly in the context of women's 'economic empowerment' and greater mobility when the structural disparities between men and women are assumed to have come under scrutiny in some ways or other, what does it mean that proverbs approving male dominance are evoked time and again in everyday life setting? Based on what we have noted among the garment workers in semi-urban locales, we argue here that even though the proverbs with the message of male dominance are still frequently referred to by both men and women engaged in industrial work, many of the female garment workers show strong cynicism about the tenets of these proverbs, at time ridicules the representation of masculinity. Through the ethnographic analysis of the moments and milieus of evocations, we argue that the persistence of such reference to the patriarchal worldview is a testimony of how complex it is to do away with the ideological formation of gender disparity that this enacts – it solicits greater policy intervention and discursive shift than liberal individualization and market incorporation. We highlight both the celebration and contestation of the proverbs in mundane life ways and further argue that the ways men and women rethink and resist the ingrained wisdom of the proverbs should be taken seriously into account – and, in that way we may better understand the agency and grounded subjectivity of the workers.

Introduction

When we first met Saleha, she behaved like a strong and contented woman who was more interested to talk about her ten years old son than anything else. A worker in a garment factory, she was in her late twenties and in a marriage, which was already longer than a decade. She appeared to be less interested to say things about her husband; however, during our early meetings we did not have any indication that there was any

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strife in her conjugal life. Four months later, in one weekend afternoon we sat in the open space in front of the room in which Saleha lived with her husband and son. It was at one edge of the sprawling settlement in Kuturia area of Ashulia sub-district in Dhaka district of Bangladesh. From different sources that included gossips circulating among her neighbors we already came to know about stories of her husband's infidelity. She was aware about the chitchat that was in the air. This time she opened about the agonies that she was enduring for long in her marital life.

> "Everyone here knows things about my husband's deeds. He keeps women and even goes to prostitutes. I wish I could live away from him. But things are not easy. He is not a good person, neither are his family members. You know my mother-in-law – she lives in other room. She always talks big, but she does not do anything to correct her son. To her all is well with her son and all the faults are with me."

As we told her that she interacted in a dignified way during our earlier meetings and we could not infer anything from the way she appeared and talked before us, she called upon the following proverb.

> "The power of a woman is her tears; and power for a thief is his lies."
>
> (নারীর বল চোখের জল, / মিথ্যা কথা চোরের বল।)

The proverb she invoked not to affirm to its essence, rather to refute it. She explained that she did not want to appear like those women who behave like the thieves and try to use their tear as their power. "Tear cannot be power. Those days are gone when women would do nothing but shed tear", she firmly told. "The society wants the women to be weak and meek, and to shed tears. I do not want to be like that". However, she concedes that she cannot be as strong and as stubborn as she wants to be particularly for the reasons that people in the family and neighborhood are not of much help; instead, they are there to rebuke and censor a woman. She then incites this proverb:

> You may not have a responsible husband to provide you with sustenance; however, there would be many to rebuke and batter you.
>
> (ভাত দিবার ভাতার নাই, কিল দিবার ঠাকুর আছে।)

Later that evening, Saleha's mother-in-law joined us and talked about what, in her view, should be the core qualities of men and women. We could understand that she perceived what we were discussing with Saleha, and clearly was making hits to her daughter-in-law in a way to chide her. As she deliberated at length as to how women have to make sacrifices to ensure peace in the *sangsar* (household, family, worldly life),a number of proverbs she invoked that eulogized masculine dominance and underscored the need for women to go through afflictions:

> "Anger is the symbol of men and shyness is that of women".
>
> (পুরুষের রাগ বেশি, নারীর লজ্জা বেশি।)
>
> "A man's resolve may make him a king; a woman's resolve will make her a prostitute."
>
> (পুরুষ জিদে বাদশা/ নারী জিদে বেশ্যা।)

“Praise only for that woman who burns a lot and turns into ashes.”

(পুড়বে মেয়ে, উড়বে ছাই, তবে তার গুণ গাই।)

The ways in which Saleha and her mother-in-law evoked probers to describe views about household and conjugal life as well as to express their views about masculinity and femininity were not uniform. Saleha called up two proverbs to engage with them in contrasting ways: she refuted and expressed rage to the first proverb that she cited whereas the second proverb she invoked to highlight how adverse social reality is coded in it. On the other hand, her mother-in-law brought in several proverbs to highlight the ‘need’ for women to make sacrifice in order to cultivate peace and happiness in the family. How men and women in contemporary context invokes proverbs that idealize norms and views about gender relations and practices can be significant sites for understanding dominant social values as LeVine (1982a: 293; cited in Abu-Lughod 1985: 246) argued that "interpersonal communication is the medium through which we discover how individuals experience their lives and how cultural beliefs shape that experience." Further, Foucault’s notion of ‘counter-conduct’ (Foucault 2007), which focuses on subjects’ resistance to governmental forms of power, may also be employed to explain the ways men and women engage with the discursive governmentality. Therefore, this write-up is of the view that by engaging with the ways in which proverbs and sayings are either commemorated or contested in contemporary Bangladesh can provide a grounded understanding as regards transformation in social dynamism.

The concepts of femininity and masculinity, as well as the values, norms, understandings, ideologies, and practices relating to them are constructed and construed in a society in culturally and historically patterned ways. On the other hand, the proverbs and axioms – generally regarded as repositories of folk wisdom (White 1987) – are expected to articulate the commonsensical in everyday life. ‘Gendered proverbs’ that embody the canonical norms of a society in terms of male-female relationship and relevant beliefs and practices are likely to provide significant insight into the cultural models of masculinity and femininity that are dominant in the particular context. However, the relationship between the ‘traditional perception’ and ‘contemporary practice’ is not straightforward or linear as there occur significant continuation and rupture between the two. The ways in which the members of a society engage with the ‘age-old’ proverbs in their everyday life can be viewed to epitomize much of the great deal of conformity, negotiation, subversion and rejection that are at play in the particular social-cultural setting with regards to both ‘customary’ and ‘newly’ unfolding values and beliefs. Arguably, the contemporary social life of proverbs is the ‘contested sites’ that unravel the processes in which cognitively and linguistically expressed cultural models are either reinforced or contested in people’s quotidian practices.

It is from this perspective that in this write-up we analyze the ‘gendered ‘Bengali sayings and proverbs that we came across in course of our ethnographic engagement with working men and women – specifically, among those who are employed in ready-made garment factories – in the semi-urban locales in Bangladesh. Even though we try to keep focus on the agency and subjectivity of the actors in a bid to move beyond structuralist or deterministic framework that highlight excessively on external forces or patterns that constrain human behavior (Ortner 2006), what we describe here is about two apparently contrasting processes occurring concurrently: potentials for challenging discriminatory

values, and norms are created in a context that also reproduce and re-embellish constraining social patterns and customs. The conceptual framing of the paper, therefore, might be seen more in line with what Giddens meant when he observed that the study of practice is not an antagonistic alternative to the study of systems or structures, but a necessary complement to it (Giddens 1979; cited in Ortner 1984: 147).

Our ethnographic engagement with the garment workers and their family members shows that the proverbs that they frequently invoke are more in line with the patriarchal values that validate subordination of women's position and demeaning of their worth and dignity: the sayings express almost unscathed prevalence of 'hegemonic masculinity' (Connell 1987). However, nearly on every occasion in which the proverbs were referred to, both male and female interlocutors of our conversations reacted in mixed ways: some expressed their appreciation and approval for the core messages of the sayings whereas others registered their cynicism, dismay, ridicule, and anger as to the asymmetrical precepts that were being conveyed. What we try here is to make sense of this apparent incongruent ways in which gendered social expressions are related to – or, reacted upon – by the working-class men and women in peri-urban Bangladesh context.

After this introduction, we briefly reflect on the conceptual framework of the write-up and then briefly discuss on aspects of gendered proverbs. After that we examine the relationship between socialization and cultural models. In the main section of the write-up, we discuss proverbs with diverse gendered meanings and try to illuminate the contexts in which we found them to be referred to by the people with whom we engaged ethnographically.

Conceptual Framework

The original focus of the study in which we came across these proverbs were to understand the impact of capitalism on gendered self, agency and subjectivity of those who are being appropriated by the globalized production regime as 'feminized cheap labor force' in the context of nationalist desire for rapid economic growth. In the same vein, we try here to make sense of the 'social reception' of the gendered proverbs in the context of neoliberal transformation that is a key force in shaping gender relations and practices in contemporary Bangladesh. In light of the fact that a couple of decades have passed since the beginning of Bangladesh women's integration first into the informal economy and then into the 'formal' industrial production regimes, one could argue that it is quite dismal and frustrating a situation that the proverbs that are cited frequently by working class men and women basically reinforce a worldview that censures and criticizes womanhood and femininity through broad-brush representations. On the other hand, by highlighting the ways in which the female interlocutors engage with, ridicule and make fun of many of the aspects of patriarchal attitudes manifested through the proverbs, one could alternatively argue that spaces for significant contestation and negotiation are opening up – or have already opened up – with regards to prevalent gendered inequalities.

As we dwell on these two contentious positions, we argue that in light of Bangladesh's already taken 'long' journey into market-led development discourse; it is not justified to point the finger at 'traditional' wisdom or 'patriarchal' norms as such for ubiquity of insulting views toward femininity. The role the contemporary forces associated with

market, state and community play to keep masculine hegemony and discriminatory gender practices in place also have to be examined. The ways in which contemporary capitalist mechanisms intersect with the conventional derogatory views about women have the potential to explain the durability of gender inequality. Therefore, with regards to the prevalence of patriarchal values in the proverbs, the question that needs to be asked is: how is it so that despite all the apparent 'achievements' in term of economic and social transformation, the ideological formation of gender disparity and disparaging attitude toward women have apparently remained deeply-seated in social cognition and linguistic representation? What are the ways in which traditional attitudes and neoliberal interventions intersect to reproduce and reinforce the basic norms of gender inequality? On the other hand, if we highlight the agency and resistance of women workers vis-a-vis the dominant cultural models, we still have to ask: How far the contestations and subversions thus waged have the potential to challenge the structures and patterns of subordination and suffering? Is it at all likely that liberal individualization and market incorporation of women would contribute to greater gender justice at household, community and state levels?

Bengali proverbs and gender relations

Proverbs are generally regarded as repositories of folk wisdom, and it is thought that they represent the commonsensical in everyday life. The analysis of the ways in which proverbs and sayings obtain their particular brand of meaning in cognitive and linguistic way may provide some significant insight into the organization of cultural models that underline them. The 'gender-related' proverbs that we present here are mostly about promoting the messages of male dominance in both rudimentary and metaphorical ways. However, we need to remain aware that Bengali proverbs are diverse in terms of their source, history, meaning and territoriality. Along with proverbs that convey the messages of male dominance, there are other proverbs that put across the grievances of women as they figuratively speak about their sufferings from the patriarchal mischievousness and try to make sense of the harsh and arduous realities (Ahmed 2007). Moreover, not all the proverbs are representative of whole geographical area that was once the greater Bengal province of British India or that is Bangladesh today. There are various proverbs and sayings in Bangladesh society today that are alleged to have been part of oral tradition of different regions within the country for long.

On the other hand, many of the proverbs could be seen as integrally connected to the ecology and life way of a particular region within the greater Bengal delta. Another aspect of proverb as linguistic figure is that it cannot be always understood as organically connected to the Bengali linguistic tradition: whereas the modern Bengali language has taken a 'standardized' form in the process of colonial modernization, the proverbs most likely have not been 'standardized' in the same way. Among the population in different areas of what is West Bengal today or among the Diaspora Bengali communities living in different parts of the world, there may be prevalence of sayings and axioms which are not fully akin to the ones available in urban or peri-urban Dhaka. Further notable is the point that most of the proverbs that are called upon today were originally shaped up in agrarian contexts, and in some cases have gone through changes in the course of colonial transformation and urbanization. As the life ways transform from agrarian to urban

settings, it remains an interesting issue to see how the proverbs are understood or interpreted in new social environment.

Socialization, cultural model and proverbs

It has been observed by many (e.g., Layng 1997; Sanndy 1981) that the process of socialization or acculturation plays important role in moulding the psyche, behaviour and action of a man or woman – or, more accurately, of a boy and girl as s/he grows up as the member of a community or society. A society trains the younger members to accept the ideal gender role that adheres to socially approved and accepted prototypes of masculinity and femininity. What the process of socialization or enculturation in a society involves, or what moral orders are emphasized upon in the way of upbringing a child can be best understood by looking into the religious customs, folklore, lullaby or cradle songs, rhymes, costumes, manners, law, art, literature, and other popular culture traits such as cinema and advertisements as well as by examining the everyday verbal or musical expressions that are culturally sustained (Chirkov 2009). The idioms that the common people use in their daily conversation can be taken as the 'cultural convergence points' that reflect much of the collective understanding about particular social relations or practices.

Browne (1998) noted that the social formation of the gender role and ideologies is a product of the process of socialization. It has also been noted that socialization process in almost every society underpins the already existing gender stratification. Gender norms of a society have significant effect on how a person grows up to think about himself or herself as a man or woman or as a transsexual person – not belonging to dominant heterosexual categories. The norms and values thus constructed give shape to the social identity of the person as well as affecting his/her entitlement of and access to various resources, opportunities and possibilities of life. Broadly speaking, in a society which is generally dominated by male-centric ideology, a boy or a man is usually expected to be trained up for a wider range of active roles and duties whereas the role expected of a girl or woman is limited. In Bangladesh, it has been a long-held view that a woman would become a sister, a housewife and a mother, and would focus more on household services and care of husband (in-laws) and children. That is, they would remain more focused on 'reproductive duties' than being part of production process, political terrain or public life. When women are systematically forced to take up different care duties and be burdened with informal activities within the household or beyond, what happens is not a continuation of conventional practices, in most cases it is a situation of stress and over-work created by market and development interventions.

It has been substantially argued by the academics – and particularly by the feminist scholars – that the gender difference that permeates diverse societies is not derived from innate biological features of women and men, rather it is due to the ways in which women and men grow up in society (Ortner 1974; Rosaldo and Lamp here 1974). Insofar as the societies construct the ideal types of masculine behavior, a man is generally equated with the symbolisms that connote heroism, courage, intelligence, power, authority, self-reliance, and other 'strong' qualities whereas femininity is more about modesty, shame, loyalty, passion, beauty, submissive sexuality, tenderness, and self-sacrifice.

However, it is important to keep in consideration that the messages that are stressed on in the process of socialization are not fully harmonized in their moral or philosophical underpinnings: there may be some apparent contradictions in the way the messages are conveyed from generation to generation (Yankah 1994). Moreover, socialization process is not the only way in which people's understandings and worldviews are molded; in every society there are ways and avenues in which hegemonic cultural models and norms are questioned. In the process of historical progress, it is also expected that the social conception of femininity and masculinity would go through some changes.

In Bangladesh context, it is generally assumed that the socially constructed concepts of femininity and masculinity have been substantially put under challenge as the women started to come out of the household domains and got involved in industrial and productive work. Shelly Feldman (2009) and others have discussed the historical process in which women's entry into market, wage earning, and industry have been made possible under the purview of what might be called neoliberalisation of economy and society. Kabeer (1991) shows that the gendered social environment started to come under challenge as the women began to engage in productive work especially in the garment sector. As the garment factories started to appropriate the cheap labor of Bangladeshi women, significant changes started to unfold in terms of relationships within the households and beyond. It is generally assumed that employment in a factory would make a woman self-reliant and substantially free from dependence on men. However, the extent to which this assumption has been practically enforced remains debatable. This write-up aims to add up new insight to that debate as it questions the extents of 'economic empowerment'.

Brief note on Methodology

In 2016, we conducted an ethnographic research on the formation of subjectivity of migrant garments workers in peri-urban Dhaka – one of our aims was to examine the making and prevalence of the notions of masculinity and femininity among the garment workers. One finding of the research was that women are becoming much more 'self-reliant' due to their employment in the garment factories and acquiring the so-called masculine qualities (which are considered as fixed for men) as they assume the role of money earner. We have seen in practical life settings that women were making the assertion that it was no longer the case for only men to be endowed with masculine qualities. Women's role as earner was facing up to the conventional fixed notions of masculinity and femininity.

Generally speaking, we started with an assumption that masculinity is no more conceived and practiced fully in the forms and shapes that were dominant in past rural and agrarian context. However, the issue at hand was to observe and analyze how it was being different. Our ethnographic observations suggest that masculinity in urban contexts shows much heterogeneity and is more in the process of having new traits as well as embodying much of the past. As we talked to both male and female workers, they brought forth some proverbs as regards femininity and masculinity, and about the expected or ideal role of man and women in the society. We noted the proverbs and tried to hear the explanations of the interlocutors about the inner meanings of those proverbs,

which are rooted in their daily life. We have noted that women use the proverbs in their conversations sometimes to justify their suffering and unfortunate plight of life and at times they call upon them in the way of making joke or ridicule, or as a way of expressing their unease and anger as to how they have to live their lives.

In our research, most of the interlocutors were from rural areas and trying to adapt to the urban environment. What we noted is that although there exist many contested ideas in the society and the role of men and women have changed with the passage of time, the proverbs which were prevalent in the villages of Bangladesh have not changed much as the people have migrated to semi-urban settings, neither did we hear new proverbs that could encapsulate the challenge and negotiation of the patterns of inequalities.

Despite the assumed weakening of the influence of patriarchal dominance in today's society, what we observed is that women still refer the male-centric proverbs – sometimes conforming to them and sometimes showing their skepticism and disregard to them. In what follows we use quotations from both male and female workers who referred to these proverbs from both critical and uncritical positions. We try to make sense of them in relation to the contexts in which they were called upon.

Bengali proverbs evoked by the garment workers

It felt intriguing as we came across a woman sewing machine operator who cited the most renowned poet of Bengali literature while talking in an informal *adda* about the ways in which Bangladesh society gives shape to a woman's submissiveness. She presented a couple of lines from a poem that we were not aware about. Following her lead, we searched for the poem and was convinced that the working of the social processes was in his mind when Rabindranath Tagore wrote the poem *Mukti* ('Liberty' – the translation below is of ours). It narrates how the ideology of timidity and introversion gives shape to particular forms of womanhood and femininity:

> I have obeyed everyone's advice as to what is right or wrong,
> I have kept my eyes down and head covered.
> That is the way I have passed twenty-two years in your house.
> And this is the reason that
> All, at home and outside, have found me
> As a woman of prosperity, chastity and goodness.
>
> (এইটে ভালো, ওইটে মন্দ, যে যা বলে সবার কথা মেনে,
> নামিয়ে চক্ষু, মাথায় ঘোমটা টেনে,
> বাইশ বছর কাটিয়ে দিলেম এই তোমাদের ঘরে।
> তাইতো ঘরে পরে,
> সবাই আমায় বললে লক্ষী, সতী,
> ভালো মানুষ অতি!)

Even though the poem was written long ago when women were supposed to be housewives without an alternative, this interlocutor of us – a female garment worker – still finds it relevant to describe the plight of today's women. As a woman earns income by transgressing the domestic boundaries, she has to keep all her kith and kin in good humor. Everyone in the family has to be satisfied that her work in the factory does not mean that she has turned into a 'bad girl'. The long shadow of the particular ways in

which ideal womanhood is constructed cannot be easily shrugged off – our conversation highlighted.

Later on, in a group discussion we brought forward the poem and tried to hear the reaction of the 'participants' there. What the interlocutors of our ethnographic fieldwork site reflected is that social taboos and restrictions involve important boundary setting precepts that encapsulate what is socially granted or not as an action or behavioral pattern from a woman. It is with reference to social values and social morale that freedom and choice of a person is defined. Though they were aware that the boundaries such declared have to be broken and transgressed all the time, it is not possible to caste away the impacts felt in diverse ways. However, we have observed in our field site that the delimiting effects of such social taboos are not similarly effective in case of people from different economic and social background. Even men and women belonging generally to the same social upbringing may experience the severity and extent of constraining norms based on the social and cultural space they are in.

Women's docility and autonomy-dependence dilemma

As we were talking to a number of male workers in a focus group session, a man sounded critical about the ways many of his female co-workers behaved. He was of the view that even though the harsh reality of their life was forcing the female garment workers to take up job in the factories, they had to remain respectful and considerate about the approved ways in which a woman might behave in line with the moral codes. One could reinterpret the codes and make it light; however, the main thrust of the code was to behave in modest and respectful ways – the male participant of our conversation stressed. How a woman dresses, manages her body and beauty, and how she interacts with her neighbors and co-workers are things that showcase her *chalan* or *chalan-balan* (that is, her ways of conducting herself). It is in this stage of discussion that he evoked this proverb:

> "A cow is known by its growth and a woman by her conduct."
>
> (গরু চিনি বলনে, নারী চিনি চলনে।)

It was not a heard-before proverb for us; even many of the interlocutors in the discussion session told that they did not hear it before. However, no one was apparently shocked or surprised to hear that the saying in some ways was making a comparison – even though metaphorically – between a cow and a woman. In fact, referring to cows, goat, donkey, cat, dog or pig – among others – is quite common in Bengali culture. However, we wanted to probe further as to what our discussion-participant was meaning by '*chalan*' (চলন) of a woman. Though generally it translates as 'conduct' or 'behavior', we thought that it would be helpful to know what meanings the word generally invoked for the user in the context. The discussion that followed was emblematic of what our interlocutors thought about ideal forms of femininity, and it showed that they were much skeptic about a view that expects a woman to be limited within some boundaries or professions; however, modesty and chastity were the key attributes that woman had to preserve.

As the discussion proceeded further, it became apparent that proper ways of *chalan* of a woman could involve so many things: her ways of mobility, extend of interaction, range of expression, her dressing, level of voice raising or remaining silent and being soft-

spoken or assertive, her tones in conversation, her attitude toward the members in the family and household. Shame, honor and modesty (*lojja, shomman, binoy*) are the tropes that were voiced by the men in the session time and again. As we persisted with the topic, the 'inevitable' question was ultimately asked by one of the participant men: "To remain respectful and modest is one thing. However, does that mean that she should be like a cow which cannot say anything?" He asked further: "Should a woman be treated like a cow as a rope is put around the neck of a domesticated cow?" Everyone agreed that comparing a woman with a cow was a matter of regret though they did not seem to have any disagreement as to how the head of the family – that is, a man in form of husband or father – must have control over the women in his tutelage.

It was in the same session that discussion turned to focus on how a woman's life was meaningless in case she fails to have a man to depend on or to have protection from:

> "If a woman fails to have a man to oversee her – even in the form of a fictive grand-son, her life is bound to be like swimming in the river".
>
> *('*না পাইয়া নাতি ভাতার,/তাই নিয়া গাঙ্গে সাঁতার।')

The saying draws attention to the hardship and difficulty that a woman might face in case she does not have a man to 'guard' her against the odds of *sangsar*, that is, this world. Here by referring to having a 'grandson' in case of absence of a 'husband' what is implied is that a woman has to live her life under the care of those men who are related to her. In other words, it indicates that the company of man is essential in a woman's life and the women are always dependent on men.

This dilemma as regards making balance between autonomy and dependence dominated many of our focus group and informal discussion sessions. The idea that a woman has to remain dependent on and guarded by a man was reverberated in different ways. One proverb we heard an elderly woman (mother-in-law of a female garment worker) to say time and again was this:

> A wife who has lost her husband is like a boat without a boatman.
>
> (পতি হারা নারী, মাঝি ছাড়া তরী।)

The woman who called up the proverb herself was a widow – and it was evident that her feelings of helplessness were connoted by the proverb. The plight of elderly persons is the issue that this proverb implies. Important point is that without a boatman, the boat loses its direction and cannot be controlled. Similarly, if a married woman does not have a husband, she becomes disobedient or a threat to family and society – she is always at risk to losing her way.

Women as the 'property' of men

The way many of the men (male workers or spouses of female workers) taking part in our group discussions or interviews talked, it became evident that the subscribed to the view that women are the properties of men: the relationship between men and women were narrated by using the metaphors that equated men to master and women to property or asset to be controlled and cultivated. An elderly man who was the father of three girls working in the garment factories called upon this proverb to highlight the importance of women to remain obedient to their husbands:

> If all the thoughts and acts of a woman revolve around her husband's feet, only then she can be called a chaste woman.
>
> (পতির পায়ে থাকে মতি, তবে তারে বলে সতী।)

However, as soon as the man put this proverb forward, it was ridiculed by Rahela, the eldest daughter of the man, who was listening to our conversation and was having tough time in her conjugal life at that time. She stressed that so many things are said by men and women that came into being centuries ago – and holds no relevance in today's reality:

> "In today's context there is no point is saying such things. These are all fictitious – worthless sayings. To remain chaste is important for women, but what about men? What does it mean to worship and put up with a bad husband forever? Some men are like devil – they don't deserve any respect. It is better either to force them to correct themselves or to part away from them."

Rahela then tried to remember a few proverbs that she finds funny and insulting for women. One such saying she mocked about was:

> The cows that plough your land and the women of your house,
> These two will follow the suit that you want them to.
>
> (হালের গাভী, বাড়ির মাগী,/ জিংক্যা চালাবে, শিংক্যা চলবে।)

The proverb is not in standard Bangla; it is in the dialect of a particular district of Northwestern Bangladesh and assumes that the 'domestication' process of a cow and a woman should be done in the same way. Rahela did not have any doubt that such proverbs were made by men just to validate their abuses and maltreatment to women.

On another occasion, we found Sumi, a wife of a sweater-factory worker to express her fun and ridicule as regards this proverb:

> A woman without a husband is like a night without a moon.
>
> (পতি ছাড়া কামিনী/শশী ছাড়া যামিনী।)

Sumi analyzed pointedly that a night does not become meaningless without the moon; similarly, a woman's life also should not be considered unworthy in case she has not got a husband in her life. Even though she laughs at such sayings, she agrees that navigating life is difficult in the hostile social setting that they are in particularly if the marriage is not working. Women's description of life of those who have been abandoned or divorced by their husbands is replete with the stories of diverse miseries and disgraces.

Importance of husband and marriage

Not all the women were as forceful as Rahela and Sumi in expressing their opinions, or in questioning the dominant norms. In the situation that is featured with extensive insecurities, women appeared to be incapacitated in terms of challenging the dominant ways in which marriage, conjugal life or household activities were carried out. Particularly as they migrate to unknown settings in the city, they find that they need protection from different imminent threats, shocks and abuses. To save them from the

possible 'advances' of predatory men in such precarious situation, the women need someone to fall back to. It is in such context that they think having a husband is like having much of the protection and safeguarding that they badly need: A husband is like a shelter – he is like an umbrella on the head, even if he is abusive and non-earning. Soheli, a garment worker in her mid-thirties, was describing the importance of having husband around a woman as she recalled this proverb:

> 'For a woman there is no way without a husband.'
>
> (পতি বিনা, নাই গতি)

Even though Soheli's husband has already married another woman as his second wife, she still wants to have the 'label' that she has got a husband even though he does not come to visit her. Having the identity of a married woman is more assuring than letting people know she is divorced. A widow is more vulnerable to sexual abuses and exploits. She explained further:

> 'Husband's company is important in every woman's life. What is the meaning of a woman's life if she does not get a good husband? I am lucky that I am still married; however, I am unfortunate that he has got a second wife and does not come to see me. A husband is like an umbrella over a woman's head. People need to know that I have got a husband.'

Centrality of marriage in Bangladesh's social context is expressed through the views brought forward by Soheli. We found many women workers who were struggling against diverse odds to keep their marriages alive; however, there were other women who thought that getting rid of a bad husband was more important than having the 'label' (*tokma)*of a married woman. A woman worker recalled this proverb in a way to ridicule the narratives of marriage and chastity:

> For a boat, a horse or a woman, the ownership is of the man who rides it.
>
> ('নাও, ঘোড়া, নারী/ যে চড়ে তারই।')

This female worker asked the question: If a society views woman to be like boats and horses, how much honor does it really hold to the women? She asked further rhetorical questions that may be rephrased this way: If a man is given go-ahead to 'ride' women, how can a marriage be a so sacred or important an institution in this society?

Women as domestic caregiver

There are many proverbs that give the authority to men to define boundaries to be enforce in terms of women's 'proper' spaces. Salehin, a husband of a female worker, while describing what was ideal ways for a woman to conduct herself, made this observation:

> "I wish my wife always stayed home. Now, I don't feel good that she has to go out to the factory to earn money. As a man you will always expect that your woman will stay home, keep it clean, and take care of your children. She will keep your meal ready to be served. Isn't this the way our society has gone for long? It's men's duty to work outside – women shouldn't do it."

He then sang a song in folk tune to express his views:

> Women are the beauty of the house; they don’t fit outside.
> Listen my sisters and mothers; you have to stay at home which is your real place.
>
> (নারী সে-তো ঘরের শোভা/ বাইরে তারে মানায়না
> শোন শোন মা-বোনেরা / ঘরই তোমাদের ঠিকানা।)

Another proverb that was evoked in a male group discussion was this:

> Much delight ruins a daughter whereas a daughter-in-law will also be spoiled if she is allowed to fetch water from outside.
>
> (‘ঝি নষ্ট চাটে, বউ নষ্ট ঘাটে।’)

Khairat Ali (38), one of our ‘respondents’ who work in a sweater factory, expressed his position about limited movement that he expects from his wife:

> “I didn’t allow my wife to go to market for buying things. Going out to buys things is work for men, not for women. If women go to market for buying things, other people don’t see this in good way.”

As of how to keep a woman within her limits, another man evoked this proverb which gives approval to the use of physical force and beating for ‘disciplining’ women:

> A woman can be taught a lesson by physical beating, whereas turmeric can be processed by a grinder.
>
> (মাগ জব্দ কিলে, হলুদ জব্দ শিলে।)
>
> An unfortunate man loses his cow whereas a fortunate one loses his wife.
>
> (অভাগার গরু মরে, ভাগ্যবানের বউ মরে।)

As of domestic violence and wife battering, a man called upon this proverb to justify the action of many of his fellow men:

> “An unchaste woman gets beating, whereas the chaste one deserves admiration”.
>
> (অসতী পায় কিল/ সতী পায় কোল।)

Men’s worth and supremacy

Men – even if he has got some faults or shortcomings – are more worthy and valuable than woman. One proverb that highlights this message was invoked by the husband of a female worker as we were discussing about reasons for discord within the marriages:

> Even a bent ring is better if it is made of gold.
>
> (‘সোনার আংটি বাঁকাও ভালো।’)
>
> Even the urination of a son may beget money whereas a daughter would mean rope around the neck.
>
> (‘পুতের মুতে কড়ি, মেয়ে গলার দড়ি।’)

Desired quality of men and women

There are many proverbs that depict what is expected behavior of men and women in the society. These were evoked by women interlocutors not to exalt the messages, rather to show how the attitude of the society is acutely abhorrent as to the worth of the women.

> River's water is preferable even though it is dirty.
> A dark woman is more desirable if she is of good ancestry.
>
> (নদীর জল ঘোলাও ভাল, জাতের ম্যায়া কালোও ভালো।)

> When one takes his father's name, he gets rewarded/
> By taking mother's name, one may rather get perished.
>
> (বাবার নাম নিলে দুধে ভাতে খায়/ মায়ের নাম নিলে ছাইয়ের তলে যায়।)

About the expected modesty from a woman, a female interlocutor referred to this proverb:

> If a housewife boasts too much of her beauty, / and gives away the base that her husband provides her, if she sleeps late in the morning, / and, if her used bed never receives sunlight, /If she does not do the chores after waking up in the morning; and if she goes bitter at night, she is a housewife of no worth."
>
> ('গিন্নি হয়ে রূপে ভোলে /স্বামীর পিঁড়া পায়ে ঠেলে
> প্রভাত কালে নিদ্রা যায়/ বাসী শয্যা সূর্য না পায়
> উদয়ে চড়া, সাঝে বাড়া/ সে গিন্নির মুখ পোড়া।')

Another proverb that we heard both women and men to refer to is this which contributes toward the construction of 'ideal' image of women as housewife:

> If a wife takes her food before her husband
> The Goddess of misfortune will come in her house very soon.
>
> ('রান্ধিয়া বাড়িয়া যেইবা নারী/ পতির আগে খায়
> সেই নারীর বাড়িতে শীগগীর/ অলক্ষী হামায়।')

Conclusion

In Bangladesh society – which is generally characterized as 'classical' patriarchal one (Kandiayoti 1988) - it is plausible to assume that the identities and positional ties of men and women are organized in structures and patterns that are too stubborn to undergo substantial shifts even though the liberal-develop mentalist economic transformation is 'successful' in reaching many of the indices. Our ethnographic reflections on the deep insecurities, precarity and affective tensions that characterize the lives of garment workers lead us to infer that most of the asymmetrical cultural norms that have traditionally been operating in the society have been appropriated and reinforced by the industrial production process as it worked out ways to extract the labor force of the 'surplus population' in cheapest price. Since women's incorporation in globalized factory floors do not question the fundamental ways in which gender-based inequality interweave with social hierarchy and cultural politics of male supremacy, it is not surprising that in everyday conversations within the factory or in household and social

realms, frequent references are made to those wisdoms which are evidently disrespectful and abusive to women.

As we reflect on the findings, we find us more inclined to the position: the prevalence of the proverbs and sayings could be seen as indication of the fact that in spite of weakening of the religiously sanctioned moral codes such as women’s physical seclusion through rigid *parda* system, the discriminatory gender norms still remain deeply rooted in ‘our’ ways of living and thinking that it is really difficult to be challenged. By extension, this could also be argued that durability of gender inequality is rather a manifestation of the limitations of market-centric development machinery which is more concerned about ‘unlimited supply’ of cheap labor for the purpose of deepening capitalism through primitive accumulation. Increased focus on wage earning under the precepts of narrow economic-empowerment discourse fails to result in overall well-being of the women for the reason that ‘new’ economic and social relations bring about newer forms of precarity and crises that entrench the discrimination. Market led initiatives such as increased wage earning, engagement in micro-credit practices, transgression of older forms of public-private divide contribute rather to the reinforcement of women’s dispossession and sufferings in different ways. We still need to contemplate on the question as to what the other possible interventions are that should be weighed on in order to challenge the discriminatory and unjust worldviews and norms prevalent in the society.

What market incorporation has meant for the female workers who join the capitalist production process is evident augmentation of their burden and responsibilities which gets doubled in some cases and tripled in others. Instead of bringing about challenges to the structural ways in which women have to bear unjust reproductive burdens and care duties, ‘adverse inclusion’ in the market brings about affective crises and emotional tensions in her life which she would not experience in earlier contexts. The production regimes make use of the cultural norms that continuously reproduce an environment for women which is insecure, threatening and sexually violent. Such intimidating and abusive environment contributes to ensure docility and timidity of industrial work force. Thus, what happens in most cases is the introduction of ‘newer’ ways in which women remain vulnerable to be exploited by both patriarchy and market.

Indeed, as we look into the dominance of male-centric views, we see ample scope to rhetorically ask this: Does neoliberal market-led transformations really intend to bring about substantial end to the gendered forms of injustice, abuse and violence? As we highlight the agency and negotiating efforts of the women workers insofar as they try to subvert the assumed truths of the proverbs, we concede that there are reasons to be skeptic about the potentials of such individual level ‘hidden transcripts’ or ‘everyday forms of resistance’ to become transformative collective power that might undermine or subvert the ‘system’. Taking both contestation and persistence into account, we are more inclined to the position that in the contemporary context what is more important is to revisit the dominant growth narratives and women empowerment discourse to see how they fail to challenge the structures and relations of male dominance. The persistence of male dominant proverbs, we argue, is a stark reminder of this urgency.

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Modern Pottery of Wari-Bateshwar: An Analysis of Scale of Production, Specialization and Standardization

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Abstract: Scale of pottery production, potters specialization and product standardization of modern pottery of Wari-Bateshwar region has been discussed in this paper. I tried to address the major reasons which influence the scale of production and crafts specialization as well as tried to identify the level of production and potter's specialization. Specialization is interrelated to product standardization, which has been discussed here .The main objectives of this study was to explore this three issues and to identify the factors which influenced these. Five pottery village has been observed for collecting field data .Ethnographic research method has been applied in this study. From this study, it has been observed that most of the potters make pottery as part-time producer and pottery making is undertaken by women. Though male potters assist in other activities but they do not participate to in the forming stage of the pot. Male potters only make miniature pot on wheel and toys in one village. Scale of ceramic production is fallen into household industry level where potters are individual specialist. I have observed that products of single potters show the minimal variation in metric measure which is an indicator of potters specialization and this also an evidence that these potters can make products in standard size. But according to the consumers, contemporary pottery is not of standard quality compared to products they used few years back or the imported products from other regions. Potters claim that the market has changed due to decreasing demand; they have to get involved with other works and have to produce a larger quantity of vessel in limited time. They have lost their interest of making pottery due to limited demand. This has resulted in a stress on potters to minimize the quality, as quantity is more important than quality to the potter which is visible in standardization of shape, reduction in variety, reduced decoration and technological shortcuts.

Keywords: Production, Specialization, Distribution, Standardization, Demand.

1. Introduction

Production, distribution, and consumption are common components in any economic system(Costin, 1991).Pottery manufacturing process is a part of pottery production process. But Rice (1996)has argued that the distinction between manufacture, 'the actual act of fabricating ceramics', and production, 'the social and economic organizational arrangements within which pottery manufacture carried out' has to be maintained. In the case of the latter, the initial topic of interest generally has been 'specialization.' Crafts specialization is connected to many issues including potter's socio-cultural and economic context, demands of pottery and its pottery distribution pattern, which is necessary to identify the economic organization. To understand its level of production as well as pottery distribution these aspects are important. The scale of pottery production and crafts specialization is related to one more issue that is - products standardization. However, the first two concerns only producers whereas standardization concerns both producers and consumers. Products standardization is such an issue which is also affected by production, distribution and consumption process. Crafts specialization is directly related to production and distribution and consumption is related to consumer's demand which plays direct role for making standard products. In this paper, scale of production, specialization of production and product standardization of modern pottery of Wari-Bateshwar region has been discussed.

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Wari-Bateshwar is one of the most prominent archaeological sites in Bangladesh. The two contiguous villages Wari and Bateswar are situated about 4 km to the south of Belabo Upazila headquarter under Narsingdi District in Bangladesh. The two villages are on the eastern fringe of the Madhupur Tract which is a Pleistocene land formation, the earliest land formation in the country. The location of site is very important which played a vital role for its development. The old Brahmaputra is only 4 km from the site. A dried up river course named Koira to the north of the village Wari can be seen at present. Arial Kha River is 3 km east to the site and the Meghna flows few km to the south of the site. *Chala* (highland) and *Baid* (low land) is the main two characteristics of the land of this region (Ahmed, 2001). People of this region live on the high land (*Chala*) and uselow land (*Baid) for* cultivation. Nearly 50 archaeological sites have been discovered around Wari-Bateshwar, most of the discoveries indicate the site as a settlement site which represent the human settlement of two period: early historic and early medieval. The validation of choosing the Wari-Bateshwar region is that it is one of the most prominent archaeological sites in Bangladesh. Human settlement had taken place in this site before the early historic period and except for few missing links it is continuing till this day (Rahman, 2018). Like any other archaeological site in the world, pottery is the most common cultural materials discovered from Wari-Bateshwar in Bangladesh. Pottery is not produced in these two villages, but it is produced by present-day potters of different other villages in this region. Ahmed (2001) mentioned that there were ten villages near Wari-Bateshwar where potters produced pottery. However, current ethnographic study has revealed that pottery is now produced only in seven villages of this region. These seven villages are Suturia, Chandanpur, Patuli, Kamrabo, Jossor, Letarob and Machimnagar. Pottery making tradition of these villages has been observed in this in-depth ethnographic study. It is important to note that at present, pottery is rarely made in Chandanpur and Patuli. For thisstudy, data have been collected from five pottery villages except Chandanpur and Patuli.The village - Suturia is under Patuli union of Belaboupazila, Kamrabo is situated in Joynagar union under Shibpurupazila, Jossor,Letarob and Machimnagar are under Jossor union of Shibpurupazila.

In spite of using same technology to produce pottery in all villages, some variations have been observed either among or between the potters which influenced their production, specialization as well as products standardization. In this study the main purpose is not to analyze the theoretical aspects of scale of production, specialization and standardization which has been discussed by many ethnoarchaeologists (Costin 1991, 1995; Rice 1987, 1991;Stark 1991).Rather, the main objective of this study is to explore these three issues in present-day pottery crafts as they are reflected in the final products in order to understand the scale of production level, producer's specialization and products standardization that are noticed in archaeological ceramics.

2. Methodology of the study

This research has been conducted based on ethnographic research method. Ethnographic fieldwork is the most common method in ethnographic research which requires data collection through standard methods such as participant observation and interviewing (Sarantakos, 1998).David and Kramer (2001) explained observation method is the most suitable method in any ethno-archaeological research and also noted that data collected through observation more convincing when interview is added to it. In this research observation with question/response technique and interviewing method have been applied. Semi-structured questionnaire was formed to interview the participants. Every household of the potter community who is making pottery at present have been surveyed

and observed. The head of every potter family was interviewed and some questions was formed only for female potter and they all was interviewed.

Some consumers from both pottery making village and non-pottery making village were interviewed to understand the consumer demand. Out of the various sampling methods, in this research, purposive sampling procedure has been applied for conducting interviewing of non-potter respondent and sample size was not determined. In purposive sampling, population is non-randomly selected rather they are chosen based on a particular characteristic. In purposive sampling, samples are selected based on the purpose of the research.

3. Socio-economic context of the potter

Prior to addressing an analytical description of this study, the socioeconomic context under which the potters in this region operated, will be presented briefly. The socio-cultural context of potter community played vital role in pottery production and crafts specialization. Whereas pottery distribution pattern indicate standardization of products.

The potter's productive organization of this region is highly socialized and connected with society and economy. Although the geographical settings of all potter's village are not same. Potters usually live in cluster organization in the village. Eighteen potter's households are situated in cluster at the corner of the village Kamrabo. In Bangladesh, where the potters reside in the village called *Palpara*. The potters are called as *Pal* and *Para* is a small unit of a village, formed by some families who are Hindus in religion. Other religious and occupational communities also erected their dwelling houses adjoining to this part. The main economic and occupational activities of those families are agriculture and animal husbandry. *Palpara* is located within half a km from Kamrabo Bazar. *Palpara*of Suturia is completely isolated from other communities in the village and situated at a corner of the village. There is no other community live within half a km around *Palpara* of this village. From the point of location, Jossor is in a convenient place, which is 2 km away from Dhaka-Sylhet highway via a paved road.is situated besides Jossor Bazar. However, only a few potter houses are located here regarding size and multiple houses use single entrance due to lack of road connectivity. Machimnagar and Letarob *Palpara* is 2 km far from Jossor Bazar via the same road. To enter someone's house one has to use courtyard of another house in Machimnagar potter community. Generally, every house has a small or big courtyard depending on the size of the house. Houses are arranged around the courtyard. Some houses have a different shade to keep raw materials and some household do not have any specific space to store raw materials. In general, they do pottery production activities in the porch of house or at the corner of courtyard. Potteries are placed into the courtyard for drying up. Every house has a small or large storage area depending on the size of the household. Pottery kiln is made at the backside of the house, but not every potter house have the kiln.

Pottery is made mainly by women in hand but male potter do other activities related to pottery production and distribution except forming and shaping the pot.

Potter's social status is medium to consumers or non- potters. Potters are thinking themselves as a member of lower-ranked group in the society. Daughter of a working potter does not want to learn pottery making and they do not intend to become potter for their low social status.

Most of the potters in this region do not have agricultural land. Only few potters are land owners. But they own limited agricultural lands. Rice or paddy is the main crop

produced here. At Kamrabo only three potters out of 14 have arable land and among them one potter (KPF8) has more land than others. Potters of Jossorand Machimnagar do not have any arable land. Only two potters of Machimnagar have small pieces of lands. During the rainy season, potters do not make pottery. Some of them involve with other works. Most of them work as agricultural laborers in the land of non-potters family. Almost every potter of more than fifty years old has one or more sons who are engaged with other occupations and contribute to the family by adding supplementary income.

4. Pottery distribution system

Pottery distribution pattern indicate standardization of products. So, it is necessary to discuss here the distribution system or marketing system of pottery in short. Pottery reaches to its users in many ways. The four systems of marketing found in this area are: a)consumers to potters-in this system when a villager needs a particular vessel and goes direct to the local potter's house to purchase it. In the village where pottery is produced, villagers use only the local types of vessels. Sometimes consumers from nearby village purchased their particular vessels from potter's house directly.b) potters to consumers-in this situation potters or a male member of potter family carries the pottery in a bamboo basket on his head or by a rickshaw van (is pulled by him) and sell the vessels in the market or nearby village and they attend a local fair where sales will be high. This system is the most popular here. c)potters to potter's trader-In potter's village, not all potters are engaged in pottery making, Some potters do not make pottery but purchase from other potter and resell in a shop or in two systems mentioned previous. d) potter to non-potter trader-in this system, the potter turns over the goods to a non-potter trader who redistribute it in short distance market or urban market. In most cases, they act as a middleman/ wholesaler. Shop owner purchases vessels from these middlemen. Traders, who sell goods to urban centers or have shop in there, purchase vessels from producer in two ways. They may make a contract with a potter for a certain number and type of vessels with an advance payment. After completion of the production, potters inform the trader who comes with a vehicle to collect the vessel and pays the rest of money in cash. Sometimes the trader pays the rest of the money in instalment. In the second way, a trader may bring his vehicles (truck/pickup truck) to a village in search of a full load to collect vessels from several households, cash is given at the time of purchase.

At Kamrabo, the first two systems of distribution patterns are observed. Each of these four systems is operating in the villages ofSuturia, Jossor, Machimnagar and Letarob. But potters of theses villages sell large number of products in last two systems. Pottery of Kamrabo is distributed in local market of nearby area or in nearby villages within 6-7 km distance. Whereas, products of Suturia, Machimnagar, Letarob and Jossor are distributed in the local or nearby villages as well as in Kishoreganj district sadar (38 km), Brahmanbaria district sadar (33 km) and Narsingdi districtsadar (25 km).

5. Scale of Production and Specialization

Identification of variation in organization of labour in production in terms of scale of production level is a well-establishedpurpose of ceramic ethno-archaeological studies with particular pertinence for investigations of development and change in complex societies (Underhill, 2003). Typological representation is proposed by a number of studies for defining the organization or the mode of pottery production (Balfet 1965; Peacock 1982; van der Leeuw 1977). Differentiating between different types of specialization has been the key purpose of such studies. To identify the typological

schema main parameters such as scale and intensity of production are used. Scale of production means levels of labour and resources used and quantities of output (Rice, 1987) whereas intensity refers to the amount of time producers spent on their craft (Costin, 1991).

In Wari-Bateshwar region, the scale or level and intensity of production as well as producer specialization depend mostly on the level of demand. The scale of production in these villages can be expressed as household industry level according to van der Leeuw(1999) and Peacock's(1982) six states of production level at present. However, information gained from older potter suggests that production level could be described as workshop industry in recent past in this region, especially the production of Suturiawhere pottery was wheel -made and produced by men (about 20 years ago).

After analysing van der Leeuw ((1999)and Peacock's(1982) study, Rice ((1987), Sinpoli(1988) and Feinman(1998)has also described the household industry level. In this level, pottery is produced at household though much production is oriented towards trade or sale beyond the household (Sinopoli, 1988). Potters are not full- time specialists; a simple technology is involved in production only with very small investment in capital equipment and using fully local materials, requiring little labour and is likely to be made by women. (Feinman1998; Rice 1987). Workshop industry level defined by van der Leeuw, is marked by the unfolding of full- time specialist, in which rising degree of high-intensity production are employed to supply broader networks of consumers. Pottery is mainly made by men using wheel-or mould though wheel made pottery is one of major component in this level and potters who have significant capital investment (kilns, wheels, quality raw materials) in the enterprise and obtain their major livelihood from it. (Leeuw, 1999)

In these villages, pottery is produced mainly by women. Though few potters of Suturia are men who own wheel but they produce only miniature pots as kid's toys, do not produce any form for utilitarian use. The level of production of these potters is household industry level though these products are made by wheel.

Women produce pottery to aid the income of the household and in some cases, it is major income source of their family or for their personal economic benefit. The former case is more evident among potters who have other income sources or own some agricultural land besides pottering. Male potter also participate in their task which is fixed (like raw material acquisition, clay preparation, drying, colouring, firing and selling) the latter is also evident among few potters of those family where male person has left his ancestral profession completely. Sometimes male of these family is related only in selling or marketing their finished products produced by women.

In household industry production level of this area, women mainly shape the pot. Both men and women take part into drying, slipping, colouring and firing process of pottery making. But usually pot is placed on the kiln by men. And fuel is fed by women during firing process. Men and women both sell their product. Though women do not go to market for selling but some of them sell their pot in the annul fair. Present production volume in this region does not require additional labour. Production is mainly kin-based. In most cases, the head of the family and his wife is associated with pottery making. In an extended family where a head lives with his sons, daughter- in- law and young daughter, children or grandchildren, it is rare that daughter and daughter-in-law is involved in production process, sometimes they help their parents or in-laws to dry the pot. Only one family (SPF 20) takes two labours that are female too. However all potters produced a limited number of forms as limited demand of various forms.

The size of a potter's household may affect the scale of his production (Kramer, 1997) is partially true to some extent. There is some evidence in every village of the present study area suggesting that small house (for example, house of KPF 12 and almost every house in Jossor) which has a small courtyard and small storage area for dried and fired pot, affect the scale of production. It is important to note that both time and resources can be utilized in a more efficient manner if the households are larger. Multiple authorship is associated with larger households. In multiple authorship system same courtyard is used by several potters for their different task of manufacturing process(Kramer, 1985).In this case one or more potter may produce very low volume of products and do their work at the corner of the courtyard and in front of the living house of each owner (for example, KPF3, KPF4, KPF 5 and KPF 6 share same household).

It is difficult to arrange a different storage area for small households and larger household with multiple authorships. In addition, in most of the cases, they do not have different rooms but they use their living room and kitchen to store dried and fired pot. Sometimes this problem makes them reduce their production. Larger households with single or double authorship or medium households with single authorship have a specific room (large or medium or small) for storing unfired and fired pots.

The frequency of pottery production is seasonal. In most cases, it is a part-time activity, though this part-time or full-time concept is a controversial issue to some archaeologists (for example, Rice1987; Costin 1991). I maintained the most effective method of measuring intensity of pottery production in this region which is to count the number of months per year that each potter worked(data has been presented in appendix 3). Beside this, I tried to maintain other criteria that whether a potter follows any economic pursuit other than pottery making or not. Based on these two criteria, I use the term part-time and full- time production to measure the intensity of pottery production. Rice (1987)) has also mentioned these two parameters to define these terms. I use part-time activity to refer those who are not involved with year-round production related task and are involved with other occupation to derive their livelihood. On the other hand, a full- time specialist makes pottery year-round or involved with pottery related task (either pot making or marketing) and follows no economic pursuit other than pottery making. Duration of spent-time on craft production varied from three to eleven months per potting household (duration of pottery making period has been shown in Appendix 3). At Kamrabo no potter worked more than 6 months a year.

Although yearly weather patterns affect the production schedules of all potters to some degree, there are important differences between potting households in intensity of production, or the time spent in pottery production each year. During rainy season (usually June –August) and winter (December and January), they produce at a different rate-only sporadically or with much reduced output. It is very difficult to identify the quantity of finished product produced in this time to measure the intensity of production. Potters count their total produced pottery by how many times they fire their pottery. They place 1000-1200 different types of pot in the kiln for every firing process (Appendix 3 have shown the number of firing each year). Usually, some potters of Suturia, Letarob and Machimnagar shape and dry the pot but do not fire them in this weather. Intensity is closely related with the time spent for craft production. Beside weather pattern, one more thing is active behind this that is how much time a female potter can spend. Almost every female potter has to do all household work. During fieldwork, I found woman who had other female member to assist her in household work could make more pots than others could who did not have this support. However, elderly

female potters are not enough strong physically to engage long hours in pottery making which affects the quantity of production (data of active potter has been shown in Appendix 2).

To identify the scale and intensity of production, the role of specialization is very significant. Generally, specialization is expressed in terms of intensiveness as part-time or full-time (Kramer 1985; Rice1987). However, for Rice (1996) this is a blurry difference.

Costin (1991)has marked out specialization as, "Specialization is not a single organizational state, nor is it a present/absent condition. As such, specialization has two primary characteristics. First, it has degrees. This term refers to the ratio of producers to consumers. For any product, there may be few or many producers relative to the total consuming population. A product that has a high number of producers in relation to consumers will have a low degree of specialization, while a product that has relatively few specialists in proportion to consumers will have a high degree of specialization". In Costin's recent typology for the organization of specialist production, potters group of this region fall within the category of individual specialization and community based specialization (Costin, 1991; Costin and Hagstrum, 1995:620-621). Costin and Hagstrum (1995)have regarded individual specialization as autonomous individuals or households producing for unrestrained local consumption and community specialization as autonomous individual or house hold-based production units, accumulated within a single community, producing for unrestrained regional consumption. Rice(1987)has termed individual specialization as producer specialization and Muller (1987)has termed as productive specialization which is perceived as 'the production of goods and services for a broad consumer population, on a (usually) full-time basis, in order to earn a livelihood'. Rice (1987) and Stark (1991) has opined that it is easier for individuals in a society to specialize in the production of some particular goods, but as far as the development of community-based specialization is concerned, specialization in one or more alternative productive strategies of larger groups of households is required, since traditional agricultural pursuits alone provide insufficient returns.

Hegmon (1995) regarded community-based specialization as a system "in which individual specialists, aggregated in a limited number of communities, produce pottery for regional distribution".

In this study area, both individual and community-based specialist groups are generally independent of sponsorship, work in a kin-based operation with household production units. The main difference is that individual specialist practices small and part- time production, produced for local distribution and traders also distribute pot in local market or within very short distance where community-based specialists practice full-time production in large quantities for regional distribution. All Potters of Kamrabo region, some potters of other four villages appeared to be individual specialist. Large portion of Suturia, Machimnagar, Letarob potters are community based specialist. Rice mentioned that "Specialization may occur when certain household, workshop and communities concentrate on manufacturing particular functional, formal or decorative categories of pottery. It may arise without intensification if it does not increase production. Specialization may involve diversification through product differentiation" (Rice 1987: 190). In this sense, all potters have some degree of specialization but few potters have high degree of specialization. For example KPF1 and SPF15 can decorate their pot better than others, LPF2 is the household for producing *Matki* (special type of storage jar) which is quite difficult task in potter's opinion and only SPF1 can make rice cocking pot,

SPF18 makes eye-catching curd pots of perfect shape. I have not used the term 'low degree of specialization'. Because specialization is related to intensification and both are directly affected by consumers demand. Many specialist potters have left pottery making for low demand. Though there are few potters, especially female potters who have learned to make pottery after marriage and practice little have a low degree of specialization.

6. Specialization and Product Standardization

Necessary connection between specialization and product standardization is mentioned in good number of studies (e.g. Longacre et al. 1988; Rice 1981, 1987, 1991; Sinpoli, 1988; Tosi, 1984; van der Leeuw 1977). In these discussions, "product standardization is viewed usually as a by-product of specialization. It results from routine and repeated actions in the formation of ceramics products"(Sinopoli, 1988). According to Longacre (1999), "the production of standardized products is the impact of skill, acquired through time because of practice by producer specialization". Longacre here has attempted to explore the uniformity or homogeneity of product in size or in other quantitative parameter to identify the level of standardization. Rice mentioned:

"According to Webster's dictionary source , the noun "standardization" refers to both a process and a quality: "the act of standardizing or the state of being standardized;" the verb "standardize," in term, may be defined as "to make standard or uniform." "Standardization" is thus both a process and an outcome of that process (i.e., a characteristic of the products). Methodologically and conceptually, then, it follows that we need to distinguish carefully between efforts to analyse standardization as a process through which uniformity in ceramics increases through time, as distinct from standardization as a relative state or characteristics of uniformity in a given set of ceramics at some point in time" (Rice, 1996).

Leeuw (1999) has emphasized on the connection between specialization and standardization. He has argued that specialization concerns producer whereas standardization concerns both producers and consumers, and also the relationship between them. Here, he has marked out the producer-consumer relationship trough a long chain of trade, which is stated as follow:

"As producer and consumer do not know each other, and have no way to find each other regularly, both parties need to be able to depend on standards-the consumers so that they know which range to choose from, as well as that they can depend on a certain quality, etc., and the producers because they need to be sure that the consumers at the other end of the chain will actually buy their products" (Leeuw, 1999).

In this study standardization means uniformity of product, diversity as well as quality and technology of manufacturing process of the product. Product is made by the potter in this region is relatively uniformed in size, shape and in other dimensional attributes. Some metric data (rim diameter, internal height, rim thickness, maximum body diameter, base diameter) have been taken to study variation has been presented by this author (Akter, 2019).This observation suggests that vessels of the same types by a given craftsman can vary up to few millimeters to a centimeter in any measured attribute of the vessels. They have told that it is a matter of hands and eye, which reflects their skill that allows them to make such standardized vessels. They achieve this skill through practice. They have learnt to take the correct amount of clay to start with, forming a cylinder of clay as the first step in making any vessel and then several clay discs is formed from this

cylinder. Each cylinder and disc is identical so that they make the standard size from these discs. The potters claim that they produce standard size for customer's demand. Customers want to buy various types of product is needed for different kinds of household work from their locality or from potters in nearby village which is related to product diversification. However, very few pottery vessels are used in everyday activities but demand for some products is good for socio- cultural and economic context of consumers in this region. From the table (Appendix 3) we can observe that most of the potters make some common pots which have relatively high demand such as *tawa* (bread baking pan), *dhakna* (lid), *poin* (cake steaming pot), *malsa* (basin).A survey on potter and non-potter consumer's demand has also reported this(Appendix 1). Although Wari-Bateshwar potters cannot make *chari* (large basin), they try to meet customer's demand by producing other vessels of their needs.

Standardization concerns consumer demand and expectation which is affected by quality of the products. Therefore, a third issue is quality of the product which is not enough standard as consumers expect. Consumers are not fully satisfied with the product made by the potter of this region. Data is collected from 66 consumers from three villages. Out of them, only15 percent have told that products' quality is medium but 85% consumers have expressed their dissatisfaction. They complain that product is not durable and sturdy, it breaks easily, and surface treatment is not good as it was in few years back in this region. Quality of product is not only related to skill of potter or specialization but related to the technology also, how the potter manufactures their vessels. We observed that the potters did not age and levigate their clay as much time as it is needed to make quality product, they are not very much caring about shaping their pot, decorating and colouring the pot. During manufacturing process, shortcuts are evident at every stage. Though the pot made by some potters is uniformed in size but rim and base of the pot is not perfectly shaped. Sometimes rim is not full-round, it is curved, some pots like *dailya*, *poin* have contiguous convex or round base but cannot stand upright straight. According to potter KPF1; KPF3; KPF 5;

'If we age clay for longer, the quality will be better. My father used to do it. I prepare the clay every day for 4-5 hours then I have to do other work (drying /colouring the vessel or go to the market). We would care about quality in the past because my full family (my father, mother, two brothers and sister) was involved to pottery making but at present we cannot do as my wife has to shape the pot alone and we try to make more pots in a day. There is nobody in the family engaged to pottery making. We cannot spend required time that is needed to make a quality product' (KPF1).

KPF5 have told about space problem for pottery making as well as admit the low quality of product. They make pot unwillingly and are not happy as demand is limited, they cannot manage their livelihood from pottery making.

'If I store my clay for few days, age the clay and levigate properly the product will be durable. However, I do not do this, as I do not want to put more effort in this work. It is a hard job and very difficult to earn sufficient money from this profession and I have to do other work for my livelihood. Moreover, quality of clay has decreased, clay was more sticky before and we cannot make good pottery from this clay (KPF5).

7. Discussion and Conclusion

Pottery is most common cultural materials discovered from Wari-Bateshwar archaeological sites. Several types of ware have been discovered from this site, which is

found in other sites of sub-continent. A large number of Northern Black Polished Ware (NBPW) sherds were found from this site.Northern Black Polished Ware is a distinct and highly polished ware which is considered the prince among the ware and is easily distinguishable from all the other ware of India (Sinha 1969,1997).Chronology of NBPW is between c.700-600 BCE and 250-100 BCE. Few black-and-red ware sherds, black-slipped ware, rouletted designed NBPW or rouletted ware, corded ware, grey ware and red ware sherds along with NBPW bear evidence of early historic settlement in Wari-Bateshwar. From the analysis of the excavated pottery of Wari-Bateshwar, it is evident that the ancient potters were better and specialized potters compared to the modern potters of this region. Variation in types of shape, surface colour, surface treatment and decoration, quality of fabric and texture, smoothness of surface, uniformity in thickness and roundness of orifice show that pottery production in ancient period might be a result of a specialized production(Akter, 2019).

The potter might have produced their pottery in workshops industry level of production or a more specialized household production level than modern production level. This may suggest that the socio-economic differences of this two different time can be the main reason behind this. Demand of pottery and social status played a vital role behind the production of specialized products.

In ancient times, pottery was the only used vessels and it had high demand which increased the potters' eagerness and specialization. On the other hand industrial vessel types have taken the place of pottery and the socio-cultural, economic status of consumers has decreased the demand of pottery which is badly affecting the eagerness and specialization of potters. This causes the occupational mobility among the potters since last 40-50 years and pottery tradition has gone into decline, and the contemporary potters of this region have not taken initiatives to develop new products to survive and do not teach their children the techniques of pottery making.

We have observed that products of single potters show the minimal variation in metric measure which is an indicator of potters specialization is that these potters can make products in standard size. But according to the consumers, contemporary pottery is not of standard quality compared to products they used few years back or the imported products from other regions. All potters have talked about a common issue that is limited demand, which decreases their interest for making pottery. Widespread circulation of plastic and metal vessels is one of the most important reasons for reduced demand of pottery vessels. Manufacture of ceramic vessel is laborious and income is relatively insecure. Potters claim that the market has changed due to decreasing demand, they have to get involved with other works and have to produce a larger quantity of vessel in limited time. They have lost their interest of making pottery due to limited demand. This has resulted in a stress on potters to minimize the quality, as quantity is more important than quality to the potter which is visible in standardization of shape, reduction in variety, reduced decoration and technological shortcuts. Simultaneously potter is a small component in the wider economy where they have available opportunity to engage in other sector such as goldsmith or other occupation related to industry. The lower quality of vessel is the result of these factors. There is no incentive for a potter to produce vessels of higher quality that is affecting to make standard product.

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Appendix - 1

Percentage of vessel types and their use in the three villages.

Used Pottery	Kamrabo (n=30) Percent (n)	Bateshwar (n=25) Percent (n)	Sujatpur (n=26) Percent (n)
Tawa (Bread/ruti baking pot)	86.66 (26)	80 (20)	69 (18)
Malsa (Basin)	96.66 (29)	88 (22)	73 (19)
Dailya (Curd Pot)	10 (3)	8 (2)	15.38 (4)
Poin (Cake steaming pot)	43.33 (13)	60 (18)	38.46 (10)
Kalash (Water pitcher)	73.33 (22)	40 (10)	30.76 (8)
Kanjighat (Rice fermention vessel)	33.33 (10)	8 (2)	11.53 (3)
Jhajor (puffed rice siever)	40 (12)	40 (10)	30.76 (8)
Shora/Dhakna (Lid)	100 (30)	96 (24)	86.46 (23)
Khola/Sanj (cake baking pan)	60 (8)	80 (20)	79.92 (20)
Money Bank	13.33 (4)	8 (2)	7.69 (2)
Pigeon feeding vessel	3.33 (1)	4 (1)	7.69 (2)
**Chari* (Cow feeding large basin)	13.33 (4)	28 (7)	23.07 (6)

*This vessel is not produced in this region, imported from other places.
But potters rarely make this type for their own use.

Appendix - 2

Potter population
Kamrabo Village:

Potter family	Name of the potter	Age of the potter	Total family members	Potter number		Other occupation
				Male	Female	
KPF-1	Satish Chandra paul	55	4	1	1	1
	Minoti Rani Paul	48				
KPF-2	Ratish Chandra Paul	40	4	×	1	1
	Rekha Rani Paul	35				
KPF-3	Ranjit Paul	40	4	1	1	×
	Bishaka Rani Paul	30				
KPF-4	Nikil Chandra Paul	50	5	×	1	1
	Jharna Rani Paul	45				
	Mother- Kalidasi Paul	70				
KPF-5	Porimol Paul	45	5	1	1	×
	Archana rani Paul	40				
KPF-6	Ratan Paul	35	3	×	1	1
	Shilpi Rani Paul	28				
KPF-7	Nagandra Chandra Paul	70	8	×	2	2
	Taramoni Paul	60				
	Daughter-in-law Sarna Rani Paul	35				
KPF-8	Haridas Paul	68	6	1	1	2
	Dhanorani Paul	60				
KPF-9	ManindraChndra Paul	72	14	×	2	6
	Chinu Rani Paul	63				
	Daughter-in-law Astami Rani Paul	40				
KPF-10	Narayan Paul	72	14	×	2	6
	Manju rani Paul	60				
KPF-11	Pobitra Paul		4	1	1	2
	Shilpi Rani Paul	45				
KPF-12	Bidhan Chandra Paul	35	4	1	1	×
	Anjali Rani Paul	55				
KPF-13	Kakhash Chandra Paul	50				
	Late					

Jossor Village:

Potter family	Name of the potters	Age of the potter	Total family member	Potter number		Other occupation
				Male	Female	
JPF-1	Sanjit Chandra Paul	48	5	1	1	×
	Sabitri Paul	40				
JPF-2	Raton Chandra Paul	48	4	1	1	×
	Manju Rani Paul	42				
JPF-3	Santosh Chandra Paul	48	6	1	1	×
	Bokul Rani Paul	41				
JPF-4	Nikil Paul	50	6	1	1	×
	Nonibala Paul	42				
JPF-5	Chittoranjan Paul	55	7	1	1	1
	Topu rani Paul	47				
JPF-6	Sukumar Paul	55	8	1	1	1
	Kalpana Paul	45				
JPF-7	Srinibas Paul	50	4	1	1	1
	Bhagabati Paul	45				
JPF-8	Ripon Chandra Paul	37	4	1	1	×
	Rekha Rani Paul	31				
JPF-9	AnukulChndra Paul	48	5	1	1	×
	Usha Rani Paul	40				
JPF-10	HaridashPaul	54	6	1	1	1
	Kalpana Rani Paul	45				
JPF-11	Nakul Chandra Paul	50	5	1	1	×
	Bashonti Rani Paul	42				
JPF-12	Bidhan Paul	37	4	1	1	×
	Jhuma Rani Paul	30				

Machimnagar Village:

Potter family	Name of the potter	Age of the potter	Total family member	Potter number		Other occupation
				Male	Female	
MPF-1	Mongol Chandra Paul	64	20	2	3	2
	Parboti Rani Paul	57				
	Ajit Chandra Paul	37				
	Shema Rani Paul	32				
	Rekha Rani Paul	80				
MPF-2	Uttam Chandra Paul	38	4	1	1	×
	Rita Rani Paul	34				
MPF-3	Tapan Chandra Paul	34	4	1	1	×
	Seema Rani Paul	30				
MPF-4	Jibon Chandra Paul	32	3	1	1	1
	Anju Rani Paul	27				
MPF-5	Gopal Chandra Paul	42	5	1	1	×

Potter family	Name of the potter	Age of the potter	Total family member	Potter number		Other occupation
				Male	Female	
	Laxmi Rani Paul	38				
MPF-6	Bhabotosh Chandra Paul	46	4	1	1	×
	Sneha Rani Paul	43				
MPF-7	Modon Chandra Paul	40	4	1	1	×
	Bokul Rani Paul	36				
JPF-8	Madhob Chandra Paul	36	4	1	1	×
	RipaRani Paul	33				
MPF-9	GanashPaul	36	5	×	1	1
	MohuaRani Paul	26				
MPF-10	Abni Chandra Paul	46	4	×	1	1
	ParulRani Paul	37				
MPF-11	Romoni Paul	42	4	×	1	1
	Sumitra Paul	31				
MPF-12	Bimol Chandra Paul	50	5	1	1	×
	Niyoti Rani Paul	40				
MPF-13	Anil Chandra Paul	55	6	1	1	1
	Kajol Rani Paul	45				
MPF-14	Ropon Chandra Paul	42	4	1	1	×
	Anjali Rani Paul	35				
MPF-15	Madhu Chandra Paul	56	8	1	1	1
	Jhorna Rani PAul	51				
MPF-16	Dhimen Paul	65	10	1	1	2
	Sushila Paul	55				
MPF-17	AboniMohon Paul	66	11	1	1	2
	Usha Rani paul	55				
MPF-18	Anukulpaul	51	8	1	1	1
	Shuva Rani Paul	48				
MPF-19	Dilippaul	51	9	1	1	2
	Laxmi Rani Paul	42				
MPF-20	Gouranga Paul	61	14	1	1	2
	Champa Rani Paul	51				
MPF-21	Birendra Paul	61	10	1	1	2
	Helena Paul	55				
MPF-22	Gopal Paul	56	9	1	1	2
	Durpoti Rani Paul	50				
MPF-23	Gouranga Paul	54	6	1	1	2
	Gondheshari Paul	45				
MPF-24	Sunil Paul	56	5	1	1	1
	Archana Rani Paul	51				
MPF-25	Rakhal Chandra Paul	46	4	1	1	×
	Laxmi Rani Paul	38				
MPF-26	Ranjit Paul	38	4	1	1	×
	Ratna Rani Paul	31				

Letarob Village:

Potter family	Name of the potter	Age of the potter	Total family member	Potter number		Other occupation
				Male	Female	
LPF-1	Dukhai Paul	68	10	1	1	2
	Minu Rani Paul	60				
LPF-2	Subash Paul	65	12	1	1	2
	Bokuli Paul	58				
LPF-3	Shailesh Paul	66	8	1	1	1
	Mina Rani Paul	56				
LPF-4	Monindra Paul	56	10	1	1	2
	BeliRani Paul	50				
LPF-5	Susil Paul	60	11	1	1	2
	PuspaRani Paul	55				
LPF-6	Sunil Paul	70	6	1	1	1
	Geeta Rani Paul	55				
LPF-7	Bijoy Paul	68	8	1	1	1
	Puspa Rani Paul	60				
LPF-8	Haridhor Paul	62	6	1	2	1
	Tapna Paul	51				
LPF-9	Probil Chandra Paul	75	14	1	1	4
	Phorani Rani Paul	64				
LPF-10	Narayan Chandra Paul	70	10	1	1	2
	MinuRani Paul	60				
LPF-11	Sushil Chandra Paul	55	6	1	1	1
	Sumi Rani Paul	48				
LPF-12	Dilip Paul	52	5	1	1	×
	Sandhya Rani Paul	44				
LPF-13	Bimol Paul	65	7	1	2	1
	Usha Rani Paul	54				
LPF-14	Shoilesh Paul	62	5	1	1	2
	Babita Paul	43				
LPF-15	Bojendra Paul	70	9	1	1	3
	Usha Rani Paul	60				
LPF-16	MongolPaul	42	5	1	1	1
	Rina Rani Paul	36				
LPF-17	Rupon Chandra Paul	46	5	1	2	1
	Swapna Rani paul	38				

Suturia Village:

Potter family	Name of the potter	Age of the potter	Total family member	Potter number		Other occupation
				Male	Female	
SPF-1	Satish Chandra Paul	75	6	1	1	×
	Wife-Late					
	Kamla Rani paul	45				
SPF-2	Jagadish Chandra Paul	52	4	1	1	×
	Aduri Paul	44				
SPF-3	Ranjit Chandra Paul	62	8	1	1	2
	Nisha Rani Paul	48				
SPF-4	Dulal Chandra Paul	65	6	1	1	2
	Usha Rani Paul	56				
SPF-5	Bidhan Chandra Paul	57	7	×	1	2
	Usha Rani Paul	47				

Potter family	Name of the potter	Age of the potter	Total family member	Potter number		Other occupation
				Male	Female	
SPF-6	KomolChandra Paul	47	4	×	1	×
	MukuliRani Paul	36				
SPF-7	Sayan Chandra Paul	47	4	1	1	×
	Premta Rani Paul	35				
SPF-8	Rabindra Paul	72	6	×	2	1
	Shail Rani Paul	63				
	Minoti Rani Paul	30				
SPF-9	Porimol Chandra Paul	46	4	1	1	×
	Maya Rani Paul	35				
SPF-10	Ranjit Paul	62	7	1	1	3
	ChinuRani Paul	52				
SPF-11	Shankar Paul	62	7	1	1	2
	Maya Rani Paul	52				
SPF-12	Binod Paul	62	8	1	1	2
	Jamuna Paul	47				
SPF-13	Late		4	×	1	1
	Chancahala Rani Paul	45				
SPF-14	JibonChandra Paul	47	4	1	1	×
	KankonaRani Paul	37				
SPF-15	Mongol Chandra Paul	47	5	1	2	×
	Subhashi Rani Paul	42				
	Sandhya Rani paul	45				
SPF-16	Porimol Paul	40	4	1	1	×
	Maya Rani Paul	30				
SPF-17	Modhusudon Paul	37	5	1	2	×
	Shanti Rani paul	30				
	M-Lalita Rani Paul	58				
SPF-18	Modan Chandra Paul	52	7	1	1	1
	Laxmi Rani Paul	41				
SPF-19	Anil Chandra Paul	47	6	1	1	2
	Lipy Rani Paul	42				
SPF-20	Ajit Chandra Paul	45	4	1	1	1
	Shefali Paul	40				
SPF-21	Ajit Chandra Paul	37	4	1	1	×
	Krishna Rani Paul	30				
SPF-22	Uttam Kumar Paul	58	6	1	1	2
	Rina Rani Paul	46				
SPF-23	Roton Paul	62	10	1	1	2
	Laxmi Rani Paul	52				
SPF-24	Arun Chandra Paul	57	3	1	1	1
	Pratima Rani	47				
SPF-25	Sunil Chandra Paul	47	5	1	1	×
	Mina Rani Paul	42				
SPF-26	Haridhor Chandra Paul	52	5	1	1	×
	Mukti Rani Paul	47				
SPF-27	Laxmi Rani Paul	55	×	×	×	×
SPF-28	Mina Rani Paul	52	×	×	×	×

Appendix - 3

Duration of pottery manufacturing & finished products
Kamrabo village

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
KPF-1	October-March	Full time	Malsa, Poin, Dailya,Kalash, Kanjighat, RoserHari, Dhakna, KobutorerThala, Khola,, TawaMinaturePot, Figurine,Toys,	3-4	Pre-firing painting on Kalash, KobutorerThala.
KPF-2	February-March	Part time	Small Scale Dhakna, MinaturePot, Figurine , Toys	Jointly once in the end of March	×
KPF-3	September-March	Part time	Malsa, Poin, Kanjighot, RoserHari, Dhakna,DailyaKobutorerThalaKhola, , Figurine	3-4 (jointly with KPF-5 in once)	×
KPF-4	February-March	Part time	Malsa,Poin,Dailya,Lid,Kanjighat,Roser Hari,Miniature Pot, Toys	Jointly once in the end of March	×
KPF-5	September-March	Part time	Malsa, Poin, , Kanjighot, RoserHari, Dhakna, KobutorerBasa/Thala, Khola,Tawa,MinaturePot, Figurine,Toys,	4-5 jointly with KPF-3	Decoration on Dailya
KPF-6	March	Part time	Miniature Pot, Toys	Jointly once in the end of March	×
KPF-7	February-March	Part time	Lid, Miniature Pot, Daliya, Money-Bank, Tawa	Once in a year (end of the March)	×
KPF-8	October-March	Part time	Malsa, Poin, Kalash, Kanjighot, RoserHari, Dhakna, KobutorerBasa/Thala, Khola, MinaturePot, Figurine,Toys,	3-4	×
KPF-9	February-March	Part time	Miniature Pot, Toys, Money-Bank	Once jointly	×
KPF-10	February-March	Part time	Miniature Pot, Toys, Money -Bank Pot	Once jointly	×
KPF-11	February-March	Part time	Miniature Pot, Toys, Money-Bank	Once jointly	×
KPF-12	February-March	Part time	Malsa, Poin, Kalash, Kanjighot, Dailya,RoserHari, Dhakna, KobutorerBasa/Thala, Khola, MinaturePot, Figurine,Toys,	2-3 times	×
KPF-13	Trader		Malsa, Poin, Kalash, Kanjighot, RoserHari, Dhakna, KobutorerBasa/Thala, Khola, MinaturePot, Figurine,Toys,	3-4	×

Jointly means they share someone else'sfor firing and jointly fire with their products
Jossor Village:

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
JPF-1	11 months (Excluding Boishakh)	Full time	Poin, Daillya, RoserHari, Khalash,Malsa, Miniature Pot, Kanji Ghot	7-8/9	×.
JPF-2	October-March	Part time	Poin, Daillya, RoserHari, Kalash, Miniature Pot, Kanji Ghot	5-6	×
JPF-3	February-March	Part time	Miniature Pot, RoserHari	4-5	×
JPF-4	October-March	Part time	Poin, Daillya, RoserHari, Kalash, Miniature Pot, Kanji Ghot	4-5	×
JPF-5	October-March	Part time	Poin, Dailya, RoserHari, Kalash, Miniature Pot, Kanji Ghot	4-5	×
JPF-6	October-March	Part time	Miniature Pot, Toys	2-3 times jointly	×
JPF-7	October-March	Part time	Poin, Dailya, RoserHari, Kalash,Malsa, Miniature Pot, Kanji Ghot	3-4	×
JPF-8	November-March	Part time	Miniature Pot, Toys	2-3 times jointly	×
JPF-9	December-March	Part time	Poin, Dailya, RoserHari, Kalash, Miniature Pot, Kanji Ghot	3-4	×
JPF-10	October-March	Part time	Miniature Pot, Toys	3-4 jointly	×
JPF-11	January-March	Part time	Miniature Pot, Toys	2-3 times jointly	×
JPF-12	October-March	Part time	Miniature Pot, Toys	2-3 times jointly	×

Jointly means they share someone's else for firing and jointly fire with their products
Machimnagar Village:

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
MPF-1	October-March	Full time	Kalash(4 Types In Size), Dailya,Poin(4 Times In Size), Lid, Tawa, Sanj,Kanjighat,RoserHari,Malsa	6-7	×.
MPF-2	October-March	Full time	Dailya(4 Types In Size), Lid, Tawa, Sanj	5-6	×
MPF-3	October-March	Full time	Dailya(4 Types In Size), Lid, Tawa, Sanj	5-6	×
MPF-4	Is not specific	Part time	Only Produce For Order	Uncertain	×
MPF-5	October-March	Full time	Dailya(4 Types In Size), Lid, Tawa, Sanj	5-6	×
MPF-6	October-March	Full time	Dailya(4 Types In Size), Lid, Tawa, Sanj	5-6	×
MPF-7	October-March	Full time	RoserHari, Kanji Ghot,DailyaIn Various Size, Jolkanda, Malsa,Tawa,	3-4	×

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
			Khola, Dhakna, Jhajhor, ChapnaTepi		
MPF-8	Mid-May toMid-April	Full time	RoserHari, Kanji Ghot,DailyaIn Various Size, Jolkanda, Malsa, Tawa, Khola, Dhakna, Jajot, ChapnaTepi	11-12	×
MPF-9	11th month	Full time	Miniature Pot, Toys, Animals Figure	3-4	×
MPF-10	11th month	Full time	Miniature Pot, Toys, Animals Figure	3-4	×
MPF-11	11th month	Full time	Miniature Pot, Toys, Animals Figure	3-4	×
MPF-12	11th month	Full time	Lots Amount Of RoserHari, Kanji Ghot,CurdPot In Various Size, Jolkanda,Malsa, Bread Roaster (Tawa), Khola, Dhakna, Jhajhor, ChapnaTepi	10-12	×
MPF-13	Mid-May-13th April (Joisthy-Chatro)	Full time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	9-10	×
MPF-14	Mid-May-13th April (Joisthy-Chatro)	Full time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	10-11	×
MPF-15	October-March	Full time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	6-7	×
MPF-16	January-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	2-3	×
MPF-17	February-March	Part time	Miniature Pot, Toys	2-3 Once jointly	×
MPF-18	October-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	2-3	×
MPF-19	January-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	2-3	×
MPF-20	October-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	3-4	×
MPF-21	January-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	2-3	×
MPF-22	October-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	4-5	×
MPF-23	October-March	Part time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	4-5	×
MPF-24	Mid-May-13th April (Joisthy-Chatro)	Full time	Poin, Dailya, RoserHari, Dhakna, Kanji Ghot	6-7	×
MPF-25	February-March	Part time	Miniature Pot, Toys	Once jointly	×
MPF-26	Uncertain	Part time	Work For Order Basis	Uncertain	×

Letarob Village:

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
LPF-1	January-March	Part time	Kalash(4 Types In Size), Dailya(4 Times In Size), Lid, Tawa, Sanj, Large Kalash	3-4 times	×.
LPF-2	December-March	Full time	Kalash(4 Types In Size), Dailya(4 Types In Size), Lid, Tawa,Sanj, Matki	4-5 times	Matki
LPF-3	November-March	Part time	Kalash(4 Types In Size), Curd Pot (4 Types In Size), Lid, Tawa,Sanj, Large Kalash	5-6 times	×
LPF-4	January-March	Part time	Dailya(4 Types In Size), Lid, Tawa,Sanj	2-3 times	×
LPF-5	December-March	Part time	Kalash, Dailya(4 Types In Size), Lid, Tawa,Sanj	3-4 times	×
LPF-6	January-March	Part time	Kalash, Dailya(4 Types In Size), Lid, Tawa,Sanj	3-4 times	×
LPF-7	December-March	Part time	Kalash, Dailya(4 Types In Size), Lid, Tawa,Sanj	2-3 times	×
LPF-8	December-March	Part time	Kalash, Dailya(4 Types In Size), Lid, Tawa,Sanj, Khola, Dhakna, Jajot, ChapnaTepi	4-5 times	×
LPF-9	December-March	Part time	Miniature Pot, Toys	Once/twice jointly	×
LPF-10	December-March	Part time	Miniature Pot, Toys	Once/twice jointly	×
LPF-11	October-November	Part time	Miniature Pot, Toys, Animals Firure	2-3 times jointly	×
LPF-12	January-March	Part time	Kalash, Dailya(4 Types In Size), Lid, Tawa,Sanj	3	×
LPF-13	February-March	Part time	Miniature Pot, Toys, Animals Firure	Once jointly	×
LPF-14	January-March	Part time	Miniature Pot, Toys, Animals Firure	Once jointly	×
LPF-15	January-March	Part time	Miniature Pot, Toys, Animals Firure	Once jointly	×
LPF-16	January-March	Part time	Miniature Pot, Toys, Animals Firure	Once jointly	×
LPF-17	January-March	Part time	Miniature Pot, Toys, Animals Firure	Once jointly	×

Suturia Village:

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
SPF-1	Whole year excluding Boishakh(14th april-13th march)	Full time	Malsa, Poin, ,Kanjighot, RoserHari, Dhakna, KobutorerBasa/Thala, Khola, MinaturePot, Figurine,Toys, Cooking Pot As Orderly Basis.	8-9	Rice cooking pot
SPF-2	Whole year excluding Boishakh (14thapril- 13th march)	Full time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	8-9	×
SPF-3	November-March	Part time	Malsa, Poin,Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	4-5	×
SPF-4	November-March	Part time	Lid, Dailya, Sanj	4-5	×
SPF-5	November-March	Part time	Miniature Pot, Kanjirghat, Small Jar	3	×
SPF-6	February-March	Part time	Miniature Pot, Toys	Once jointly	×
SPF-7	11 months excluding Boishakh	Full time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, Khola, MinaturePot, Figurine,Toys	8-9	×
SPF-8	November-March	Part time	Small Scale Toys, Lid And Money-Bank	Once /twice jointly	×
SPF-9	11th months	Full time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	8-9	×
SPF-10	11th months	Full time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	11-12	×
SPF-11	11th months	Full time	Miniature Pot,, Animals Firure, Laxmi	10-11	×
SPF-12	11th months	Full time	Miniature Pot,AnimalsFirure, Laxmi, Water Jar With Regular Vessels	11	×
SPF-13	11th months	Full time	Miniature Pot, Animals Figure, Laxmi, Water Jar	8-9	×
SPF-14	11th months	Full time	Miniature Pot, Animals Figure, Laxmi, Water Jar	8-9	×
MPF-15	11th months	Full time	Miniature Pot, Animals Figure, Laxmi, Water Jar (3 Types)	9-10	Decoration Pot

Potter family	Duration of Production time	Part time/full time	Products	No. of firing (in a Year)	Special Products
SPF-16	11th months	Full time	Malsa, Poin, Kalash, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	9-11	×
MPF-17	11th months	Full time	Malsa, Poin, Kalash, Kanjighot, RoserHari, Dhakna, KobutorerBasa/Thala, Khola, MinaturePot, Figurine,Toys, Frying Pot	9-11	×
MPF-18	11th months	Full time	Malsa, Poin,, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	9-11	×
SPF-19	11th months	Full time	Only Miniature Pot-Produced By Wheel	6-7	×
SPF-20	11th months	Full time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot, Miniature Pot By Wheel	9-10	×
SPF-21	Not specific	Part time	Produced By Order	×	×
SPF-22	October-March	Part time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	4-6	×
SPF-23	October-March	Part time	Malsa, Poin, Kanjighot, RoserHari, Dhakna, KobutorerBasa, Khola, MinaturePot, Figurine,Toys, Frying Pot	4-6	×
SPF-24	11th months	Full time	Miniature Pot By Wheel, Lid And DailyaByMould, Money-Bank By Wheel	8-9	Miniature pot
SPF-25	October-March	Part time	Lid, Dailya, Malsa, Money-Bank	4-6	×
SPF-26	October-March	Part time	Lid, Dailya, Malsa, Money-Bank	4-6	×
SPF-27	Not specific	Full time	Work As A Labor	×	
SPF-28	Not specific	Full time	Work As A Labor	×	

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Book Review
On
Entrepreneurship in Emerging Economies: Enhancing its Contribution to Socio-Economic Development by Jerzy Cieślik

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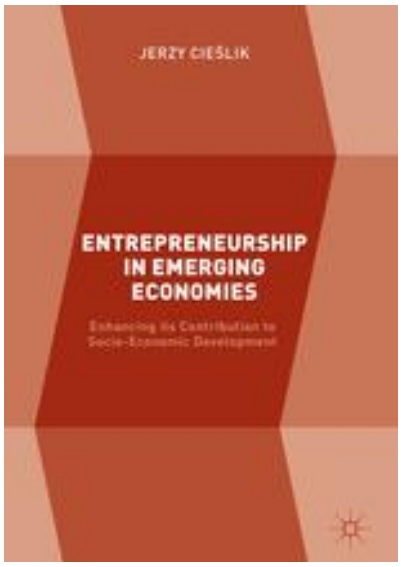
Entrepreneurship in Emerging Economies: Enhancing its Contribution to Socio-Economic Development, by Jerzy Cieślik. First Edition. Switzerland: Palgrave Macmillan, 2017. 274 pp. Price: $129.00. ISBN 978-3-319-41720-2 (Paperback).



Entrepreneurship is essential to the socio-economic development of emerging economies. Establishing entrepreneurial ventures creates a positive impact on economic indicators such as GDP, national income, and employment rate. Entrepreneurial ventures in international markets may widen the scope and create an opportunity to enhance business growth, efficiency, and knowledge. When entrepreneurial businesses in a country extend to international markets, it not only improves the socio-economic development but also helps the economy to grow. Entrepreneurship allows any person (men, women, young, elderly, marginalized, and minority) to explore his or her capability through creativity and innovation that results in a positive and supportive contribution to the society. So, it could be said that emerging economies need to create a positive platform for the evolution of entrepreneurship through research, innovation and policy creation.

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Entrepreneurship in Emerging Economies: Enhancing its Contribution to Socio-Economic Development, by Jerzy Cieślik looks at the development of entrepreneurship in the context of developing economies. The book offers tools and guidelines for academics, policy makers and professionals to understand how entrepreneurship and its policy instruments help emerging economies as drivers of economic growth. In recent years, entrepreneurship policies have been widely debated and interest has grown in entrepreneurship policy issues in emerging economies (Bennet, 2014; Bridge, 2010; Naudé, 2011). In this context, this book focuses on enhancing the contribution of entrepreneurship (free enterprise) to the socio-economic improvement of evolving markets by putting forward policy suggestions, concepts and ideas that best accommodate a well-functioning market system.

Jerzy Cieślik is a Professor and works at the Center for Entrepreneurship at Kozminski University, Warsaw, Poland as the Director. His areas of specialization include ambitious forms of entrepreneurship (growth-oriented, international, and technology-based) and innovation policy. He had previously worked as Partner and CEO at Ernst & Young Poland. Cieślik has expertise and research experience in the areas of entrepreneurship, internationalization of SME, self-employment trends and government policies. He is the author of Entrepreneurship, Policy, Growth (2014) and Ambitious Entrepreneurship: How to Launch Your Own Business (2006).

In this book, Cieślik explores how entrepreneurship can play a significant role in the socio-economic progress of emerging economies, emphasizing on its contribution in employing development programs and policies. The book makes use of latest researches in the academic sphere and includes the experiences of policy executions to suggest the best instruments and tools that can be adapted to the institutional contexts of developing countries. The book is drawn from the author's earlier work in Polish, *Entrepreneurship, Policy and Growth* (Cieślik, 2014). In this book, instead of only focusing on the Polish economy, the author focuses on the broader perspective of emerging economies, giving the book an international comparative perspective.

The book addresses a wide-ranging audience of academics, policymakers, students, and professionals. It could also help entrepreneurs to understand the greater social context of running a business.

There is a total of 8 chapters in the book. Chapter 1 is introductory, Chapter 2 presents crucial ideas concerning entrepreneurship and discusses the progression of opinions on its role in socio-economic development. Chapter 3 talks about entrepreneurs and entrepreneurial establishments in terms of type, dimension, and diversity. Chapter 4 outlines the diverse approaches to measuring entrepreneurial initiatives. Chapter 5 explains the role of different sizes of business establishments in the creation of employment. Chapter 6 explores the relationship between innovation and entrepreneurship and how innovations in information technology, telecommunications, biotechnology, new materials, and new approaches to organization, management, and marketing have transformed entrepreneurship. Chapter 7 discusses entrepreneurship and international activity, how recent trends in entrepreneurship affect smaller firms in international trade, foreign direct investment, and industrial partnership. The final chapter, Chapter 8 is about entrepreneurship policy.

The reviewers have followed a three-step process in reviewing the book. First, each of the chapters and contents was thoroughly read. Second, a close content analysis and critical assessment were made. Third, a final conclusion was drawn regarding the contribution and suitability of this book for the readers.

The *Introduction* chapter (Chapter 1) starts with what entrepreneurship is and what it is associated with. The author describes the paradigm shift during the late 20th and early 21st century, where researchers and policymakers turned their attention from large corporations to young/small firms as the drivers of economic development. The chapter primarily states the overview of the book to help the reader get an understanding of the structure and purpose of the book. In this book, the author looks at entrepreneurship from the macroeconomic, countrywide perspective. In doing so, in Chapter 1, the author explains "emerging economy" and "catching up countries" and details history of these terms.

In *Essence of Entrepreneurship* (Chapter 2), the author reviews how the understandings of the concept of entrepreneurship and its contribution to socio-economic growth has evolved in the 20th and 21st centuries. In doing so, Cieślik divides the evolution into four phases: Schumpeterian theory (Phase I), dominance of large corporations and linkage of entrepreneurship with traditional small business (Phase II), renaissance of entrepreneurship through invention in small firms (Phase III) and greater aspect of entrepreneurship (free enterprise) through higher/advanced education institutions (academic entrepreneurship), social and non-profit organizations (social entrepreneurship), culture and art (entrepreneurship in creative sectors), and state (public) and local administration/supervision (public entrepreneurship) (Phase IV). Furthermore, the author reviews the important variances between small business and high-growth, innovative/state-of-the- art firms. It provides a good understanding of how the two types of businesses operate in terms of management, financing, growth, and strategy. The author also explains the concept of ambitious entrepreneurship using definitions of Stam et al. (2012) and Lichtenstein and Lyons (2010):

> "An ambitious entrepreneur is someone who engages in the entrepreneurial process with the aim to create as much value as possible." (p. 32)

Dimensions of Entrepreneurship (Chapter 3) is all about characterizing types of businesses under different facets of entrepreneurship that are based on Cieślik's own study. Here the author discusses 24 aspects of entrepreneurship under small business, entrepreneurship that is internal and external to the economy considering the socio-economic reasons that require the attention of civic authorities. At the beginning of this chapter, the author explains four broad dimensions of small businesses, keeping in mind that the diversity of small businesses has a great impact on socioeconomic development. While explaining broad dimensions of small businesses, the author has considered supreme values, marginalized groups, and entrepreneurship between employee and employer and criminal entrepreneurship. Later on, thirteen sub-categories have been discussed by the author under this broad dimension of small business based entrepreneurship. Within the economy, high-tech, knowledge-based and intellectual entrepreneurship have been identified as the indicators of innovative entrepreneurship while high growth, international and franchising approach of entrepreneurship has been identified as the indicators of dynamic entrepreneurship. The author further explains the

facets of entrepreneurship outside the business sector where essential features of entrepreneurial activity have been found in academic, arts and culture, social and public entrepreneurship. The author explains why these indicators of entrepreneurial attitudes and behavior outside the economy are considered as "late-comer advantage" in the mature economies. The chapter ends with key policy lessons addressing policymakers to develop comprehensive entrepreneurship policy keeping focus on economic goals and social objectives.

Measuring Entrepreneurship: International Comparisons (Chapter 4) is essentially about entrepreneurship measurement. In doing so, the author identifies four basic directions: a) measuring total business action, b) measuring early-stage entrepreneurial action, c) measuring the dynamic and innovation related segment of entrepreneurship, d) measuring entrepreneurial action via multi-criteria systems. A number of global measurement indexes have been explored such as Global Entrepreneurship Monitor (GEM), OECD–Eurostat Enterprise Birth Rate and The World Bank Group Entrepreneurship Survey (WBGES). A comparison of business ownership rates for the European transition economies and the Anglo-Saxon countries (Australia, Canada, UK, US, New Zealand, Ireland) has been made. However, it should be noted that the chapter does not address entrepreneurship in the Asian countries, rather it focuses on the European perspective only. As the book concentrates on emerging economies, the inclusion of emerging economies for non-European regions would have provided a greater global outlook for measuring entrepreneurship.

Entrepreneurship and Employment (Chapter 5) explores the association between entrepreneurship and job creation. The author reviews the different research directions and arguments made in employment generation over the years. The author compares the two different measurement methods for entrepreneurship and employment – US and OECD-Eurostat. In case of the US, measurement is only limited to businesses; whereas OECD-Eurostat includes all businesses and all entities related to those businesses, such as, employees. Further in the chapter, the author explores the employment growth of high growth enterprises in the OECD countries. A detailed analysis of the employment growth of the Polish enterprise sector is also included. Cieślik also provides a comparative analysis on the job quality in the SME sector, concluding that job quality is poorer in small businesses compared to the larger ones. His rationale is that large companies offer greater pay, a broader array of benefits and show eagerness to introduce performance-based bonus systems. However, Cieślik also states that this overall assessment is not a necessary parallel to the employee opinions. Here he refers to the findings of de Kok et al. (2011), who found that job satisfaction is higher for employees working in smaller firms than those working for larger counterparts.

Entrepreneurship and Innovation (Chapter 6) creates a link between entrepreneurship and innovation, and how breakthrough innovations by small firms have successfully challenged the dominance of large firms in the 21st century. Cieślik states,

> "The revival of entrepreneurship at the turn of the 21st century was driven by small start-up companies that, by implementing ground-breaking innovations, managed to challenge the dominance of large corporations in key sectors of the economy." (p.157)

This chapter particularly focuses on the role of innovation in entrepreneurship and its effect at the micro (firm) and macro (economy) stage. Innovation is seen as a macroeconomic development factor because an inventor of an exclusive technological solution may be able to temporarily monopolize it by patenting or restricting access to critically important data. Over time, however, the monopoly will not sustain due to the technology eventually moving to public domain. Through novel technology and solutions, firms generate a constant supply of innovation and create economic growth for all. At the company level, the author states that innovation is a vital catalyst for successful business. The author also mentions that research on the strength and direction of the relationship between technological advancement and business performance has not generated any conclusive evidence so far. Although the author stresses on breakthrough innovation, he also cites a research by Bhide (2000) where results show that only 6% of respondents in the study had started their business with a unique product or service. The study concluded that in majority of cases, successful entrepreneurs either imitated or adapted the already existing products or services in the market. It is evident that by innovation, the author not only refers to innovators of breakthrough technology but also refers to successful imitators. The author categorizes innovativeness into three categories: new in terms of world, market, and firm. Based on that, he discusses four types of innovative ventures: a) high-tech start-ups, whose founders introduce revolutionary solutions to the market; b) academic spin-offs, where a high-tech business is "spun off" from universities and is founded by researchers working in there. Generally, the academic institution retains the ownership of the innovative technology and the researchers and scientists involved with the invention retain copyrights; c) spillover hunters, the smart and young innovators and founders who use "free", untapped inventions, by spotting the profit potential that others have failed to identify and d) proactive imitators, enterprising individuals who seek business prospects and spot production techniques unfamiliar in their domestic markets.

International Dimension of Entrepreneurship (Chapter 7), as the name suggests, explores the international contexts of entrepreneurship. In the emerging economies, expansion of entrepreneurial firms into international markets helps domestic economies and firms to expand to global capital and penetrate foreign markets. The author primarily explores export-oriented manufacturing firms and highlights foreign direct investment (FDI). Cieślik stresses the significance of entrepreneurship in international processes and growth opportunity of domestic companies through export experience. The export intensity in total sales accelerates not only revenue but also accelerates the learning process of domestic companies. The goal of export promotion is to catapult domestic firms to international markets that will help them to expand from small business to large business. The expansion of international markets has a positive influence on the development of ambitious entrepreneurs which results in positive growth in the employment and innovation capacity. Due to this expansion scope, domestic companies get the opportunity to improve their efficiency, know-how and learning experience. The author explains how FDI spillover effect increases the new growth opportunities for domestic firms, especially for high-tech firms through "intermediated internationalization." Cieślik describes how the emergence of the international small business segment has risen up due to the growth of information and technology in the global economy. Information and technology have helped to disseminate information and

eliminate traditional barriers to expanding business abroad. Companies with strong domestic root and global presence basically act as business ambassadors for their country. To support the domestic firms' internationalization process, the author recommends policies that promote the aspirations of entrepreneurs by keeping the focus on high export intensity, outward foreign direct investment (OFDI), facilitating FDI spillovers policy initiative, and accelerating the internationalization of local high-tech companies.

In *Entrepreneurship Policy: Towards an Integrated Framework* (Chapter 8), the National Entrepreneurship System has been suggested by the author as a holistic model. The main components of this model are the specific needs of developing countries, entrepreneurship policy, favorable institutional environments, and realistic philosophies for implementing selective policy actions. The National Entrepreneurship system is based on a single assumption, that is, an entrepreneurship policy of a nation shall focus on achieving an autonomous objective – entrepreneurial growth ambitions and accelerate economic growth as a by-product. The author states that the development objectives and the autonomous strand – both should be given equal importance. According to the model, contribution of businesses relative to GDP growth is an indicator of the effectiveness of an autonomous entrepreneurship policy. The author proposes that in the National Entrepreneurship System framework, public support for entrepreneurship would be provided by establishing an institutional framework for doing business. The framework should assist entrepreneurs to conquer any "stuck points" they experience in their entrepreneurial path. This can be achieved by increasing the operational size of the business while simultaneously helping them to develop managerial and technological skills and knowledge according to the specific needs of the diversified array of entrepreneurs and their ventures.

The book is well constructed and Cieślik makes very intelligent use of tables, charts, and figures to support his points. For example, Cieślik shows the evolution of entrepreneurial views through a graphical representation in Chapter 2 (fig. 2.1, p. 14), the dimension of entrepreneurship in Chapter 3 (fig. 3.1, p. 42) and national entrepreneurship system/structure (fig. 8.2, p. 236). The book is well referenced, with ample research references in every chapter and reference lists at the end of every chapter. It should be noted that this book is essentially focused on entrepreneurial policy making and at the end of each chapter, policy direction is given in accordance with the content of the respective chapter.

One of the limitation of the book is that the data and examples in it do not represent Non-European emerging economies. The book might be somewhat difficult for a first-time student in the field of entrepreneurship to understand as it does not contain the basic elements of entrepreneurship in detail. There is no review of the key terms at the end of the chapters and there are no chapter-end review questions which are important for a textbook. Another issue with the book is that the organization of the chapters is not reader-friendly. The book starts with an introductory chapter followed by the essence of entrepreneurship (Chapter 2), dimensions of entrepreneurship (Chapter 3), measuring entrepreneurship/international comparisons (Chapter 4), entrepreneurship and employment (Chapter 5), entrepreneurship and innovation (Chapter 6), the international

dimension of entrepreneurship (Chapter 7), and entrepreneurship policy: towards an integrated framework (Chapter 8). This flow of the chapters could have been more coherent if dimensions of entrepreneurship could be combined with international dimension at the beginning of the book and essence of entrepreneurship could be combined with entrepreneurship and employment, followed by the chapter on entrepreneurship and innovation, and measuring entrepreneurship and entrepreneurship policy: towards an integrated framework (Chapter 8) the end of the book. Had the chapters been organized in this flow, it would have made the book easier and more reader-friendly. The inclusion of case studies would have also been a valuable addition to the contents of the book.

In spite of the above, it could be said that the book would be particularly useful for students, researchers, academicians and trainers (or mentors providing guidance to small and medium enterprises) wanting to learn about entrepreneurial policy making as the book uses a wide range of empirical research.

The book is well written and includes a wide array of data and information. It could be used as a textbook at the postgraduate level in business schools. The book helps policymakers and lets the readers understand the sort of support and decisions needed for entrepreneurship development in emerging economies. The book also explains how entrepreneurs can boost socioeconomic growth via their local and international entrepreneurial businesses. The book helps readers interested in entrepreneurship and entrepreneurship policy through theoretical/academic notions, and experiences observed throughout the 20th century and at the beginning of the 21st century. The policy instruments and directions put forward in the book are based on empirical research and formulated using data from Eurostat, OECD, and Global Entrepreneurship Monitor (GEM). Although there are a number of books on entrepreneurship in emerging economies such as *Routledge Handbook of Entrepreneurship in Developing Economies* (Williams & Gurtoo, 2016), *Financing Entrepreneurship and Innovation in Emerging Markets* (Casanova et al., 2017), *Entrepreneurship and Small Business Development in Post-socialist Economies* (Smallbone & Welter, 2009), *The Coming Prosperity: How Entrepreneurs Are Transforming The Global Economy* (Auerswald, 2012), *When Economies Change Hands: A Survey of Entrepreneurship in the Emerging Markets of Europe from the Balkans to the Baltic States* (Dana, 2010), *When Economies Change Paths: Models of Transition in China, the Central Asian Republics, Myanmar & the Nations of Former Indochine Française* (Dana, 2002), none of the books provide such an comprehensive understanding on the ongoing interaction of business operations and entrepreneurship policies and how they impact socioeconomic development in emerging economies like Cieślik's book does. So, it could be concluded that *the book "Entrepreneurship in Emerging Economies: Enhancing its Contribution to Socio-Economic Development"* is most certainly a good addition to the existing field of entrepreneurship, particularly to the field of entrepreneurship policymaking.

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