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DOES EDUCATION PLAY A MEDIATING ROLE IN THE RELATIONSHIP BETWEEN ASSET AND PARTICIPATION IN NON-FARM EMPLOYMENT? EVIDENCE FROM RURAL BANGLADESH

Ishtiaque Selim[1] and Sharif M. Hossain[2]

Abstract

The paper attempts to examine the roles of household asset and education in the participation in non-agricultural employment by individuals from rural Bangladesh. Past studies mostly focused on the *ceteris paribus* (i. e., keeping the effect of other variables constant) impacts of education and asset endowment on non-farm involvement decision. However, the endowment of assets might not necessarily lead to non-farm engagement. As taking up activity beyond farming requires skill, knowledge, decision-making ability, and capacity to gather and assess information, individuals with educational attainment might be well placed to join the non-farm sector. Thus, from the rural perspective of a developing nation like Bangladesh, we may assume that education could mediate a potentially positive association between asset endowment and non-farm employment participation by an individual. In other words, asset holdings might increase the likelihood to get involved with non-farm employment through educational attainment. Utilizing the Bangladesh Household Income and Expenditure Survey (HIES) data of 2010, the paper estimates a probit equation and a series of hierarchical regressions to test the mediating role of education. We provide robust evidence that education mediates the relationship between asset holdings and participation in non-farm employment.

Key words: Bangladesh, non-farm employment, household asset, education.

1. Introduction

In the past, agriculture had taken the centre-stage in the question of rural development (Anderson and Leiserson, 1980). However, at present, the policy debates encircling rural economy are paying considerable attention to the non-farm sector or employment (Lanjouw and Shariff, 2004). Typically perceived as a "low-productivity sector", the non-farm economy currently turns out to be an important driver of rural welfare (Hojo, 2012). In recent years, non-farm employment contributed quite significantly to the diversification of rural household income and livelihood (Start, 2001). Especially in South Asia, Latin America and sub-Saharan Africa, the share of non-farm income has become increasingly dominant (Barrett et al., 2001; Reardon et al., 2001; Seddon and Subedi, 2000; Reardon et al., 2007).

[1] Associate Professor, Department of Economic, Jagannath University, Dhaka.
[2] Associate Professor, Department of Economic, Jagannath University, Dhaka.

In Bangladesh, the non-farm sector is regarded as a vital component of the growth strategy for rural areas (World Bank, 1997; 2016). The sector has significant implications for employment creation, income generation and poverty reduction in Bangladesh (World Bank, 2016). According to an estimate, non-agricultural employment has become a source of income for 77% of households in rural Bangladesh (World Bank, 2016).

The non-farm sector in Bangladesh includes activities like micro-entrepreneurship, small retail businesses, service and processing, and wage employment. Amongst other things, factors like physical asset and education, often drive an individual to get associated with non-farm work (Bezu and Barrett, 2012; Reardon et al., 2001; Lanjouw and Shariff, 2004). Physical assets create funds for investment in the non-farm sector, while education enables rural people to get acquainted with the necessary skill, and the pros and cons of this sector. However, in Bangladesh, low asset base remains an issue for rural households (Osmany et al., 2015). For example, without having much land and asset, the marginal peasants in the country are forced to work as day labourers with a subsistence wage level, which exposes them to poverty and vulnerability. At the same time, lack of education or literacy limits the rural workforce's ability to explore beyond subsistence farming. Even if they get engaged with the non-farm employment, these individuals found themselves at the lower end of the activities. In fact, a large portion of rural workers has remained illiterate in Bangladesh. (Own calculation from HIES, 2010).

Previous studies reported the positive impacts of both asset endowment and education on non-farm engagement by an individual. However, asset endowment might not lead to non-farm involvement. This association could be mediated by education because taking up employment in non-farm sector requires some skill, knowledge, decision-making ability, and capacity to gather and assess information. Given this context, the current article argues that physical asset holdings increase the likelihood to get engaged with non-farm employment through educational attainment. In other words, our main objective is to investigate whether education mediates the positive association between asset holdings and non-farm participation. We also examine the role of assets in an individual's education. To address the issues, we analyze the data generated from Bangladesh Household Income and Expenditure Survey (HIES) 2010. We conduct a hierarchical regression analysis following Baron and Kenny (1986) to test the mediating role of education. From the results, we have robust evidence that education mediates the positive relationship between asset and participation in the non-farm activity.

Our study makes a couple of contributions. First, it contributes to the current studies on non-farm employment and participation factors. Past researches mainly focused on the *ceteris paribus* (i. e., effects of other variables are kept

constant) impacts of education and asset endowment on non-farm involvement decision. But, in the rural perspective of a developing nation like Bangladesh, lack of education usually inhibits an individual from exploring the employment opportunities in the non-farm sector. This paper provides further insights by investigating the mediating role of education in the relationship between asset and non-farm involvement. Second, our findings might contribute at the policy level. Over the years, the interest amongst the policymakers has been growing to promote non-farm employment for poverty alleviation in rural areas (Lanjouw and Shariff, 2004). The findings from this study might assist in designing specific policies in relation to the roles of assets and education in the non-farm sector.

The article is organised as follows. Following the introduction Section 2 focuses on the review of relevant literature and formulation of testable hypotheses. Section 3 deals with data and estimation techniques. The results of our analysis are presented in Section 4, while Section 5 provides conclusion.

2. Review of Literature and Formulation of Testable Hypotheses

2.1 Factors Influencing Participation in Non-Farm Employment

The non-farm activities are generally generated outside the boundary of farming, fishing and hunting. They include a wide range of diverse activities, from small business and enterprises to service, processing and wage employment (Reardon et al., 2001). The high-income opportunity in non-farm jobs mainly lures people from a less-productive farm sector (World Bank, 1997). However, a couple of factors, namely, pull factors and push factors primarily influence the participation in rural non-farm employment (Rahman, 2014).

The pull elements are opportunity or demand-driven, while the push elements are distress or need-driven (Davis, 2003). The demand-pull factors arise with the emergence of newer markets and the advent of technologies and with income hike in lower and middle-income rural households (Davis, 2003; Islam, 1997). The distress-push factors, on the other hand, are associated with limited opportunity in the farm sector, natural shocks, lack of farmland and absence of an enabling environment (Davis, 2003). Nevertheless, people endowed with assets, education, social capital and have better access to infrastructure are more likely to join non-farm activities (Lanjouw, 1998).

2.2 Effects of Assets on Education

A large body of literature has reported the positive effect of physical asset holdings at household level on the educational attainment of an individual. Possession of assets opens up an avenue of welfare for individual members of the households. For example, assets could be invested in education, which in turn

moderated the incidence of poverty both at household and individual levels (Kafle et al., 2018). In the perspectives of developed and developing economies alike, studies have noted that holdings of physical assets led to higher investment in education, which consequently had a positive impact on educational outcome (Chowa et al., 2013; Conley, 2001; Deng et al., 2014; Cockburn and Dosite, 2007). For Ghanaian households, Chowa et al. (2013) found a positive effect of durable assets on education. They argued that durable assets increased access to information and transportation and thus reduced the cost of attaining education. Deploying an asset-based index, Filmer and Pritchett (2001) revealed that in the asset-rich Indian households, school enrollment was 30% higher than that of the asset-poor households. Notably, owning a house significantly increased the probability of receiving education as it enhanced security and comfort level of individual members of the household. Hence, considering all these, we can formulate the following hypothesis:

H1: Household's physical asset holdings are positively related to an individual's education.

2.3 Asset, Education, and Participation in Rural Non-Farm Employment

The endowment of the physical asset is vital to make a decision on joining non-farm employment. Various studies have reported the significance of asset holdings in this regard. For example, Bezu and Barrett (2012) showed from Ethiopian context that households with a strong asset base were more likely to switch to high-income non-farm activities. The assets generally translated into an investment for the non-farm sector. By contrast, for some Latin American economies, Reardon et al. (2001) found that poor households characterized by lack of asset were mostly engaged with subsistence level of non-farm activities.

The agricultural asset could be a great source of investment to get involved with non-farm activities because some past studies mentioned the significant linkage effect from farm to non-farm sector. Hazell and Haggblade (1990) estimated that 1% increment in farm income raises non-farm income by 0.64% in rural India. Another study conducted by the International Food Policy Research Institute (IFPRI) found that farm output surged non-farm employment by 90% (IFPRI, 1995). As such, farm asset could pave the way for an increase in farm output, which might result in high investment in the non-farm sector. Furthermore, studies have stressed the importance of possessing livestock as a source of capital for the non-farm sector (Ellis and Mdoe, 2003; Ellis and Bahiigwa, 2003).

Educational attainment is also quite critical to participate in non-farm activities. A number of studies conducted across South Asia, Latin America, and Africa had mentioned the significant impact of education on non-farm involvement (Reardon et

al., 2001; Lanjouw, 2001; Deichmann et al., 2009; Bezu and Barrett, 2012; Lanjouw and Sharriff, 2004; Ackah, 2011; Hojo, 2012). Bezu and Barrett (2012) contended that non-farm activities required the combination of time, skill and management. Therefore, an educated individual is firmly placed to take up and thrive in the non-farm sector. Apart from that, education helps a potential participant to gather and understand information about non-farm employment better than an uneducated individual (Hojo, 2012).

Furthermore, in non-farm employment, the role of education is vital to ensure the better utilization of capital generated from the physical asset. From the perspective of rural farm sectors, studies have pointed out how education ultimately helped the farmers to make efficient decisions and to become better managers in resource allocation (Asadullah and Rahman, 2009; Reimers and Klasen, 2013). Another study by Jamison and Lau (1982) claimed that education assisted farmers in receiving appropriate information on input and output prices, which helped them to maintain a steady income and profit. In the similar vein, education would likely to have a positive impact on an asset-rich individual's decision to join the non-farm sector. An individual with educational attainment will be more probable to make a prudent decision, take an educated risk, and acquire managerial skill for the non-farm sector. Physical assets might supply the much-needed capital, but to make the best use of the capital in the non-farm sector one needs skill and judgment, which is likely to be provided by education. At this juncture, we may argue that education could further strengthen the positive association between physical asset holdings and non-farm engagement by a worker. Therefore, we construct the following hypothesis:

H2: Education mediates the positive relationship between asset endowment of households and an individual's participation in non-farm employment.

3. Methodology

3.1 Data and Variables

The current study utilizes data from HIES 2010, which was conducted by the Bangladesh Bureau of Statistics. We employ the data on rural working adults from different households across seven administrative divisions of Bangladesh. The Dependent variable is the current "working status" of individuals. It is a binary variable, coded either as one if the person worked in the non-farm sector or zero if worked in the agricultural sector. The independent variable, "Hh rich in Asset" is also binary, taking either one if the individual's household was asset-rich or zero if the household was asset-poor. We consider the median value of the household asset to determine whether the household was rich in asset. We avoid using the mean value as it is more likely to be impacted by outliers. To determine the asset value, we add the prices of house, land, livestock, durable goods, agricultural inputs and other assets.

The mean asset value is BDT (Bangladesh Taka) 3,02,960, and the median value is BDT 1,66,840. Households with asset value equaled to or more than the median value are regarded as asset-rich households. The mediator of this study is "Education", which we code as one for an educated individual and zero for a not-educated individual.

The control variables include basic demographic and household characteristics such as "Gender" (coded as one for male), "Age" (in years), "Marital status" (coded as one for married), "Daily wage" (logged), "Active days/month" (number of days an individual worked in a month), "Household size", and "Dependency ratio". The other controls are "Safety net" (coded as one if the individual received benefits under safety net), "Credit access" (coded as one if individual had access to microcredit) and "Electricity access" (coded as one if household had access).

3.2 Descriptive Statistics

The final sample size was 10,856. We excluded the child labour and old workers of over 64 years of age from the sample. The descriptive statistics related to all the variables are shown in Table 1.

Table 1. Summary Statistics (Full Sample)

Variables	*Mean*	*Std. Dev.*	*Min*	*Max*
Working status	0.50	0.50	0.00	1.00
Education	0.50	0.50	0.00	1.00
Hh rich in Asset	0.50	0.50	0.00	1.00
Age (years)	36.58	12.54	15.00	64.00
Gender (Male=1)	0.91	0.29	0.00	1.00
Marital status	0.79	0.41	0.00	1.00
Safety net (yes=1)	0.13	0.35	0.00	9.00
Active days/month	23.58	6.09	1.00	50.00
Daily wage	2.70	2.66	0.00	9.96
Credit access	0.14	0.35	0.00	1.00
Household size	5.14	2.11	1.00	17.00
Dependency ratio	2.41	1.58	0.00	14.00
Electricity access	0.42	0.49	0.00	1.00

As observed from Table 1, almost half the individuals are engaged with the non-farm activity, and roughly 50% of the workers are not-educated. As far as asset

endowment is concerned, only half the rural households are rich in asset. Furthermore, the average age of an individual worker is over 36 years old, 79% are married, and 91% are male. These rural workers are active for about 24 days in a month, with 13% of them receive benefits from the safety net program. Each household has roughly five members, including two dependents. Also, only 42% of households have access to infrastructure like electricity.

Table 2. Descriptive Statistics: Comparing between Non-Farm Workers and Farm Workers

	Non-Farm Sector		**Farm Sector**	
Variables	*Observations*	*Mean*	*Observations*	*Mean*
Education	5422	0.58	5434	0.42
Hh rich in asset	5422	0.52	5434	0.48
Age	5422	34.59	5434	38.57
Gender (Male=1)	5422	0.88	5434	0.93
Marital status	5422	0.75	5434	0.83
Safety net (yes=1)	5422	0.09	5434	0.17
Active days/month	5422	25.18	5434	21.99
Daily wage	5422	3.44	5434	1.96
Credit access	5422	0.14	5434	0.15
Household size	5422	5.21	5434	5.08
Dependency ratio	5422	2.35	5434	2.47
Electricity access	5422	0.49	5434	0.35

Additionally, we compare the descriptive statistics between farm and non-farm sector in Table 2. The comparative statistics reveal that 58% of non-farm workers are educated, while this proportion is only 42% in farm sector. Fifty-eight per cent non-farm workers belong to asset-rich households as opposed to 48% workers in the farm sector. It further appears that workers are relatively young in the non-farm sector, with an average age of roughly 35 years. They are also more active in a month and earn a higher wage (logarithmic). The male workers dominate employment in both sectors. Only 9% of non-farm workers receive benefit under the safety net program, while this share amongst farm workers was 17%. Moreover, nearly half the non-farm households have electricity compared to only 35% in the farm sector.

Finally, we check the correlation between the explanatory variables in our model. An association of 70% and above between explanatory variables could reduce the

precession level of the estimated parameters in a regression analysis (Tabachnick et al., 2007). We report the coefficient of correlation in Appendix. We observe that in all cases, the strength of associations between the independent variables were considerably less than 70%, thus ensuring the efficiency of the predictability of our models.

3.3 Models and Issues of Estimation

Our empirical strategy includes a univariate test followed by probit regression and hierarchical regression technique. We also perform a path analysis to find out the total and direct effects the household level asset could assert on non-farm participation, and indirect effect (via education) it could exert. Furthermore, we check the robustness of our model with a couple of sub-samples and a different estimation technique.

As far as the univariate test is concerned, we exploit the z-test to see if the percentages of educated individuals are significantly different between asset-rich and asset-poor households. Furthermore, we examine whether the proportion of asset-rich households and educated workers are significantly different between non-farm and farm sectors. Then, we estimate the following probit equation to test the association between household asset and individual education (H1).

$$M_i = a_1 + b_1 Y_i + b_2 N_i + V_1 \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Here, M_i is the education variable for individual$i$, Y_i is the asset variable for individual i's household, N_i is the vector includes all the individual, household and other controls and V_1 is the error term.

Next, we estimate a series of hierarchical regressions to find out if education mediated the relationship between household asset and non-farm participation. Here, we deploy the method suggested by Barron and Kenny (1986). According to them, three conditions must be satisfied to confirm the mediating role of a variable. First, the mediator (education) exerts a significant impact on the dependent variable (participation in non-farm). Second, the independent variable (household asset) affects the dependent variable (non-farm participation) significantly. Third, the effect of the mediator (education) on the outcome variable remains significant, but the impact of the independent variable (household asset) becomes weak and not significant. Here, the third model requires to be controlled by both the mediator (education) and independent variable (asset).

Hence, the hierarchical regression analysis involves the estimation of the following three models, namely, (2), (3) and (4) to test the mediation hypothesis (H2).

$$z_i = a_2 + b_3 M_i + b_4 N_i + V_2 \dots\dots\dots\dots\dots\dots\dots\dots (2)$$

$$z_i = a_3 + b_5 Y_i + b_6 N_i + V_3 \dots\dots\dots\dots\dots\dots\dots\dots (3)$$

$$z_i = a_4 + b_7 Y_i + b_8 M_i + b_9 N_i + V_4 \dots\dots\dots\dots\dots\dots\dots (4)$$

Here, variable z_i indicates individual$i$'s working status: either involved with non-farm or farm activity. The notations M_i and Y_i are mediator (education) and independent variables (household asset) respectively. We apply probit model to estimate equation(2), (3) and (4) because the outcome variables (z_i) in all three models are dichotomous (either working in the farm or non-farm sector).

4. Results and Discussions

4.1 Univariate Test

Table 3 presents the results of the z-test. It shows that majority of the workers (63%) from asset-rich households are educated, while only 37% of the workers are uneducated. The difference is highly significant ($p<0.01$). We also observe from the table that asset-rich households supply a significantly ($p<0.01$) high portion of non-farm workers (52%). At the same time, amongst the educated workforces, significantly ($p<0.01$) high numbers (58%) have taken up employment in the non-farm sector.

Table 3. Results from z-Test

Variables	*(1)Educated worker*	*(2) Not educated worker*	*Diff: (1) - (2)*	*P-value*
Asset-rich households	63%	37%	26%	0.000
Variables	*(1)Farm worker*	*(2) Non-farm worker*	*Diff: (1) - (2)*	*P-value*
Asset-rich households	48%	52%	-4%	0.000
Educated worker	42%	58%	-16%	0.000

4.2 Household Asset and Education: Evidence from Probit Regression

We test the first hypothesis by regressing individual education on the household asset. Table 4 summarizes the results. We report the marginal effects of probit estimation. The marginal impact of household asset suggests that keeping other variables constant if an individual belongs to an asset-rich household, he or she is 21% more likely to be educated than an individual from an asset-poor household. The coefficient is statistically significant at 1% level. Hence, we have evidence to support the first hypothesis that there is a positive association between household assets and

individual education. This finding is in line with the results in other literature (See, for example, Filmer and Pritchett, 2001).

It appears that physical assets may be translated into various benefits for households (Kafle et al., 2018), and one of the benefits perhaps took in the form of investment in education as more members of households might receive education. Asset endowment by a household lowers the opportunity cost of pursuing education by an individual from that household. In the rural context of a developing economy, physical assets like house, farmland, durable goods and other assets work as a base that provides security, money, information and transportation to get a relatively easy access to education. It is also evident that access to credit and electricity, and being a male exert a positive and significant impact on education. By contrast, getting married and taking benefits under safety net program significantly ($p<0.01$) reduce the likelihood of receiving education by 6.3% and 6.7% respectively.

Table 4: Marginal Effects from Probit Model (Dependent Variable: Educated individual=1)

Independent variables	*Marginal Effects*
Household rich in asset (=1)	0.210***
	(0.01)
Age	-0.007***
	(0.00)
Gender (male =1)	0.136***
	(0.02)
Marital status (married=1)	-0.063***
	(0.01)
Safety net (yes=1)	-0.067***
	(0.01)
Active days per month	0.005***
	(0.00)
Daily wage	-0.002
	(0.00)
Individual credit access (yes=1)	0.027**
	(0.01)
Household size	-0.000
	(0.00)
Dependency ratio	-0.003
	(0.00)

Electricity access (yes =1)	0.174***
	(0.01)
N	10,856
Pseudo R-square	0.1276

(**) (***) indicates statistical significance at 5% and 1% level respectively. Regional dummies were included, but not reported. Standard error in the parentheses.

4.3 The Mediating Role of Education: Evidence from Hierarchical Regression Analysis

Next, we run the hierarchical regressions (equation 2, 3 and 4) to find out the mediating role of education. Specifically, we are interested to see if the three conditions propagated by Barron and Kenny (1986) are satisfied. Table 5 summarizes the results.

Table 5. Hierarchical Regression (Marginal Effects from Probit Models; Dependent Variable: Participation in non-farm employment = 1)

Independent Variables	*(1) Marginal Effects*	*(2) Marginal Effects*	*(3) Marginal Effects*
Household rich in asset (=1)		0.029***	0.003
		(0.01)	(0.01)
Education (yes=1)	0.122***		0.121***
	(0.01)		(0.01)
Age	-0.003***	-0.004***	-0.003***
	(0.00)	(0.00)	(0.00)
Gender (male =1)	-0.178***	-0.160***	-0.178***
	(0.02)	(0.02)	(0.02)
Marital status (married=1)	0.020	0.011	0.020
	(0.01)	(0.01)	(0.01)
Safety net (yes=1)	-0.061***	-0.068***	-0.061***
	(0.01)	(0.01)	(0.01)
Active days per month	0.016***	0.017***	0.016***
	(0.00)	(0.00)	(0.00)
Daily wage	0.043***	0.042***	0.043***
	(0.00)	(0.00)	(0.00)
Individual credit access (yes=1)	0.023*	0.027**	0.023*
	(0.01)	(0.01)	(0.01)
Household size	-0.000	-0.001	-0.001
	(0.00)	(0.00)	(0.00)

Dependency ratio	-0.002	-0.002	-0.002
	(0.00)	(0.00)	(0.00)
Electricity access (yes=1)	0.088***	0.109***	0.087***
	(0.01)	(0.01)	(0.01)
N	10,856	10,856	10,856
Pseudo R-square	0.1614	0.1502	0.1614

(**) (***) indicates statistical significance at 5% and 1% level respectively. Regional dummies were included, but not reported. Standard error in the parentheses.

The findings reported in the first column indicate that the mediator or education significantly ($p<0.01$) influences a person's engagement with non-farm activity. An educated person, as other variables remain unchanged, is 12.2% more probable to join non-farm employment than a not educated person. It confirms the first condition of Baron and Kenny (1986) mediation analysis. This positive association is consistent with the findings from existing researches.

From column 2, we have evidence that satisfies the second condition of Barron and Kenny (1986) as physical asset holdings by a household have a significant (at 1% level) impact on non-farm involvement by an individual. Other things equal, a worker from an asset-rich household is 2.9% more likely to get engaged in the non-farm sector. This finding also supports past studies. The result underlines the need for capital to join the non-farm activity in a developing nation like Bangladesh. In such economies, lack of physical asset often impaired a movement into the high end of non-farm activities (Bezu and Barrett, 2012; Reardon et al., 2001). As such, people in developing nations are mostly engaged with the low end of jobs in this sector. Therefore, they found themselves trapped in a cycle of low income and poverty. Nevertheless, an individual belongs to a household rich in physical asset might get the capital to take up non-farm activity that yields a better return (Bezu and Barrett, 2012).

In the third column, we present the results of the third specification (equation 4), which was controlled for both mediator (education) and independent variable (asset). We observe that the mediator variable (education) still retains its positive and significant ($p<0.01$) impact on non-farm participation. On the other hand, the effect of household assets becomes relatively small in size (0.003) and statistically insignificant ($p>0.10$). All these have satisfied the third condition of mediation. Thus, we have evidence to support the claim made in the second hypothesis (H2) that

education mediated the positive link between household's asset endowment and individual's involvement in the non-farm sector. The results further suggest that more active workers, a high daily wage and access to electricity increased the likelihood to take up non-farm activities.

Next, we run a path analysis to find the total, direct and indirect effects of asset holdings on non-farm participation. Through path analysis, we decompose the total effect of asset holding into direct and indirect effects. Table 6 provides the overall results.

Table 6. Decomposition of the Total effect of Asset Holding on Non-Farm Participation

Effects	*Coefficient*	*Standard Error*	*P-value*	*Z-score*
Total	0.040715***	0.009	0	4.25
Direct	-0.0016927	0.009	0.863	-0.17
Indirect	.0424077***	0.003	0	14.38

The total effect of asset holding on non-farm employment is positive and statistically significant at 1% level. The direct effect of asset holding emerges as negative and not significant ($p>0.10$). However, the indirect effect of asset holding on non-farm participation turns positive and significant ($p<0.01$). It implies that asset holdings, via education, significantly impact an individual's participation in the non-farm sector. Therefore, the results from hierarchical regression and path analysis have confirmed the mediating role of education.

It implies that education pulled an individual from asset-rich household into non-farm sector. Asset holdings at household level would be likely to provide education for individuals, which consequently assisted them in finding employment in the rural job market. Members or individual with education can seek more information on non-farm employment and enjoy relative flexibility offers by this sector. An educated individual endowed with capital sourced from household assets might initiate entrepreneurial activities, such as opening up a business and service delivery or join salaried employment, which could reduce uncertainty and give a steady income.

4.5 Robustness Checking

Here, we have tested the robustness of our main results to a couple of sub-samples: male workers and married workers, and a different estimation technique: linear probability model. Table 7 reports the results of the robustness checks.

Table 7: Robustness Checking for Asset Effect on Education and Mediating role of Education

Independent variables	*(1) DV: Educated individual (0=not educated)*	*(2) DV:Take part in non-farm activity (=1)*	*(3) DV:Take part in non-farm activity (=1)*	*(4) DV:Take part in non-farm activity (=1)*
Panel A: Married workers (N=8,565)				
Asset	0.220***		0.020*	-0.005
Education		0.109***		0.110***
Panel B: Male workers (N=8,945)				
Asset	0.21***		0.036***	0.010
Education		0.122***		0.120***
Panel C: Linear Probability Model(N=10,856)				
Asset	0.22***		0.026***	0.000
Education		0.120***		0.120***

(*) (**) (***) indicates statistical significance at 10%, 5% and 1% level respectively. In all models, we included the individual, household and regional controls, but the parameter values are not reported. We also do not report the robust standard errors.

Table 7 includes three panels, namely, A, B, and C. Panel A and B present the findings for married and male sample, respectively. Panel C provides the results from the linear probability regression method. Marginal effects reported in Column one are related to the first hypothesis (effect of asset on education), while those reported in column two to four are related to the mediation hypothesis. The findings from the three panels are consistent with our main results as household assets increase the likelihood of getting education by around 21% to 22% ($p<0.01$). At the same time, education continues to play a mediating role in the positive relationship between household asset and non-farm participation (See, Table 7; column 2 to 4).

5. Conclusion

In recent years, the non-farm sector has assumed a lot of importance in Bangladesh. A number of push and pull factors influenced the individuals to get engaged with this sector. Physical asset and education, amongst other things, are the two critical elements. Asset, on the one hand, often supplies the much-needed capital for a rural individual to join non-farm activities. On the other hand, education not

only provides the skill, knowledge, and ability to take up such activities, but also develops the capacity to explore opportunities in the non-farm sector. As such, a plethora of studies mentioned that education had driven rural individual into non-farm employment.

In this article, we examined the role of education, as a mediator, in the positive relations between household asset holdings and participation in non-farm activities. Based on evidence from some past studies, we came up with the hypothesis that education would play a mediating role in the relationship between household asset and non-farm engagement. We also tested the hypothesis that asset would impact the education of an individual positively. Analyzing a large and nationally representative data of Bangladesh and by deploying the hierarchical regression technique, we confirmed the mediating role of education. We showed that asset holdings had exerted a positive influence on non-farm employment through education. In other words, we found that asset increases the probability of being educated, which subsequently lures the individual into non-farm activity. Our results further suggested that asset holdings were positively associated with education.

Most of the prior studies only looked into the partial impacts of asset and education on non-farm employment. Here we have explored a route (education) through which asset can boost up participation in non-farm employment. Therefore, the study has provided some new insights into the non-farm literature.

Our research also has some important policy implications. The study underscores the need for further investment by government and private sector in rural education infrastructure and educators to ensure seamless supply of quality education. Also, the government requires stressing on asset transfer program in rural areas because, as this study found, asset has a vital connection with education and rural employment. BRAC, the Bangladeshi NGO, has championed such program with "significant and long-lasting effects on poverty reduction" (Kafle et al., 2018). We reported (See, Table 4 and column 3 in Table 5) that vulnerable people under social safety net protection were less likely to receive education and take up non-farm employment. In this context, an effective asset transfer program could not only pull a significant number of rural poor from social safety net service of the government but also create an avenue for them to join the non-farm sector.

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Appendix: Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Working status	1.00												
(2) Education	0.16	1.00											
(3) Asset	0.04	0.26	1.00										
(4) Age (years)	-0.16	-0.20	0.06	1.00									
(5) Gender	-0.09	0.09	0.08	0.02	1.00								
(6) Marital status	-0.10	-0.14	-0.01	0.51	0.14	1.00							
(7) Safety net	-0.11	-0.12	-0.10	0.19	-0.04	0.10	1.00						
(8) Active days/month	0.26	0.09	0.07	-0.04	0.03	-0.03	-0.08	1.00					
(9) Daily wage	0.28	-0.01	-0.15	-0.18	-0.06	-0.12	-0.04	0.11	1.00				
(10) Credit access	-0.01	-0.02	-0.03	0.16	-0.04	0.15	0.02	-0.02	-0.07	1.00			
(11) Household size	0.03	0.08	0.23	-0.08	0.12	-0.02	-0.11	0.09	-0.06	-0.03	1.00		
(12) Dependency ratio	-0.04	-0.02	0.06	0.16	0.25	0.33	0.01	0.03	-0.09	0.09	0.32	1.00	
(13) Electricity access	0.14	0.23	0.31	0.03	0.05	0.03	-0.08	0.08	-0.02	0.01	0.08	0.04	1.00

*The co-efficient of correlations of the six regional dummies are not reported. The correlation coefficients amongst these six dummies are under 0.7.

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UTILIZATION OF REMITTANCE IN THE ECONOMIC DEVELOPMENT OF BANGLADESH: A STUDY ON THE POPULATION OF DHAKA CITY

Ayesha Akhter*

Abstract

Remittance is one of the most significant economic factors in Bangladesh as it affects the balance of payments of the country, foreign exchange reserves, national savings, reserve funds, supply of money, living standards and reduction of poverty. Earnings from remittances are rising day after day and are now the second largest source of foreign exchange earnings after exports. The study explores the significant factors and utilization of international remittance in Bangladesh by using primary data from 80 migrant households from Dhaka city. The study applies descriptive statistics to know about the variables & Z-test to prove the hypotheses. The estimated results find that household size, training, skill, years at abroad and earnings significantly affect international remittance in Bangladesh. The study also finds highest amount of remittance is utilized only in consumption of food purpose and most of the migrates do not have any training as a result they do not get good job.

Key Words: Remittance, Utilization of Remittance, Economic Development.

Introduction

As 'remittances' becomes a common concept for more and more politicians and social scientists, there are good reasons to pause to explore its meaning. When remittances are mentioned , what first comes to mind is usually the proportion of their earrings sent by migrant workers to their families in the country of origin. The classic image is that of a lone migrant worker who is back home helping his or her children, wife and parents. This is an essential part of the scenario, but there is a much wider array of transfers covered by remittance statistics and remittance discussions. With relation to the balance of payments figures, economists also describe remittances. (e.g. Ratha 2003).

The word Remittance originates from the word "remit" which means money/fund transmission. Remittance, in banking terms means the movement of funds from one place to another. If money is passed from one nation to another, it is called International Remittance.

A remittance is a transfer of money to a person in their home country by a foreign worker. Remittance refers to the funds that an expatriate sends via cable, mail or online transfer to his or her home country. For many of the countries that receive

* Assistant Professor, Department of Finance, Jagannath University Dhaka-1100

those, these peer-to-peer transfers of funds across borders are economically important.

Foreign remittance may be classified into two types Inward Foreign Remittance and Outward Foreign Remittance. Inward International Remittance applies to payments obtained from abroad. In other words, from the point of view of the recipient country, remittance coming into our country from other countries by the remitter through an approved banking channel through freely convertible foreign currencies is called 'Inward Foreign Remittance'. From the remitter's point of view, it is called outward Foreign Remittance. Outward remittance of funds conducted by D.D. T.T., T.T. etc. Along with the application, the remitter must deposit money containing the name and address of the currency name of the payee etc. All outward remittances must cover the transactions authorized by the Bangladesh Bank.

Remittance has contributed little to remittance-receiving economies' economic growth and may have slowed growth in some (Barajan, Chami, Fulenkamp, Gpen, montiel, IMF working paper, WP/09/153). Stahl and Arnold (1986) claim that because of their potential multiplier effect, the use of remittances for consumption may have a positive effect on growth. A 10% rise in remittances has resulted in a 0.3% increase in GDP per capita income (Bichaka Fayissa, The Impact of Remittance on Economic Growth and Development in Africa, Feb. 2008)

Since most of the remittance debate has been framed in terms of whether or not they are good for growth, researchers have tried to find the proper solution to this issue. (reviews by Ghosh 2006, de Haas 2005, Kapur 2004). The overall impact of remittances on quantifiable variables such as poverty and inequality can be calculated through econometric modeling through countries and time periods. The finding of the most detailed analysis of this type is that a 10 percent rise in official foreign remittances per capita would lead to a 3.5 percent decrease in the proportion of people living in poverty on average (Adams and Page 2005). This is a strong outcome that can illustrate the ability of remittances as an attention grabber. However, considering its political significance, such a global coefficient can be roughly as analytically useful as a person's average comfort with her head in the oven and her feet in the freezer. This is not only a matter of remittances being 'good' in some places and 'poor' others but that they are inconsistent and nuanced in their incorporation into development processes. For example, remittance inflows can carry many people in a given community out of poverty, but at the same time strengthen an environment of apathy and waiting that dominates society at the micro-level (e.g. Halstead 2002, Richman 2005).

By making them cheaper, safer and more efficient for both migrant sending and receiving nations, the development community will further enhance the effect of remittance flows for development. The 'International Remittances Agenda' will

include the following: better data and monitoring, reducing prices, connecting remittances to household-level financial access, leveraging remittances for capital market access at the institutional or macro level.(Dilip Ratga, MPI no.8, Sep 2013).

Objective of the study

The objective of this study is:

1. To know the professional information and migration process of migrators who provide remittances.
2. To know about the utilization of remittance and the significant relation between utilization of remittance in several sources and remittance earnings.

Literature Review

Remittance is widely considered to be one of the main sources of foreign income for developing countries such as Bangladesh. There is a controversy on the domestic effects of international remittances, although a lot of research has worked to ascertain the connection between remittances and economic growth. Various studies have shown that remittance fosters economic development through remittance investment. Glytos (2005) proposed that remittances could cause more capital goods to be imported, which could help lift the growth rate. On the contrary, Stahl and Arhold in 1986 claimed that remittances could have a negative effect on domestic economic development. Oberoi and Singh claimed in 1980 that an excessive degree of capital intensity in the agricultural sector would have a negative effect on growth if remittances were used for conspicuous consumption or unproductivity. The study also noted that the issue of moral hazard between remitters and recipients may arise if recipients become highly dependent on the easy cash that causes them to reduce labor market participation. Remittances have an adverse impact on economic development (Barajas et al. 2009, and Chami, fullenkamp and Jahjah, 2003).

Chami et al. done on large number of studies based on panel-data, covering a number of countries in 2003. This research also found that remittances have negative on growth in the study on 113 countries. There is no statistical correlation between remittances and per capita income growth, as the International Monetary Fund studied 101 developing countries in 2005. On the other hand, in their study of 39 developing countries from 1980 to 2004, Pradhan, Upadhyay and Upadhyaya found a positive effect on growth in 2008. In the year 2006, Ziesemer claimed that remittances rise savings, which upsurge investment by declining interest rates and also increase the literacy rate.

A few studies have been done to identify the effect of foreign remittances on Bangladesh's economic growth. Stahl and Habib claimed in 1989 that a multiplier effect of remittances exists. They also mentioned that remittance increase savings,

which can boost economic growth. For the 1976-1988 period, they further calculated the multiplier for Bangladesh. Mahmud claimed in 2003 that remittances promote growth in Bangladesh, and Siddique also claimed in 2004 that remittances could increase Bangladesh's economic growth. A long-run positive relationship between remittances and GDP was found by Paul and Das (2011) . Rahman et al. (2006) and Rahman (2009) concludes that remittances tend to have negligible and ambiguous impact on the GDP of Bangladesh. In Bangladesh, Siddique, Selvanathan and Selvanathan (2010) also find that remittance growth does not lead to economic growth.

A large number of research studies on migration and remittance have been carried out in different activities, but these do not cover all dimensions of migration and the use of foreign remittance. Murshid et al 2003 has suggested a study title "utilization of remittance at the household level and socioeconomic conditions of returns of migrants. The impact of the remittance at the community level and the Bangladesh diaspora belongs to the UN research topic.

Giuliano and Ruiz-Arranz (2005) conducted a study with International Monetary Fund (IMF) on the impact of remittance to growth. 100 countries data was analyzed in that study. Besides that a research on remittances and economic growth in major South Asian countries (i.e., Bangladesh, India and Sri Lanka) was conducted in 2012 by Siddique, Selvanathan and Selvanathan. By using the Granger causality test under a Vector Auto Regression (VAR) system using time series data over a 25-year period from 1980-2005, this paper investigated the causal relation between remittances and economic development. The empirical paper identified the mixed response of remittances to economic development. The study finds that in the case of Bangladesh and India, there is no causal correlation between remittances and economic development. For Sri Lanka, however there is a two-way causal relationship between remittances and economic development.

In 11 leading remittance-recipient developing countries, including Bangladesh, Das and Chowdhury (2011) explored that there exists a long-term relationship between remittances and GDP. They applied latest developed econometric techniques, i.e., panel co- integration and pooled mean group (PMG) approach. The findings support a positive long-term relationship between GDP and remittances. However the remittance-GDP coefficient's magnitude is very small. Their outcome also indicates that developed countries should develop policies aimed at redirecting this external resource into more productive sectors.

Research Methodology

The purposes of the study are to identify the significant sectors of utilization of international remittance in Bangladesh by collecting primary data through questionnaire survey from 80 migrant households of Dhaka city. This study applies

descriptive statistical test to know the basic features & summaries of the dataset and Z test to know the sample value is in the critical areas or not to prove the hypotheses of this study. The study has used MS Excel to conduct all of these tests. In this regard, the study analyzes data through frequency and percentage, and the results are presented in tabular form. The two-tailed z-test is used as a hypothesis test in which the z-statistic follows a normal distribution along with critical range. The study used z-test rather than t-test because the sample is greater than 30 and under the central limit theorem: as the number of samples gets larger, the samples are considered to be approximately normally distributed.

Analysis and Findings:
Frequency Table

Table: 1.1 Based on Personal Information

Characteristics	Categories	Frequency	Percentage
AGE	Less Than 25	12	15.00%
	25-30	22	27.50%
	35-45	35	43.75%
	More Than 45	11	13.75%
GENDER	Male	69	86.25%
	Female	11	13.75%
EDUCATION LEVEL	Class 1 to Class 5	4	5.00%
	Class 6 to Class 10	18	22.50%
	Class 11 to Class 12	24	30.00%
	Graduation	15	22.50%
	Post-Graduation or above	19	23.75%
MARITAL STATUS	Unmarried	28	35.00%
	Married	49	61.25%
	Divorced	2	2.50%
	Widow	1	1.25%
HOUSEHOLD SIZE	1 to 3	19	23.75%
	4 to 6	56	70.00%
	7 to 9	5	6.25%

This table shows that most of the migrants are middle aged (35-45) and male, and a few numbers of female are going to abroad for livelihood. Educational qualification of most of the migrants is low which is between class11 to class 12. 61% of the migrants are married, and their household size is about 4 to 6.

Based on Professional Information

Table: 1.2

Characteristics	Categories	Frequency	Percentage
SKILL	Unskilled	29	36.25%
	Semi-Skilled	16	20.00%
	Skilled	15	18.75%
	Professional	20	25.00%
TRAINING	Yes	33	41.25%
	No	47	58.75%
REGION OF MIGRATION	Asian	12	15.00%
	Middle-East	35	43.75%
	African	1	1.25%
	European	17	21.25%
	American	15	18.75%
YEAR STRYED IN ABROAD	Less than 4 years	27	33.75%
	4 years to 8 years	28	35.00%
	8 years to 12 years	17	21.25%
	More than 12 years	8	10.00%
EARNINGS	Less Than 30,000	2	2.50%
	30,000 to 5,0000	12	15.00%
	50,000 to 80,000	19	23.75%
	80,000 to 1,00,000	18	22.50%
	More than 1,00,000	29	36.25%

REMITTANCE TRANSFER CHANNEL	Bank	58	72.50%
	Western Union	7	8.75%
	Money Gram	5	6.25%
	Bkash	7	8.75%
	Any unfair way	3	3.75%

This table provides some information about the migrant who are staying abroad and send their earnings to their household. This information shows that very little number of migrants go to abroad with skills and most of them are not properly trained. 43.75% of the migrant staying in Middle-East country from the 80 people and 21% are living in Europe. 36.25% migrants earn more than BDT 1, 00,000 and using Bank as a remittance-transferring channel.

Based on Utilization of Remittance
Table: 1.3

Characteristics	Categories	Frequency	Percentage
FOOD	Less than 5000	6	7.50%
	5001 to 10,000	25	31.25%
	10,001 to 15,000	23	28.75%
	15,001 to 20,000	20	25.00%
	More than 20,000	6	7.50%
NON FOOD	Less than 5000	26	32.50%
	5001 to 10,000	28	35.00%
	10,001 to 15,000	18	22.50%
	15,001 to 20,000	8	10.00%
HOUSING	Less than 5000	24	30.00%
	5001 to 10,000	18	22.50%
	10,001 to 15,000	18	22.50%
	15,001 to 20,000	10	12.50%
	More than 20,000	10	12.50%
DURABLE GOODS	Less than 5000	15	18.75%
	5001 to 10,000	33	41.25%
	10,001 to 15,000	12	15.00%
	15,001 to 20,000	14	17.50%
	More than 20,000	6	7.50%

MEDICAL	Less than 5000	40	50.00%
	5001 to 10,000	24	30.00%
	10,001 to 15,000	11	13.75%
	15,001 to 20,000	2	2.50%
	More than 20,000	3	3.75%
EDUCATION	Less than 5000	30	37.50%
	5001 to 10,000	21	26.25%
	10,001 to 15,000	11	13.75%
	15,001 to 20,000	7	8.75%
	More than 20,000	11	13.75%
INVESTMENT	Yes	7	8.75%
	No	73	91.25%
SAVINGS	Less than 5000	11	13.75%
	5001 to 10,000	19	23.75%
	10,001 to 15,000	17	21.25%
	15,001 to 20,000	15	18.75%
	More than 20,000	18	22.50%
SOCIAL WELFARE	YES	43	53.75%
	NO	37	46.25%
PLACE OF CONTRIBUTION	School	6	7.50%
	Religious Organization	14	17.50%
	Social Organization	5	10.00%
	Helpless People	17	21.25%
	Others	1	1.25%
RANGE OF CONTRIBUTION	Less than 5000	18 (From 43 people)	42.00%
	5001 to 10,000	17 (From 43 people)	40.00%
	10,001 to 15,000	7 (From 43 people)	16.00%
	15,001 to 20,000	1 (From 43 people)	2.00%

Table 1.3 shows that 31.25% migrants utilize BDT 5001-10000 of their remittance as food consumption. Most of the households 28 out of 80 utilize BDT 5001-10000 to nonfood consumption. Besides, that most of the households housing utilization is less than 5000, that means they have their own house rather than rented house and most of their expenditures on durable goods are between BDT 5001-10000, which provides an abnormal indication of hiding actual utilization of remittance as durable expenditures. Most of the household utilize less than BDT 5000 for medical and education purposes. 23.75% households saves their excess amount of the remittance amount BDT 5001-1000 and only 22.50% which is 18 person out of 80 save their excess amount of remittance more than BDT 20,000. It is very alarming that only 8.75% households utilize their remittance as new investment. 43 persons out of 80 contribute to the social welfare that is good indication and most of them contribute to 'Helpless People' of the society.

Based on Migration Process

Table: 1.4

Characteristics	Categories	Frequency	Percentage
CAUSE OF MIGRATION	Escaping from unemployment	15	18.75%
	Escaping from Poverty	11	13.75%
	Searching for better life	28	35.00%
	More earnings	20	25.00%
	Others	6	7.50%
MEDIUM OF MIGRATION	Broker	28	35.00%
	Privet Agencies	39	48.75%
	Government	5	6.25%
	Others	8	10.00%
LOAN ACCEPTANCE	YES	42	52.50%
	NO	38	47.50%
LOAN RANGE	Less than 1,00,000	5 (From 42)	12%
	1,00,000 to 2,00,000	12 (From 42)	28%
	More than 2,00,000	25 (From 42)	60%

SOURCE OF LOAN	Relative	19 (From 42)	45.00%
	Friend	2 (From 42)	5.00%
	Bank	7 (From 42)	17.00%
	NBFI	3 (From 42)	7.00%
	Local Lender	11 (From 42)	26.00%

Most of the migrants about 35% which is 28 persons out of 80 leaved their country for searching a better life and most of them used private agencies for migration process. 52.50% migrants out of 42 person took loan for migration and most of them which is 45% used their relative as the source of fund to face migration cost and rest are used their own fund for migration.

Z test Result

As I am concerned about the utilization of our foreign remittance so I have taken null hypothesis as there is a no relationship between earnings and the utilization of commodities and services. The alternate hypothesis states that there is a relationship between earnings and utilization of commodities and services.

Ho: There is no relationship between earnings and utilization remittance.

H1: There is a relationship between earnings and utilization remittance.

Based on Earning and Food utilization

	Earnings	Food
Mean	3.75	2.9375
Known Variance	1.38	1.17
Observations	80	80
Hypothesized Mean		
Difference	0	
Z	1.741	
P (one-tailed):		
Left Tailed (Z < z)	0.9591582	
Right Tailed P (Z > z)	0.0408418	
P (two-tailed) 2P (Z > |z|)	0.0816836	

Two-tailed examined that is there any relation between earnings and food utilization. The study has found, there is a significant relationship of food utilization with earnings at 10% level of significance. One tailed test found the relationship is positive at 5% level of significance.

Based on Earning and Education utilization

	Earnings	Education
Mean	3.75	2.35
Known Variance	1.38	1.17
Observations	80	80
Hypothesized Mean		
Difference	0	
Z	1.891	
P (one-tailed):		
Left Tailed (Z < z)	0.9706878	
Right Tailed P (Z > z)	0.0293122	
P (two-tailed) 2P (Z > |z|)	0.0586243	

Two-tailed examined is there any relationship between expenditure for education and earnings. The study has found, there is a significant relationship of expenditure for education with earnings at 10% level of significance. One tailed test found the relationship is positive, because the sample mean is significantly greater than the population mean.

Based on Earning and Savings utilization

	Earnings	Savings
Mean	3.75	3.125
Known Variance	1.38	1.88
Observations	80	80
Hypothesized Mean		
Difference	0	
Z	2.154	
P (one-tailed):		
Left Tailed (Z < z)	0.9843799	

Right Tailed P (Z > z)	0.0156201
P (two-tailed) 2P (Z > |z|)	0.0312402

Two-tailed examined is there any relation of savings with earnings. The study has found that the sample mean is at the critical range at 5% level of significance. So, we reject null hypothesis, and there is relation between them. One tailed test found the relationship is positive, because the sample mean is significantly greater than the population mean.

Based on Earning and Medical utilization

	Earnings	Medical
Mean	3.75	1.8
Known Variance	1.38	1.05
Observations	80	80
Hypothesized Mean		
Difference	0	
Z	4.111	
P (one-tailed):		
Left Tailed (Z < z)	0.9999803	
Right Tailed P (Z > z)	0.0000196	
P (two-tailed) 2P (Z > |z|)	0.0000394	

Two-tailed examined is there any relation of expenditure for medical with earnings. The study has found, the sample mean is at the critical range at 5% level of significance and that indicated, there is relation between them. It is found by right-tailed of one-tailed test that the relationship is positive, because the sample value is in the critical range of right side in the normal distribution.

Based on Earning and Non-Food utilization

	Earnings	Non-food
Mean	3.75	2.1
Known Variance	1.38	1.87
Observations	80	80

Hypothesized Mean	
Difference	0
Z	4.535
P (one-tailed):	
Left Tailed (Z < z)	0.9999971
Right Tailed P (Z > z)	0.0000028
P (two-tailed) 2P (Z > |z|)	0.0000057

The two-tailed test examined is there any relation of expenditure for non-food with earnings. The study has found significant relationship between them, because the sample mean is at the critical range at 5% level of significance and the one tailed test found that the relationship is positive.

Based on Earning and Durable goods utilization

	Earnings	Durable Goods
Mean	3.75	2.5375
Known Variance	1.38	1.87
Observations	80	80
Hypothesized Mean		
Difference	0	
Z	3.891	
P (one-tailed):		
Left Tailed (Z < z)	0.9999501	
Right Tailed P (Z > z)	0.0000499	
P (two-tailed) 2P (Z > |z|)	0.0000998	

Two-tailed examined is there any relation of expenditure for durable goods with earnings. The study has found, the significant relationship of durable goods utilization with earnings at 5% level of significance. One tailed test found the relationship is positive.

Based on Earning and Investments

	Earnings	Investment
Mean	3.75	1.911392405
Known Variance	1.38	0.08
Observations	80	79

Hypothesized Mean Difference	0
Z	2.913
P (one-tailed):	
Left Tailed (Z < z)	0.9982101
Right Tailed P (Z > z)	0.0017899
P (two-tailed) 2P (Z > |z|)	0.0035797

The two-tailed test examined, there is relation of expenditure for investments with earnings. From the table it is found that the sample mean is at the critical range of the normal distribution at 5% level of significance. One tailed test shows that the relationship is positive.

So, it is clearly seen that in all cases the z value exceeds the critical value. So the null hypothesis is rejected and alternate hypothesis accepted which states that there is a relationship between earnings and utilization.

Recommendations

This paper "Utilization of Remittance in the Economic Development of Bangladesh: A Study on the Population of Dhaka City", has laid some groundwork which will open the window for further research. This study was based on primary data. Primary data always present the realistic scenario. The result will be more representative if the observation will be more because this study has used only seven variables are considered to show the relationship between remittance and its utilization. So , the future research should consider more observation and variables to get more ideas related to remittance earnings.

Conclusion

Remittance inflows contribute more towards the economic growth of Bangladesh. By increasing the availability of foreign exchange reserves, the proper use of remittances can also boost socio-economic development. Since most people are less educated, some steps should be taken by government to make accessible information related to migration that will speed up their productivity and increase the level of earnings. The study has found that very few households utilize remittance for investment purposes like business, savings and real estate, which could create new employment and income earning opportunities. That is, to get proper benefit from remittance, households have to be encouraged to spend it on productive purposes.

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Appendix

Questionnaire

Personal Information:

1. Age

i) less than25 ii) 25-35

iii) 35-45 iv) more than 45

2. Gender

i) Male ii) Female

3. Level of Education

i) Primary (class 1to 5)

ii) Secondary (class 6 to 10)

iii) Higher Secondary (11 to 12)

iv) Graduation

v) post-graduation or above

4. Marital status

I) Unmarried ii) Married iii) Divorced iv) Widow

5. Household size (No. of family member)

i) 1 to 3 ii) 4 to 6

iii) 7 to 9 iv) 10 or above

Professional Information of Migrant

1. Does he/she has any skill?

i) Unskilled ii) Semi skilled

iii) Skilled iv) Professional

2. Does he/she has any training?

i) Yes ii) No

3. What is the region of Migration?

i. Asian countries

ii. Middle-East Countries

iii. African Countries

iv. European Countries

v. American Countries

4. Years of staying at abroad

i. Less Than 4 Years

ii. 4 Years to 8 Years

iii. 8 Years to 12 Years

iv. More than 12 Years

5. Monthly Earnings

i. Less than 30000
ii. 30000 to 50000
iii. 50000 to 80000
iv. 80000 to 100000
v. More than 100000

6. Remittance Transferring Channel

i) Bank
ii) Western Union
iii) Money Gram
iv) Bkash
v) Any Unfair way

Migration Process:

1. Causes of Migration

i. Escaping from unemployment
ii. Escaping from Poverty
iii. Searching for better life
iv. More earnings
v. Others

2. What is the medium of migration?

i. Broker
ii. Privet agencies
iii. Government
iv. Others

3. Did he/she take loan for migration?

i. Yes ii. No

4. If yes then what is the range of loan amount?

i. Less than 100000
ii. 100000 -200000
iii. Above 200000

5. Source of loan

i. Relative ii. Friend iii. Bank iv. NBFI v. Local Lender

Utilization of remittance

1. Food-

i) Less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

2. Non-Food

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

3. Housing

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

4. Durable goods

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

5. Medical treatment

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

6. Education

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

7. Investment

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000

8. Savings

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) More than 20000

9. Any contribution to social welfare

i) Yes ii) No

10. Place of contribution

i) School ii) Religious Organization
iii) Social Organization iv) Helpless people
v) Others

11. Contribution amount

i) less than 5000 ii) 5001-10000
iii) 10001-15000 iv) 15001-20000
v) Above 20000.

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DETERMINANTS OF FINANCIAL PERFORMANCE OF SELECTED COMMERCIAL BANKS IN BANGLADESH: AN ECONOMETRIC FOCUS

Dr. Md Shakawat Hossain*

Abstract:

The present study attempts to identify the major determinants of the financial performance of four selected commercial banks. This study is based on mainly secondary data i.e. the publication of sample commercial banks like annul reports & other official reports. Purposive sample is followed for the inclusion of sample commercial banks. Data covers ten years operational information of the commercial banks is collected mainly from their Annual reports. Two hypotheses are tested following multi co-relation, regression, ANOVA test. Both the hypotheses are accepted based on r-values, r^2 and adjusted r^2. Concluding remarks are that major determinants of financial reporting are deposit mobilization, volume of classification loans, disbursement of loans and advances & equity volume of the sample commercial banks. The degree of correlations might be different among the sample banks still variances are found within 74% to 98%. Prudent use of working fund is needed to minimize classified Loans and develop more recovery or increasing profit & Equity growth of commercial banks. There is also urgency for controlling cost of funds using prudent fund asset practices, effective project appraised & credit worthiness of borrowers, good monitoring & supervision during post loan period, controlling diversion of fund & motivating the entrepreneurs towards the social responsibility are needed for sustainable development banking in Bangladesh. Bank management authority should develop strategic planning & control of fund management to stand in financial market in Bangladesh.

Background of the study

Commercial bank in Bangladesh plays vital character in developing our industrial advancement through providing various forms of industrial finance, foreign exchange activities, agriculture-finance and some other development activities in our capital market. These banks have been playing an important role in the economic development of Bangladesh. They provide investible funds to both the public sector, and specially the private sector (Barkat 2019).After liberation of Bangladesh the then commercial bank were nationalized through establishing Sonali bank, Janata bank, Rupali bank and Uttara bank. In 1993 public banks and Uttara bank were nationalized. After that about 45 commercial banks were established in the private sector. There is strict competition among the various state-owned commercial banks, private bank and foreign commercial banks working in our economy. For the survival

* Associate Professor, Department of Accounting & Information Systems, Jagannath University, Dhaka.

of our banking sectors we need productive use of banking funds through appropriate project appraisal, monitoring of supervision, compliance of regulatory framework, good use of ethical code of conducts, developing corporate governance of activities, prevention of misuse of fund, cost–austerity adoption of corporate social responsibility activities and some other value added effects. Financial performance of specialized commercial banking or developing of financial institutions like BDBL, BKB, RAKIB and BASIC banks etc is also questionable (Sultan-2014). In this context, a thorough study on the extent on threats and challenges on the way of functioning of our commercial banks strongly is needed for the achievement of sustainable development of goal of economy.

Objectives:

The main objective of the study is to focus the basic indicators of financial performance in the context of selected commercial banks in Bangladesh.

Specific objectives are as follows:

1. To assess the various components of financial performance like earning, loan disbursement activities, deposits mobilizations, stuck of advances of commercial banks during five years 2008-2017
2. To identify the major factors influencing the financial success and failure of commercial banks during the period.
3. To provide guidelines for developing financial solvency of commercial banks based on major findings and observations.

Methodology:

Sample of the study:

Sample of the study for four commercial banks like Sonali bank, Agrani Bank (State owned) UCB Ltd and Dutch-Bangla Bank Ltd (private commercial bank) selected on the basis purposive sampling method. Mainly secondary data are collected from the annual reports & others publication of commercial banks covering the period from 2008-2017.Techniques of analysis follow mainly multiple correlation, regression & ANOVA for testing of the two selected hypotheses.

Need for the study:

Banking sector of Bangladesh contributes a lot in financing the different economic activities through deposit mobilization, providing loan & advances, issuing debt securities for fund raising, investing the working fund in different assets (Fama 1980).Banks are to bear relevant costs for managing their liabilities and generate

earnings from their investments (Syeed et.al 2012)). Determination of financial performance might be both internal and external comprising strength and weakness factors and opportunity and threats. Practically internal factors might be controllable in different tiers of management factors beyond absolute control of management. Various studies done on performance of commercial banks in Bangladesh have mentioned multi-dimensional factors leading to unhealthy financial performance of our commercial banks. This study will try to identify the major indicators of financial performance along with their controllability by way of sincere attention of management authority and other stakeholders.

Review of Earlier research

- Abedin et al studied 29 listed commercial banks having 10 years operational information Altman Z score is used to predict the tendency towards bank ruptcy. Findings are that increase in capital adequacy ratio & efficiency in the banking sector prevents the way towards bank ruptcy, although non-performing loans and increase age had adverse effects.
- Saha & Nabila studied that 21 private commercial banks covering data for a period of 2009-2016.They found that non-conventional banks are in better position. Future financial distress is predicted using Z score based on testing of specific hypotheses. They suggested for better control of Bangladesh banks through strict monitoring & supervision of the sample Banks.
- Harun & Moniruzzman narrated that the services under on line banking are branch free transaction, fund transfer, bank statement, paying utility bills, checking account balances etc.420 customers are interviewed through a structural questionnaire. Factors behind satisfaction are secured transactions, service quarterly & physically facilities, accuracy, speedy service, Eage of use, more convenient etc. Grievances are found due to technical problem, high services change, less convening less secured etc.
- Hossain etal found that poor technology, improper policy, lack of environmental awareness, green Human Resources Management policy etc had adverse effect on earnings of commercial banks in Bangladesh. They also suggested for developing green attitude of employees & customers providing need based training following green code of conduct to prevent the unusual stuck up advantages & high cost of funds.
- Ali Noor etal found that financial performance of the banks as measured by profitability & productivity revels that there is co-integration among the various indicators, classified loan has negative impact on ROI, ROA & ROE.

- Karim & Mitra narrated the green banking practices of 30 listed banks for 2011-2015, showing 2 selected variables .They found that most of the banks comply with green banking policy and online banking; lowest compliance is in annual report verifications, green quarter report, website disclosure, climatic change fund, education & training to customers etc.
- Halim & Khalid (2016) found that Islamic Banks are financially stronger than conventional banks as because size & operational efficiency leads to the stability. Practically Islamic banking has good financial soundness inspite of differences among the various units.
- Ahsanullah & et.al (2014) observed that bank specific variables like net profit margin loan loss Reserve to terms loan, loan to assets, Equity to asset significantly influenced the earnings of Islamic banks although size of bank carries insignificant influence .Virtually degree of inflation negatively influenced the earnings but growth of GDP bears insignificant & negative impact on their earnings.
- Habib (2015) asserted the idea that private sector banks had topmost performance followed by specialized banks public sector banks & foreign banks respectively. More total assets, fixed assets, operational assets & equity are not enough for increasing financial performance in practices.
- Antown et.at (2014) used financial performance index following CAMEL ratios. They found that asset quality and earnings of the banks are negatively affected by size & positively influenced by business mix & degree of inflation. Capital adequacy and liquidity are negatively influenced by size and positively influenced by concentration of bank & economic growth.

Hypotheses:

Considering the relevant studies following hypotheses are formulated:

1. There is a positive correction between earnings & volume of loan disbursement & classified loans of commercial banks in Bangladesh.
2. There is a positive relation between earnings & deposit volume & equity capital of commercial banks.

Testing of hypotheses:

Multiple correlation and regression results indicate that in Sonali bank 89% of variance in profit is due to variance in independent variance like deposit volume, classified loan, Loans & advances & Equity volume. In Agrani bank 88% of variance of profit is due to same reasons. In UCB 74% variances are influenced by the

selected variable while in Dutch bangla bank Ltd 98% of variances are for the similar reasons. So both the hypotheses are accepted based on r values, r^2, adjusted r^2 etc.

Findings & observations:

$BE = \alpha + \beta_1 BD + \beta_2 BLA + \beta_3 BCL + \beta_4 BEQ + Ei$
α = Intercept or constant value
βn = Co-efficient of predictive values
BE = Bank Earning
BD = Bank Deposit
BLA = Bank Loans and Advances
BCL = Bank Classified Loans
BEQ = Bank Equity
Ei = Error term or residual value

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.941[a]	.886	.794	300.48206

a. Predictors: (Constant), EQUITY, CLAS_LOAN, LOAN_ADV, DEPOSIT

The model summary provides the R, R^2, adjusted R^2, and the standard error of the estimate, which can be used to determine how well a regression model, fits the data. The value of R represents the multiple correlation coefficients. It is seen from the table that the value of R equals .941 indicates a highly good level of prediction and highly model fit of the data set. The R^2 value represents the coefficient of determination which is the proportion of variance in the profit that can be explained by the four independent variables which means that about 89% of the variance in the profit can be accounted for by a variation in the four independent variables. In other words, all the four independent variables jointly influence the profit.

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4226532.444	4	10555633.111	9.690	.014[b]
	Residual	545909.156	5	10893181.831		
	Total	47692441.600	9			
a. Dependent Variable: profit						
b. Predictors: (Constant), EQUITY, CLAS_LOAN, LOAN_ADV, DEPOSIT						

The F-ratio in the ANOVA table also tests whether the regression model is a fit for the data. The table shows that the four independent variables significantly predict the dependent variable, F (4, 5) = 9.690, p < .0005 (i.e., the regression model is a good fit of the data).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5114.326	1203.785		3.395	.019
	DEPOSIT	.070	.017	2.405	4.236	.008
	CLAS_LOAN	.141	.065	.551	2.166	.083
	LOAN_ADV	.188	.043	1.541	4.369	.007
	EQUITY	.534	.293	.701	1.821	.128

a. Dependent Variable: profit

By considering standardized coefficient beta value and t value, the more the value, the better the relative importance of the factors. It is clearly shown from the table that loan and advances is the most contributing factor which holds standardized beta value 1.541 which is the highest with t value 4.369, followed by deposit bearing value 2.405, classified loans and equity .551..701 respectively.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.937[a]	.878	.780	3155.29282

a. Predictors: (Constant), EQUITY, LOAN_ADV, CLAS_LOAN, DEPOSIT

It is seen from the table that the value of R equals .937 indicates a highly good level of prediction and highly model fit of the data set. The R^2 value represents the coefficient of determination which is the proportion of variance in the profit that can be explained by the four independent variables which means that about 88% of the variance in the profit can be accounted for by a variation in the four independent variables. In other words, all the four independent variables jointly influence the profit.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	357353326.187	4	89338331.547	8.973	.017[b]
	Residual	49779363.813	5	9955872.763		
	Total	407132690.000	9			

a. Dependent Variable: profit

b. Predictors: (Constant), EQUITY, LOAN_ADV, CLAS_LOAN, DEPOSIT

The F-ratio in the ANOVA table also tests whether the regression model is a good fit for the data. The table shows that the four independent variables significantly predict the dependent variable, $F(4, 5) = 8.973$, $p < .0005$ (i.e., the regression model is a good fit of the data)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4817.372	2872.790		1.677	.154
	DEPOSIT	.091	.021	1.825	4.306	.008
	CLAS_LOAN	.504	.102	1.401	4.931	.004
	LOAN_ADV	.036	.017	.465	2.067	.094
	EQUITY	.256	.154	.569	1.662	.157

a. Dependent Variable: profit

It is clearly shown from the table that deposit is the most contributing factor which holds standardized beta value 1.825 which is the highest with t value 4.306, followed by classified loan bearing value 1.40, loans and advances and equity .465, .569 respectively.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.860[a]	.739	.530	737.58946

a. Predictors: (Constant), EQUITY, CLAS_LOAN, DEPOSIT, LOAN_ADV

It is seen from the table that the value of R equals .860 indicates a highly good level of prediction and highly model fit of the data set. The R^2 value represents the coefficient of determination which is the proportion of variance in the profit that can be explained by the four independent variables which means that about 74% of the variance in the profit can be accounted for by a variation in the four independent variables. In other words, all the four independent variables jointly influence the profit

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7705284.965	4	1926321.241	13.541	.009[b]
	Residual	2720191.035	5	544038.207		
	Total	10425476.000	9			

a. Dependent Variable: profit

b. Predictors: (Constant), EQUITY, CLAS_LOAN, DEPOSIT, LOAN_ADV

The F-ratio in the ANOVA table also tests whether the regression model is a fit for the data. The table shows that the four independent variables statistically significantly predict the dependent variable, $F(4, 5) = 13.541$, $p < .0005$ (i.e., the regression model is a good fit of the data.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	770.710	890.465		.866	.042
	DEPOSIT	.021	.042	1.435	-.497	.064
	CLAS_LOAN	.184	.147	1.000	1.254	.002
	LOAN_ADV	.030	.045	1.973	.680	.005
	EQUITY	.132	.159	1.050	.834	.442

a. Dependent Variable: profit

It is clearly shown from the table that deposit is the most contributing factor which holds standardized beta value 1.973 which t value .680, followed by classified loan bearing value 1.254, loan & advances and equity .680, .834 respectively.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.989[a]	.977	.959	128.17652

a. Predictors: (Constant), EQUITY, LOAN_ADV, CLAS_LOAN, DEPOSIT

It is seen from the table that the value of R equals .989 indicates a highly good level of prediction and highly model fit of the data set. The R^2 value represents the coefficient of determination which is the proportion of variance in the profit that can be explained by the four independent variables which means that about 98% of the variance in the profit can be accounted for by a variation in the four independent variables. In other words, all the four independent variables jointly influence the profit.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3514120.293	4	878530.073	53.474	.000[b]
	Residual	82146.107	5	16429.221		
	Total	3596266.400	9			

a. Dependent Variable: profit

b. Predictors: (Constant), EQUITY, LOAN_ADV, CLAS_LOAN, DEPOSIT

The F-ratio in the ANOVA table also tests whether the regression model is a fit for the data. The table shows that the four independent variables significantly predict the dependent variable, $F(4, 5) = 53.474$, $p < .0005$ (i.e., the regression model is a good fit of the data)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2144.278	492.914		-4.350	.007
	DEPOSIT	.010	.006	.971	1.701	.150
	CLAS_LOAN	.465	.080	2.275	5.830	.002
	LOAN_ADV	.010	.005	.607	1.752	.140
	EQUITY	.443	.108	2.484	4.104	.009

a. Dependent Variable: profit

It is clearly shown from the table that equity is the most contributing factor which holds standardized beta value 2.484 which t value 5.830, followed by classified loan bearing value 2.275, deposits and loans and advances.

Conclusions:

From the above analysis and interpretation of selected variables it can be concluded that all the four independent variables jointly influence the earning of commercial banks. Practically in sonali bank loan & advances is the most contributory factor followed by deposit volume, classified loans & Equity position respectively. In Agrani bank deposit volume is the most influencing factor backed by classified loan, Loans & Advances and equity volume. In UCB similar relations are found but in Dutch Bangla bank Ltd Equity volume is the most influencing factor accompanied by classified loan, deposit volume, loans & advance respectively. However in all the sample banks basic determinants of changes in earning are more or less restricted within the four independent variables as explained in model summary.

Policy implifications:

Bank management should try to control classified loans & advances through increasing recovery of Loans & Advances; prudent sanctioning of Loans & Advances based on extensive project appraisal modules following consistent etc commercial feasibility, financial feasibility, technical, marketing and economic feasibility. Deposit mobilization activities should also be organized to control cost of fund. Generation of more equity might be possible through increasing operating & non-operating income of the sample banks through reducing cost of fund & productive uses of fund. There is also needed for good monitoring & supervision of advances, uses of MIS reports through modern information technology. Customers' awareness & counseling are also needed to develop good customer relation. Bench marking technique might be followed to know the internal strength and weakness, external opportunity and challenges thereon on the way of achieving sustainable development in Bangladesh.

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RESEARCH METHODS EMPLOYED IN INVESTIGATING APPLICATIONS AND IMPACT OF INTERNET OF THINGS (IOT) AND ARTIFICIAL INTELLIGENCE (AI) IN COMMERCIAL SUPPLY CHAIN MANAGEMENT (SCM)

Md. Mahathy Hasan Jewel*

Abstract:

Artificial Intelligence (AI) and Internet of Things (IoT) are increasingly becoming popular across all disciplines of business. Supply Chain Management (SCM) is of exception to this regard. This article tries to explore the research methods used in previous research in investigating application and impact of IoT and AI in commercial SCM. The present study consists of five (05) segments, where the first segment briefed introduction embarking research methodology; the second segment present literature review with a set of review procedures articulated; the third segment states a brief analysis about the research methods used in the reviewed literatures along with evaluation from the stipulated authors/researchers, the fourth segment displays the key research findings and the final segment discuss the conclusion of the study.

Key words: Research Methods, Artificial Intelligence, Internet of Things, SCM

Introduction:

Proper understating of research methodology is a key to successful accomplishment of research projects that delivers valuable outcomes for businesses around the world. Research methodology provides the key strategic directions or ways through which data can be collected and analysed to find out the answers of the formulated research questions in conducting any research (Malik et al., 2019; Tsang et al., 2018). A comprehensive research methodology includes the description of methods of data collection (quantitative), sample size, sampling technique, distribution of sample for the survey, methods of data collection (qualitative), focus group discussions (FGDs), in-depth interview (IDIs), key informant interview (KIIs), structure and guideline for FGD, KII and IDI, transcript analysis, detailed survey questionnaire, data recording and validation techniques, other important research elements, training method of the field staffs, ethical considerations, quality control mechanism and data analysis tools and techniques (Stentoft and Rajkumar, 2018; Cannella et al., 2018; Blossey, Eisenhardt and Hahn, 2019; Tu, Lim and Yang, 2018; Aich, Sain and Chakraborty, 2019).

* Associate Professor, Department of Marketing, Jagannath Universaity, Dhaka.

Objectives:

The main objective of this research is to find out research methods employed in investigating applications and impact of IoT and AI in commercial supply chain Management (SCM). Others objectives are to evaluate research methodology used in this aspects.

Methodology:

In order to the review conducted for this research to be effective and precise, a set of techniques and procedures were determined and finalised beforehand for inclusion and exclusion of literatures. As this is a type of systematic review (Daya, Hassini and Bahroun, 2019; Fiorini and Jabbour, 2017; Baryannis et al., 2019;) of existing literature in the field, only published peer reviewed journal articles were taken into consideration which were predominantly searched and taken from Google Scholar. Only the downloadable pdf versions of the searched materials written in English language with full content access have been reviewed which must include at least one research methodology as the study required comprehensive analysis of the methodology used in that paper.

Searching were conducted using two levels of keywords combined conjunctively with the word 'and', where the first level denoted the search context which is Supply Chain Management (SCM) and the second level denoted the prime factors of consideration; such as use, application, impact, effect, artificial intelligence (AI), internet of things (IoT), research method and methodology (Birkel and Hartmann, 2019; Baryannis et al., 2019; Blossey, Eisenhardt and Hahn, 2019). As application of IoT and AI in SCM is comparatively a new phenomenon, only the recent (2016 and later) articles were searched. Earlier literature were only considered and searched for validation if those were cited in any of the reviewed literature. (Baryannis et al., 2018; Soleimani, 2018). To make this more comprehensive and rewarding three search techniques were followed, namely (a) backwards snowballing which means checking the list of references from the chosen prominent literatures, (b) screening the table of contents from recent volume of the most prominent journals of business management, SCM and science & technology, and finally (c) comparison and cross check the screened literature with previous literature reviews on the field. In this regard, the earliest reviewed study was published in 2013, so the time period of this literature review can be stated as 'from 2012 up to and including April 2020. In this regard, the reviewed literatures can be summarised in the following table:

Description	Number
Literature Downloaded	103
Discarded Literatures	45
Considered for Primary Review	58

Figure 1: Inclusion-Exclusion Summary

Literature review:

SCM denotes the idea that comprises of all the activities from planning phase to the execution phase of procurement, manufacturing and distribution of tangible business commodities with a special focus on coordination and collaboration with stakeholders outside of the institution such as suppliers, customers and other concerned parties (Naskar, Basu and Sen, 2020). However, Min et al. (2019) argued that SCM not only focused on delivery anymore and became a customer-focused management discipline which serves as a strategic competency and sources of competitive advantage for the business (Min et al. 2019). This enhanced understanding of SCM prompts all SCM practitioners to reconsider their stances and reshape their perceptions about the managerial tools and means and the way to measuring SC performance (Müller et al., 2019; Hiromoto, Haney and Vakanski, 2017; Senders et al, 2019).

Industry 4.0 is on the move and new technologies such as AI and IoT are affecting the business environment in broad-spectrum and supply chains in specific which is likely to mould the future of SCM in the coming years (Bell and Griffis 2011; Klumpp and Zijm 2019). IoT and AI have been taken seriously by the world's top corporations in their SCM conduct as both can be used as a conjunction of the information floating in the virtual world and users of this information in the real world scenarios such as the SC participants (Chen, Xia, and Wang, 2010; Kawsar, Kortuem, and Altakrouri, 2010). In recent years SCs are heavily dependent on smart technologies such as sensors, electronic tags, trackers, and other smart devices which serve as dispensers of real-time information to all the concerned and connected parties (Maniyaka et al., 2017).

No.	Techniques of AI and IoT adoption in SCM
1	Techniques that rely on some form of mathematical optimisation.
2	Network-based approaches that represent problems as sets of possible states and transitions among them.
3	Methodologies that adopt agent-based modelling and multi-agent system interactions.
4	Approaches that involve some form of automated reasoning based on existing knowledge and
5	Machine learning and big data analytics techniques
These can lead to risk-aware automated supplier selection, information dissemination modelling in a supply network, identification and prediction of deceptive supply chain practices, data-driven explanation of resilience and end-to-end decision support to facilitate collaborative disruption management.	

Figure 2: Techniques of AI and IoT Adoption in SCM (Yan et al., 2018; Tu, 2018)

This technology-enabled progression has brought new opportunities for the SCM, however, it's not entirely exempted from posing new challenges too (Porter & Heppelmann, 2014). Contrasting views are prevailing in the SCM practitioners as well as academic researchers about how to effectively leverage these technologies in SCM applications and performances, how to measure the effectiveness of its usage or how to quantify performance measures, and how it can assist the decision making in the existing SCM paradigm (Waller and Fawcett, 2014).

Research areas which are dominating the investigation of applications and impact of IoT and AI in commercial SCM arena are demand management, sourcing, transportation, manufacturing and operations with some of these combined in order to get more comprehensive insights about the ideas pertaining to overall SCM (Goldsby et al. 2019; Singh and Challa, 2016; Radanliev, 2019). These essential predictive insights can be generated by utilising the models and tools that fall within the wider range of IoT and AI (Baryannis et al., 2019). However, research methodologies used to investigate the applications and impact of IoT and AI in commercial SCM in theses diverse areas are more or less the same, which includes literature review, case studies, qualitative approach covering conceptualization of theories and empirical studies; and, quantitative methods such as statistics, mathematical optimisation and simulation (Ghadge, Dani, and Kalawsky 2012; Parry et al., 2016; Sahu and Nayak, 2017; Carbone et al., 2018; Tu, Lim and Yang, 2018; Tsang et al., 2018; Nawaz, Janjua and Hussain, 2019; Eyob and Eyob, 2019). Nevertheless, Yan et al. (2018), and adopted game theory as a research method.

Analysis, Discussion and Evaluation of Research Methodologies:

Most of the reviewed literatures about investigating applications and impact of IoT and AI in commercial supply chain management have either utilised a systematic literature review, or a mixed research method. The systematic reviews as well as narrative review (although meagre) were used to understand the existing research questions and the research gaps in this field. However, in the mixed method, qualitative approach predominantly utilised to understand the underlying motivational factors of the adoption or intention of adopting AI and IoT in SCM (Boeck and Wamba, 2008; Fisher and Monahan, 2008; Hellström, 2008; Tu, 2017). For instance, Boeck and Wamba (2008) utilised qualitative method, including participant observation, action research and the grounded theory (GT) when conducted a research on radio frequency identification (RFID) adoption in a retail industry supply chain. Qualitative approach can assist to gain insights about core perception of the business regarding the probable benefits, use capacity and boundary of using AI and IoT as well as the level of efficiency in supply chain management if these technologies are used. (Boeck and Wamba, 2008, Radanliev, 2017; Hartmann, 2018; Malik et al., 2019;).

Despite this usefulness of the qualitative method, the quantitative approach is the primary research method used in the mixed method discipline (Tu, 2018, Haddud, et al., 2017; Singh and Challa, 2016). Case study as a dominant research method was also seen (Parry et al., 2016; 2017; Wakenshaw et al., 2017; Kaurin and Kilibarda, 2018; Aich, Sain and Chakraborty, 2019) and user framework and modelling for AI and IoT adoption was also a dominant theme for some researcher like Rezaei, Shirazi and Karimi (2017), Wang et al. (2018), Laxmi and Mishra (2018), Tu, Lim and Yang(2018), Müller et al.(2019) and Duan, Xiu and Yao (2019). However, the mixed method is becoming more popular as this enables the researchers to use a mixture of several methods such as qualitative, qualitative, case studies, literature reviews and consultative process which could generate more precise and comprehensive insights about the researched area (Baryannis et al., 2018).

Each research method used in a mixed method approach has its own pros and cons and these methods combine different methods to complement each other in a positive way. For instance, to examine the complex and interrelated factors affecting the adoption of IoT in logistics and SCM (Tu , 2018; Tu, Lim and Yang; 2018 and Tsang et al, 2018) had utilised a mixed research method which was actually a sequential mixed method proposed by Venkatesh et al. (2013). A sequential mixed method design strategy involves conducting a qualitative survey consisting of focus group discussions (FGDs) and in-depth interviews (IDIs) with the top-level management personnel to understand and identify the core factors first; then a theoretical framework is developed for explaining the interrelations of this identified

factors and finally a quantitative research is conducted on a big representative sample to verify and validate the theoretical framework and transcript ideas into knowledge (Venkatesh et al., 2013).

Researches in SCM build models to explain the underlying factors impacting the SC and their interrelations. The diffusion of innovations (DOI) theory proposed by Rogers Everett (1995) and the technology-organization-environment (TOE) framework proposed by Tornatzky and Fleischer (1990) are the two popular theory for hypotheses development which is a useful tool to investigate the application and impact of new technologies such as AI and IoT in organisations (Sarkar and Oberoi, 2019; Birkel and Hartmann, 2019). Another research instrument is data triangulation which as used by the Lovelace et al. (2016) which helps to acquire data from multiple sources and then processed in a manner that best serves the research purpose. This technique provides an opportunity to cross validate the data sources and discard or grounded the inappropriate data to get an accurate picture for polished prediction (Senders et al., 2019). Reconciling qualitative and qualitative findings can be done effectively by grounded theory (GT); however, using GT in literature review is a matter of controversy for some researchers (Van Rensburg and Ukpere, 2014).

Interdisciplinary research is another important area of concern for some researchers in SCM, especially for those who study sustainability in SC operations related to new technology; which includes using large data sets, employing mixed or multiple methodologies and formulate research team from multiple disciplines (Ketter et al. 2016). Boyer and Swink (2008) argued that a holistic or comprehensive understanding of application and impact of AI and IoT in SCM requires employing multiple methodological approaches (Canuel et al., 2017). This means employing a range of methods such as case studies, data mining and visualizations, analytical, empirical, and computational methods.

Findings:

From the literature review, it becomes evident that most of the studies were conducted by literature review or framework/model designing or a mixed method. Literature review was predominantly systematic with some use of bibliometric analysis. Use of both inductive and deductive research methods were visible, however, deductive approach seems the dominating theme in this regard which signifies testing an existing theory rather than building or developing a new theory or framework. In designing and evaluating model or framework only a few literature were focused on analysing the suitability of the proposed models or frameworks. Although almost all of the studies contain some sort of knowledge or insights, however, most of the literature show a limited scope to be used as a reference point for practical decision making for the SCM managers whether to adopt AI and IoT or not and whether this adoption would be cost-effective for the company in the short and long run or not, which shows a limited ability to answer ‘whether’ and ‘how’ in

regards to AI and IoT utilisation in SCM. This can be the most valuable aspect for future research directions. Mixed method seems to be the most promising methodology used in this regard which combines qualitative insights with verifiable facts obtained from quantitative surveys in order to provide a holistic notion of the sought values. Nevertheless, discussion about quality control mechanism and ethical considerations were almost non-existent.

Methodology type		Number of Literature	Authors
Case Studies		06	Kesharwani, Sarkar and Oberoi, 2019; Kaurin and Kilibarda, 2018; Wakenshaw et al., 2017; Aich, Sain and Chakraborty, 2019; Carbone et al., 2018; Parry et al., 2016.
Framework and Modelling		15	Chen, 2019; Benčić, Skočir and Žarko, 2019; Abdel-Basset, Manogaran and Mohamed, 2018; Müller et al., 2019; Hiromoto, Haney and Vakanski, 2017; Laxmi and Mishra, 2018; Rezaei, Shirazi and Karimi, 2017; Tu, Lim and Yang, 2018; Tu, Lim and Yang, 2018; Nawaz, Janjua and Hussain, 2019; Duan, Xiu and Yao, 2019; Dasaklis, Casino and Patsakis, 2019; Alzoubi, 2018; Zhong, Xu and Wang, 2017; Wang et al., 2018.
Literature Review	Systematic	17	Daya, Hassini and Bahroun, 2019; Fiorini and Jabbour, 2017; Baryannis et al., 2019; Garrido-Hidalgo et al., 2019; Eyob and Eyob, 2019; Blossey, Eisenhardt and Hahn, 2019; Baryannis et al., 2018; Soleimani, 2018; Manavalan and Jayakrishna, 2018; Mishra ,2016; Min, 2010; Liao et al., 2018; Shah and Ververi, 2018; Dubey et al., 2017; Birkel and Hartmann, 2019; Baryannis et al., 2019; Sanders et al., 2019;
	Narrative	04	Rejeb, Keogh and Treiblmaier, 2019; Dash et al., 2019; Cannella et al., 2018; Marjani et al., 2017.
Mixed Method (Qualitative, Quantitative, Case study, Literature review, Grounded theory, Framework and Modelling)		15	Zhao and Qian, 2017; Li et al., 2017; Malik et al., 2019; Tsang et al., 2018; Tu, Lim and Yang, 2018; Tu, 2017; Stentoft and Rajkumar, 2018; Sahu and Nayak, 2017; Rupasinghe, 2017; Radanliev, 2017; Hartmann, 2018; Haddud, et al., 2017; Singh and Challa, 2016; Radanliev, 2019; Radanliev, 2019.
Game Theory		01	Yan et al., 2018

Figure 3: Summary of Major/Broader Findings.

Concluding Remark:

Although methodological approach varies, almost all the literatures used common methodologies found in other researches of this kind. However, the selection of research method was based on the appropriateness of the context and sought values which are subject to the ability and choice of the researchers. Although usage of IoT in SCM is on sharp rise; impact of AI and IoT in SC operations in terms of quantifying measures in SCM research is still in a very early stage; however, AI (big data, machine learning and associated analytical techniques) has not yet been

made any significant impact in the field of SCM research, despite its high potential (Waller and Fawcett 2014; Choi, Wallace, and Wang 2018).

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CAPITAL STRUCTURE AND FIRMS' PERFORMANCE: EVIDENCE FROM MANUFACTURING SECTOR OF BANGLADESH

Roushanara Islam[1], Md. Maruf-Ul-Alam[2]

Abstract:

This paper aims to construct a study on detecting capital structure influence on firm's performance in Bangladesh. The study has used a panel dataset of 41 manufacturing firms from 2013 to 2019 to know about the impact of long-term and short-term debt financing on performance measurement tools: Return on Assets (ROA), Return on Equity (ROE). The preliminary examination supports the fixed effects regression model and finds both long-term debt financing and short-term debt financing negatively affect firms' performance. On the contrary, firm-specific variables: firm size, firm age, and firm efficiency have a positive impact on performance. Further, the study discloses manufacturing firms' tendency to finance debt more from the short-term source than the long-term one. The study implies that appropriate capital combinations for manufacturing firms' are essential to maximizing their performance, ultimately improving the capital market's efficiency.

Keywords: Capital Structure, Debt Financing, Optimal Capital Structure, Fixed Effects Model, Manufacturing Firm, Bangladesh.

JEL Classification: *C23; G30; G32.*

1. Introduction

The capital structure is the composition of a firm's debt and equity instruments. The combination of preferred stock, common stock, and debt is considered permanent long-term financing (Van Horne and Wachowicz, 2005; Besley and Brigham, 2008). The optimal proportion of long-term funding varies based on economic and firm-specific factors.

However, the optimal combination of the capital structure depends on the availability of financing sources and the firm's individual preferences. The preferred level of capital structure mix, directly associated with return and risk, impacts the firm's value maximization. So, managers should carefully select financing sources and combinations of these funding sources because they directly influence firm performance and survival (Chinaemeren and Anthony, 2012). On the contrary, an ineffective decision has increased financing costs and ultimately negatively impacted its performance.

[1] Assistant Professor, Department of Finance, Jagannath University, Dhaka.

[2] Bachelor of Business Administration, Alumnus, Department of Finance, Jagannath University, Dhaka.

Though the capital structure is the combination of financing from different sources, it is always regarded to finance from the best sources with the best options, which is the desirable capital structure (Ghalibafasl, 2005). So, the proportion of capital structure components differs from firms to firms, and managers must set the best combination for their firms. Some theories also support the dependency of performance on capital structure decisions. Modigliani and Miller (MM) Theory, Agency Theory, Trade-off Theory, and Pecking Order Theory are the most significant among those theories.

Modigliani and Miller (1958) indicated that the value of unlevered firm is equal to the value of levered firm. There is no relation between performance and capital structure decisions under some assumptions like the world of perfect markets, no transaction costs for raising money, no taxation, and also the disclosure of all informations. Because of these assumptions' inconveniency, Modigliani and Miller (1963) have given another theory considering the tax factor. They found that unlevered firm's value is less than the value of levered firm's; the difference amount is the return from tax-shield created from the cost of debt financing. According to Kraus and Litzenberger (1973), founders of the classical version of trade-off theory, the levered firm's market value is equal to the unlevered firm's market value plus the levered firm's tax shield created from interest payments due to debt financing minus the cost of that debt financing. This theory indicates the optimal capital structure built from the tax shield advantages and the bankruptcy costs of debt financing. Scott (1977) specified optimal capital structure is the level where, for extra funding amount of leverage, the marginal rise of bankruptcy costs is equal to the marginal increase of tax shield benefits. This concept is known as trade-off theory. Jensen and Meckling (1976) have discussed managers and shareholders' role in agency theory. The owners employ managers to maximize the shareholder's wealth and firm's value. But conflicts will happen if managers work for their personal goals instead of the owner's interest.

Afterward, Jensen (1986) talked about the free cash flow theory issues. In this theory, the author indicates that managers usually invest in unnecessary or less profitable projects because of their interest rather than shareholders', and this behavior creates agency conflict. Debt financing can reduce agency costs or agency conflicts because it requires scheduled payments, and firms must pay those at a specific time. So, managers have to invest the free cash flows in profitable projects and generate significant cash inflows for debt financing scheduled payments. As a result, debt financing used a disciplinary tool to ensure its welfare. On the other side, Myers and Majluf (1984) have talked about the pecking order of financing decision making, and this order is known as Pecking Order Theory. Because of information asymmetry among investors, shareholders, and managers, companies must finance from internal sources first, then fund from borrowed capital, and at last, they may go

for equity financing by selling shares to shareholders. There are no transaction costs, no flotation costs, and no need to maintain the balance of funding from internal sources. That is why funding from internal sources is always preferable. But those situations are applicable for external financing, so there is a negative relationship between profitability and external financing sources.

In corporate finance, capital structure theories and their relationship with firms' performance have been debatable. Some ideas suggested using debt as a primary source of financing because it creates tax advantage, consequently increasing income. But debt makes riskiness because debt must be payback and creates interest expenses. However, firms do not have to pay back the lending amount in equity financing. Still, it cannot generate tax benefits because the dividend is not tax-deductible, and equity financing dilutes the existing stockholder's ownership. Debt and equity financing both have positive and negative sides, and that is why it creates confusion that these sources impact the firm's performance and firm's future value. That is why firms should determine the relationship between performance and capital structure sources. If there is no relationship, firms do not consider which source is good or bad. Still, if there is a relationship, firms must carefully consider these sources and determine the optimal capital structure considering the different proportion of capital sources where the performance is encouraging. In optimal range, firms can maximize the future value and can minimize the cost of capital. So, this study's main objective is to determine the impact of capital structure on a firm's performance.

2. Literature review

The combination of financing from different sources like preferred stock, debt instrument, and common stock is called capital structure. From Modigliani and Miller (MM) pioneer work, many literature pieces developed to reveal the relationship between capital structure and firm performance and identify the optimal capital structure, the debt-equity ratio, that maximizes firms' profitability. The empirical study considered the return on assets, return on equity, Tobin's q ratio, profit margin, earning per share, return on sales, the market value per share, operating return, return on investment capital and return on capital employed as firm's performance measurement tools. On the other hand, as control variables, several studies used firm size, age, growth rate, efficiency or assets turnover, sales, liquidity, growth potential, ownership structure, asset tangibility, risk or beta, tax rate, cash flow. Researchers used long-term debt ratio, short-term debt ratio, total debt ratio, debt equity ratio, or total equity ratio as a proxy for the capital structure variables.

2.1 Empirical Evidence

From MM's pioneer model to today, capital structure is essential in corporate finance study. The evaluation of capital structure impact on firm performance by different researchers considered in this section. Firstly, the relation between firm performance and other variables and later study findings based on its locations.

Performance and Capital Structure

The capital structure measurement tool can be the Long-term Debt Ratio (LTDR) or Short-Term Debt Ratio (STDR). From the perspective of Return on Asset (ROA); Ebaid (2009), Salim and Yadav (2012); Dawar (2014), Zeitun and Tian (2014), Cole, Yan and Hemley (2015) and Nwude, Itiri, Agbadua, and Udeh (2016) studies found negative relation with LTDR. Besides Ebaid (2009), Khan (2012), Salim and Yadav (2012), Dawar (2014), Zeitun and Tian (2014), and Nwude, Itiri, Agbadua, and Udeh (2016) studies found negative relation with STDR.

In the case of Return on Equity (ROE), as a proxy of performance, Ebaid (2009), Khan (2012), Salim and Yadav (2012); Dawar (2014), Javed, Younas, and Imran (2014) studies found negative relation with LTDR and Salim and Yadav (2012), Dawar (2014), Le and Phan (2017) literature support the negative association with STDR. Ebaid (2009) and Le and Phan (2017) also found a positive relation between STDR and ROE.

Performance and Firm Size

The positive relation between ROA and firm's size is supported by the literature of Simerly and Li (2000), King and Santor (2008), Fazlzadeh, Hendi and Mahboubi (2011), Pouraghajan, Malekian, Emamgholipour, Lotfollahpour and Bagheri (2012), Salim and Yadav (2012), Dawar (2014), Zeitun and Tian (2014), Vithessonthi and Tongurai (2015), Nwude, Itiri, Agbadua and Udeh (2016). On the other hand, negative relation was found in Cuong and Canh (2012) and Wahba (2014).

Moreover, firm size has a positive impact on ROE also based on the study of Khan (2012), Muritala (2012), Pouraghajan, Malekian, Emamgholipour, Lotfollahpour, and Bagheri (2012), Salim and Yadav (2012), Dawar (2014), MA, (2015).

Performance and Firm Age

Firm's age has a positive influence on ROA found in King and Santor (2008), Wahba (2014), Chadha and Sharma (2015), Nwude, Itiri, Agbadua, and Udeh (2016), and the negative effect found in Dawar (2014), Vithessonthi and Tongurai (2015). On the contrary, based on ROE, the negative influence is seen in the Dawar (2014) study and the positive impact in the Muritala (2012) study.

Performance and Efficiency

Muritala (2012), Pouraghajan, Malekian, Emamgholipour, Lotfollahpour and Bagheri (2012), Javed, Younas and Imran (2014), Chadha and Sharma (2015) study found the positive impact of efficiency on firm performance.

Performance and capital structure from Asian context

Fazlzadeh, Hendi, and Mahboubi (2011) have used the fixed effect method on 137 Tehran stock exchange-listed firms from six different sectors from 2001 to 2006 to determine the impact of ownership concentration (CR), institutional ownership concentration (INSH), and institutional ownership (INS), Natural logarithm of total asset (LNA), risk (beta), business cycle (IVA), leverage, liquidity (CUR) and equity to asset ratio (EAR) on performance measurement tools: ordinary income to total assets ratio (OIA), net income to total assets ratio (NIA). The study has found a significant negative impact of INHS and IVA on firm's performance and a significant positive effect of INSH, CUR, beta, EAR, LNA on firm's performance. Khan (2012) has used STDTA, LTDTA, TDTA, the logarithm of total assets (LNTA) as independent variables, ROA, ROE, GM, and Tobin's Q dependent variables. The study used 36 engineering companies from Karachi Stock Exchange-listed in Pakistan from 2003 to 2009. The study found significant negative relation of STDTA, TDTA with ROA; STDTA, LTDTA TDTA with ROE; STDTA, TDTA with GM; STDTA, TDTA, LNTA with Tobin's Q and significant positive relation of LNTA with ROE; LTDTA with GM and Tobin's Q ratio. Salim and Yadav (2012) have used the OLS regression method to recognize the effect of long-term debt (LTD), short term debt (STD), total debt (TD), growth (as independent variables), and size (as control variable) on performance measurement tools: EPS, ROE, Tobin s Q, and ROA. They used Bursa Malaysia Stock Exchange-listed 237 companies from 1995 to 2011 from six sectors (construction, consumer product, industrial product, plantation, property, trading, and service) in Malaysia.

Dawar (2014) has used 100 Indian companies from several sectors from the Bombay Stock Exchange (BSE) from 2003 to 2012. The study used the fixed effect regression method. The study used independent variables: LTD (long-term debt to total assets), STD (short-term debt to total assets), age, size, sales growth, liquidity, tangibility, ADV (Advertising, distribution, and marketing expenses to total operating expenses), and dependent variables: ROE, ROA. The study found LTD, STD, and age have significant negative impact and tangibility, size, liquidity significant positive impact on ROA and ROE. Zeitun and Tian (2014) have used 167 Amman Stock Exchange (ASE) listed firms in Jordan from 16 different sectors from 1989 to 2003. They used three regression methods: Pooled OLS method, Fixed effects model, Random effects to determine the impact of STDTA (short-term debt to

total assets), LTDTA (long-term debt to total assets), TDTA (total debt to total assets), TDTE (total debt to total equity), size, growth, tangibility, tax, STDVCF (the standard deviation of cash flow for the last three years) on ROA, Profitability, MBVR (market value of equity to book value of equity) and Tobin's Q ratio.

Vithessonthi and Tongurai (2015) have used three categories of firms in Thailand from 2007 to 2009, where the subsamples are: (1) the international and domestic firms, (2) the large and small firms, and (3) the large domestic, small domestic, sizeable global firm and small international firms. The study's finding was leverage has a negative effect on domestic firms but a positive impact on multinational firms. The firm's size will moderate the effect of leverage on its performance. If a firm's size is large (the firm is international or domestic), then the effect of leverage is substantially larger than small firms. Chadha and Sharma (2015) have used 422 Bombay Stock Exchange (BSE) listed manufacturing companies from India from 2004 to 2013. They used fixed effect regression method to know the impact of firms' size, financial leverage (D/E), firm age, tangibility, sales growth, asset turnover, and ownership structure on performance measurement tools ROA, Tobin's Q ratio, and ROE. The study has found some significant relationships: tangibility negative, firm age positive, asset turnover positive, ownership positive, sales growth positive on ROA; debt-equity negative, tangibility positive, sales growth positive on ROE; size negative, firm age positive, tangibility positive on Tobin's Q ratio.

To determine the effect of Debt Ratio (DR) on performance measurement tools ROE, ROA, EPS; Nassar (2016) has used multivariate regression analysis on Istanbul Stock Exchange (ISE) listed 136 Turkish industrial companies from 2005 to 2012. The study found that the debt ratio has an inverse influence on ROA, ROE, and EPS. Le and Phan (2017) used Vietnam Stock Market listed non-financial firms from 2007 to 2012. They used liquidity, risk, growth, investment, profitability, total debt to book value of total assets (TLEV), cash flow, dividend, and total debt to the market value of total assets (MTLEV) as independent variables to determine the effect on performance measurement tools: Tobin's Q, ROE, and ROA. The results indicate that all debt ratios significantly negatively affect the firm performance tools. They used OLS, Fixed Effects, Random Effects, and two-step GMM estimator regression methods in their study.

Chowdhury and Chowdhury (2010) have used 77 manufacturing companies from the engineering, food, pharmaceutical and chemical, fuel, and power sectors in Bangladesh and found that the long-term debt ratio does not influence performance. They used fixed effect regression model for their study.

Hossain (2016) has used 81 DSE listed manufacturing companies from 2002 to 2014 and used STDR, LTDR, TDR as capital structure tools, ROA, and ROE as performance measurement tools. The study used a panel corrected standard error

regression model and found total debt ratio (TDR) has a significant negative effect on ROA and ROE. The study also found a significant negative impact of STDR on ROA and a positive impact on ROE. The research does not see any considerable influence of LTDR on performance.

Imtiaz, Mahmud and Mallik (2016) used a panel dataset on eight pharmaceutical companies from 2009 to 2013. The study found a significant negative relation between debt ratio and profitability.

Hossain (2016) has used 106 Dhaka Stock Exchange listed manufacturing firms (2008-2011). The study used ROA, ROS (return on sales) as dependent variables and Debt Ratio (DR), Debt to Equity Ratio (DER), Current Debt Ratio (CDR), Current Assets Proprietors' Funds Ratio (CAPFR), Proprietary of Equity Ratio (PER), Total Sales (TS), Total Assets (TA), Liquidity (LIQ) and Age as independent variables. The study's multiple regression model concluded a significant negative impact of debt ratio on ROA and ROE.

Siddik, Kabiraj and Joghee (2017) have used a panel dataset from 2005 to 2014 of 22 banks listed in Dhaka Stock Exchange (DSE). The study used ROA, ROE, EPS as dependent variables and TDTA, STDTA, LTDTA, liquidity, size, growth opportunity, economic growth, and inflation as independent variables. LTDTA and STDTA have a significant negative impact on ROA, ROE, and EPS. TDTA has a significant negative effect on ROE, ROA but a significant positive impact on EPS.

Moreover, the analysis of Rahman, Sarker and Uddin (2019) also found a significant negative relation between debt to equity ratio with ROA, ROE, and EPS; and a positive association between ROA and debt to equity ratio from the fixed effect regression model. The study considered 10 DSE listed manufacturing companies from 2013 to 2017 to influence capital structure on performance.

Performance and capital structure from African context

Ebaid (2009) has used the ordinary least square method on 64 firms from both financial and non-financial industry in Egypt from the period 1997 to 2005 to determine the impact of total debt, short-term debt, long-term debt, the firm size on performance measurement tools: ROE, ROA, and GM (Gross profit Margin). The study has found significant negative relation of total debt, short-term debt, and long-term debt with ROA, a significant negative impact of long-term debt, and a significant positive effect of short-term-term debt on ROE.

Wahba (2014) has used 50 firms from several sectors in Egyptian Exchange (EGX) listed firms in Egypt from the period 2008 to 2010 to determine the impact of ownership (managerial ownership, institutional ownership, private ownership, state ownership), total debt ratio, age, size, liquidity, tangibility on ROA, Tobin's Q. The

finding of that study was: Private ownership has a significant negative effect on ROA, but total debt ratio, managerial ownership, and age have a positive impact on ROA; total debt ratio and managerial ownership have a positive impact on Tobin's Q ratio. Nwude, Itiri, Agbadua and Udeh (2016) have found a significant negative effect of debt ratio on ROA but a positive impact of size and age on ROA. They took 43 firms listed in Nigerian Stock Exchange from 2001 to 2012 and used Pooled OLS method, Fixed effects model, Random effects method to determine the impact of size, age STDR, LTDR, TDTR on ROA.

Performance and capital structure from Australian context

Clarke, Seng and Whiting (2011) have used 2161 firms from 2003 to 2008 listed in the Australian Stock Exchange. The study used intellectual capital like capital employed efficiency, value-added intellectual coefficient, structural capital efficiency, and human capital efficiency to determine firm's performance. The research found a significant positive relationship between leverage and performance. On the other hand, Skopljak and Luo (2012) have used 23 Australian banks and financial institutions from 2005 to 2007. The study found that leverage (Debt/Total assets) positively impacts performance. But the study found no significant relation of firm's size with performance.

The study of Fauzi and Locke (2012) used 79 New Zealand Stock Exchange (NZX) listed firms from 2007 to 2011. The analysis wanted to know the ownership and board structure on firm's performance (ROA, Tobin's Q). The research used leverage and size as control variables. The study found that leverage has no impact on performance, and firm size positively impacts performance.

Performance and capital structure from European context

Górriz and Fumás (1996) have used 81 Spanish stock market listed non-financial firms to know the relationship between firms' performance and ownership. The study also used size, leverage ratio (D/E), the number of employees as a control variable, and the study found the negative relationship of leverage ratio with gross return on equity.

Vătavu (2015) has used the ordinary least square method, random effects method, and fixed effects model on 196 Bucharest Stock Exchange's listed Romanian manufacturing firms from 2003 to 2010 to find the determinants of performance. The study uses business risk, tangibility, tax, total debt, total equity, short-term debt, inflation, liquidity, and long-term debt as variables. This study's findings were total debt, tangibility has a significant negative impact on ROA and ROE, inflation has a significant positive impact on ROA, and tax has a significant positive effect on ROE and ROA.

Nasimi (2016) has used London Stock Exchange-listed 30 firms (FTSE-100 index) from 2005 to 2014. The study used the Fixed effects model and Random effects regression method and found significant negative relation of Debt to Equity ratio with ROA and ROIC (return on investment capital) and the positive association of Interest Coverage with ROA ROIC. The study found a significant positive impact of Debt to Equity ratio and Interest Coverage on ROE.

Performance and capital structure from North American context

Simerly and Li (2000) have used the generalized least squares method on 700 US firms to determine the impact of environmental dynamism, firm size, and capital structure on ROA and ROI (return on investment). The study has found significant negative relation of leverage, environmental dynamism with ROI and ROA but the positive connection of size with ROA and ROI.

King and Santor (2008) have used 613 Canadian firms (1998 – 2005) to know the link between firm performance, ownership, and capital structure. Yan and Hemley (2015) have used 90 firms, 30 firms per sector from Industrial Sector, Healthcare Sector, and the Energy Sector, in the USA from 2004 to 2013. The study wanted to know the effect of Long-Term Liabilities to Total Assets Ratio (LTD) on Operating Return (OPR), ROA, Profit Margin (PM), Market Value per Share (MVPS). In the industrial sector: LTD has an inverse effect on ROA, OPR, and a positive impact on PM, in the healthcare sector: LTD has a negative association with ROA, OPR, and in the energy sector: LTD has a negative correlation with ROA, PM and positive impacts of OPR.

Hossain and Nguye (2016) have used ten Canadian gas and oil firms' data from three periods from 2004 to 2013: the pre-crisis period from 2004 to 2006, the crisis period from 2007 to 2009, the post-crisis recovery period from 2010 to 2013. Khodavandloo, Zakaria, and Nassir (2017) also used the same three periods on 45 firms from Malaysia's trading and services sector. These two-study found that all these three periods' leverage is negatively related to the firms' performance.

3. Model and Variables

Data sources and sample size

The study is based on secondary data of selected manufacturing firms operating in Bangladesh. Here 41 manufacturing companies listed in Dhaka Stock Exchange (DSE) from the period 2013 to 2019 are considered to examine the impact of capital structure on firm's profitability. Data sets are present in appendix III. The sample includes three companies from cement, two from ceramic, five from engineering, 11 from food and allied, six from fuel and power, six from pharmaceuticals and chemicals, two from the tannery, and six from the textiles industry. The chosen firms

represent the industrial driving force in Bangladesh, so that the sample will serve the research's primary purpose perfectly.

Variable Description

The empirical evidence supports different variables to test the impact of capital structure on firm's profitability. These variables include Return on Asset (ROA), Return on Equity (ROE), Gross Profit Margin (GPM), Earnings Per Share (EPS), Asset Turnover, Tobin's Q, profit efficiency (Demsetz and Lehn, 1985; Gorton and Rosen, 1995; Mehran, 1995; Himmelberg, Hubbard and Palia, 1999; Majumdar and Chhibber, 1999; Ang, Cole and Lin, 2000; Singh and Davidson, 2003; Abor, 2005; Berger and Patti, 2006; Ebaid, 2009).

According to the research objectives, two accounting-based ratios, Return on Asset (ROA) and Return on Equity (ROE), are used to measure firm profitability or performance.

Independent Variable

The explanatory variables, Long-Term Debt Ratio (LTDR) and Short-Term Debt Ratio (STDR) assess capital structure's impact on firm performance or profitability. These ratios calculate as Long-Term Debt to Total Assets (TA) and Short-Term Debt to Total Assets (TA).

Exogenous Variables

Firm-specific variables are also used in explanations of performance or profitability. These are firm size, firm age, firm efficiency. Firm size calculates as the log of total assets, firm age measures as the difference between the establishment year and the observation year, and firm efficiency measures by sales revenue to total assets.

Model and Hypothesis

This section focuses on formulating models and hypotheses used to examine the impact of capital structure on firm performance or profitability.

Model 1(ROA):

$$ROA_{it} = \beta_i + \beta_1 LTDR_{it} + \beta_2 STDR_{it} + \beta_3 Size_{it} + \beta_4 Age_{it} + \beta_5 EFFI_{it} + \varepsilon_{it}$$

Model 2(ROE):

$$ROE_{it} = \beta_i + \beta_1 LTDR_{it} + \beta_2 STDR_{it} + \beta_3 Size_{it} + \beta_4 Age_{it} + \beta_5 EFFI_{it} + \varepsilon_{it}$$

In these two models, long-term debt ($LTDR_{it}$) and short-term debt($STDR_{it}$) are independent variables reflecting the capital structure of the firm and $\beta_1, \beta_2, \beta_3, \beta_4 \; and \; \beta_5$ are coefficients.

The hypotheses of this study are given below:

Model 1 (ROA): H_0= There is no significant impact of Independent Variables on ROA.

H_1= There is a significant impact of Independent Variables on ROA.

Model 2 (ROE): H_0= There is no significant impact of Independent Variables on ROE.

H_1= There is a significant impact of Independent Variables on ROE.

4. Empirical Results and discussion

Descriptive Statistics

These descriptive statistics of dependent, explanatory, and control variables are presented in table 1. According to this summary table, the Long-Term Debt Ratio (LTDR) minimum value is .000. The maximum value is 0.7630, which indicates that sample firms use long-term debt financing from 0.00% to 76.30% of their total assets. On average, every firm uses 13.30% of its capital structure as long-term debt financing. Standard deviation indicates that each quantity's average distance is 13.80% away from its mean value of 13.30%.

On the other hand, sample firms of this study use short-term debt between 2.40% to 73.50% of their total assets. The mean value indicates that a short-term debt financing source finances 33.40% of the capital structure. Each observation's dispersion in the short-term debt ratio is 17.50% away from its mean value.

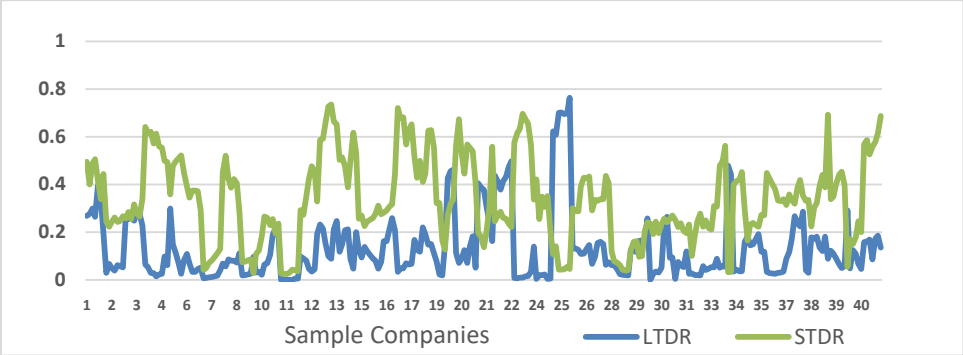
Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
ROA	.056	.067	-.057	.734
ROE	.112	.129	-.58	.965
LTDR	.133	.138	0	.763
STDR	.334	.175	.024	.735
AGE	27.265	14.993	2	67
SIZE	22.319	1.715	16.731	27.438
EFFI	.77	.663	.016	4.541

Source: Authors' Calculation

The mean value of STDR and LTDR indicates, manufacturing firms in Bangladesh use more short-term debt than long-term debt. Figure 1 displays the line graph of all STDR and LTDR values of sample companies from 2013-2019, where most of the time, the LTDR line is lower than the STDR line.

Figure 1: Components of Debt Ratio



Source: Authors' Calculation

Return on Assets (ROA), performance measurement indicator, of manufacturing firms in the sample, generates at least -5.7% net profit and 73.40% net profit of their total assets. The mean value indicates that every firm's net profit is 5.6% of their total assets on average. The standard deviation is 6.7%, which suggests every observation is very close to the mean value. Another performance measurement indicator, Return on Equity (ROE), shows that sample firms generate at least -58% and at most 96.50% net profit of their total shareholder's equity. The mean value of 0.112 indicates that every firm generates 11.20% net profit of their total shareholder's equity. Each observation's dispersion in ROE is 12.90% away from its mean value.

The natural logarithm of total assets is considered as firm size in this study. In the sample, the range of firm size is from 16.731 to 27.438. The mean size of the firms in the model is 22.319. Standard deviation indicates every observation point is very close to the mean value. Moreover, the range of firm age is from 2 years to 67 years in the sample. The mean age of the firms in the model is 27.265 years. Standard deviation indicates each observation's average distance is 15 years away from its mean age around 27 years. Besides, firms in the sample use total assets efficiently to generate sales revenue at least .016 times their total assets and at most 4.54 of their total assets. On average, every sample firm uses its assets effectively to generate 77% asset turnover. Every observation point is widely dispersed from the mean value, indicated by the standard deviation.

Correlation Matrix

Table 2: Correlation between variables

Variables	ROA	ROE	LTDR	STDR	AGE	SIZE	EIFFI
ROA	1.000						
ROE	0.786	1.000					
LTDR	-0.227	-0.077	1.000				
STDR	-0.067	-0.171	-0.172	1.000			
AGE	0.208	0.246	-0.041	0.222	1.000		
Size	-0.117	-0.158	0.349	0.049	0.137	1.000	
EFFI	0.253	0.383	-0.048	0.313	0.295	-0.342	1.000

Source: Authors' calculation

Table 2 shows that return on assets and return on equity are positively correlated and have a strong association. Return on assets is negatively correlated with long-term debt, short-term debt, and size. On the other hand, return on assets is positively associated with firm age and efficiency. The degree of association, either positive or negative, between ROA with independent and control variables is low. ROE is inversely associated with long-term debt, short-term debt, firm's size. ROE has a positive linear association with the firm's age and efficiency. There presents a weak degree of positive or negative correlation between ROE with independent and control variables separately except efficiency where ROE and efficiency have a moderate degree of positive correlation.

Regression Model

From Hausman Test, Breusch-Pagan Lagrange Multiplier (LM) Test, F-test, Akaike's Information Criterion (AIC), and Schwarz's Bayesian information criterion (BIC) Test, the study has found that Fixed Effects Regression Model is the best-fitted regression model for Model 1(ROA) and Model 2 (ROE) (see Appendix II). From Variance Inflation Factor (VIF) test, Pesaran Cross-sectional Dependence (CD) Test Dataset, Wooldridge Test for Autocorrelation, Wald Test for Groupwise Heteroscedasticity, the study has found that explanatory variables are free from Multicollinearity, and the dataset is free from Cross-sectional Dependency and Autocorrelation, but heteroscedasticity is present in the dataset (see Appendix I). So, for the sake of a consistent and unbiased result, the study has resolved the heteroskedasticity issue with robust standard errors. After that, the regression models for Model 1(ROA), Model 2 (ROE) have become the best linear unbiased estimators.

Table 3: Regression Models

Variables	Model (1)	Model (2)
	ROA	ROE
LTDR	-0.133***	-0.023
	(0.024)	(0.067)
STDR	-0.094***	0.031
	(0.018)	(0.035)
AGE	0.001***	0.001***
	(0.000)	(0.000)
Size	0.003	0.014**
	(0.003)	(0.006)
Efficiency	0.030***	0.058**
	(0.009)	(0.023)
Constant	0.001	0.142
	(0.076)	(0.139)
Observations	287	287
R-squared	0.177	0.173
Number of Firms	41	41

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculation

The explanatory and control variables, long-term debt ratio, short-term debt ratio, age, and efficiency significantly impact the explained variable- return on assets at a 5% level of significance. Among these explanatory variables, the firm's age and efficiency positively impact ROA. LTDR and STDR have a negative impact on

ROA. Firm size has a positive impact on returns on assets but insignificant. Besides, the firm's age, size, and efficiency significantly impact return on equity at a 5% level of significance. Firm Age, size, and efficiency have a significant positive effect on ROE. ROE negatively influences the long-term debt ratio and positive influence on the short-term debt ratio, but these relations are not substantial.

To remain other independent and control variables constant, at 1 percent change in long-term debt ratio has a resultant change of 13.30 percent on the return on assets in the opposite direction in Model 1 and at 1 percent change in the short-term debt ratio has a consequent change of 9.40% percent on the return on assets in the opposite direction in Model 1. Both LTDR and STDR have a significant inverse impact on firm's performance. But, if the firm is getting older, its performance also increases because age positively impacts ROA and ROE. Moreover, firm's total assets have a positive impact on firm's performance; if firm size increases by 1%, performance (ROE) will improve by 1.4% at the same time. Besides, asset turnover has a positive effect on firm's performance. If efficiency changes by 1%, ROA will change by 3.0%, and ROE will change by 5.8% in the same direction of efficiency change.

5. Findings

The study's descriptive statistics provide remarkable evidence that manufacturing firms in Bangladesh prefer short-term debt financing over long-term debt financing. One of the main reasons for that is the nature of manufacturing companies' day-to-day operations. The primary source of short-term debt financing from trade credit and bank loans involved revolving credit and credit agreement lines. Apart from this, additional regulatory supervision costs, strict covenant, and financial distress possibilities might offset the benefit of long-term debt financing. Consequently, long-term debt financing is a relatively costly funding source than short-term debt financing. Moreover, the underdeveloped, inefficient, and weak regulatory structure of the debt market, information asymmetry problems, and earnings volatility of these manufacturing companies have discouraged finance from the long-term source.

The study found a significant negative impact of long-term debt and short-term debt on the firm's performance from multiple regression models supported by the literature discussed previously. So, manufacturing companies should be careful while using debt financing as a fund source because if debt financing increases, performance will decline. The results recommend that these companies' managers do not use excessive leverage in their capital structure. They must try to finance their projects from internal sources such as retained earnings at first; they go for debt and equity financing as a last option and Pecking Order Theory supports this concept. Firms should use internal financing sources because there is no maintaining balance,

no transaction costs, and no flotation costs, but these costs are related to debt and equity financing. From the descriptive statistics, the study has found that, on average, every firm in this study uses 46.7% (STDR: 33.4%, LTDR: 13.4%) debt of their entire capital structure, which is not a mere amount. So, the question arises why these firms would choose to finance a considerable amount by using debt if debt financing has negatively associated firm performance. Because debt finance achieves tax benefits, or only it has a tax shield advantage. Also, debt financing as opposed to equity financing because financing from issuing shares leads to dilution of ownership, and shareholders become antagonistic due to their maximum percentage of firm's ownership. Debt financing may serve as an excellent disciplinary device that ensures managers-shareholders do not waste the generated cash flows because of debt repayment obligations. As a result, shareholders-managers conflicts and agency costs may reduce, and Agency Theory supports this concept.

Moreover, if companies want to issue shares, the likelihood of debt financing will follow many formalities provided by the Bangladesh Securities and Exchange Commission (BSEC). Companies have to face flotation costs such as registration fees, underwriting fees, and legal fees when they want to finance by issuing new shares. So, both time and money wastage occur for equity financing, consequently motivate firms to debt financing. For that reason, to remove the controversy related to the preference and non-preference of debt financing defined by Pecking Order Theory and Agency Theory, an appropriate mixture of debt and equity in the capital structure should be taken for better profitability. Top management should make financing decisions carefully to remain profitable and more competitive.

An experienced firm can gain better credibility and reputation in the market. So, those manufacturing firms in Bangladesh are more experienced; their performance will be better, the study has found that. Large-sized firms earn higher returns than small firms due to economies of scale, degrees of freedom in diversifying their investments, resilience during business downturns, lower asset volatility, and considerable influence in product and factor markets. The large and experienced manufacturing firms in Bangladesh add more returns to their assets. Similarly, Efficient firms are competent to generate high sales revenue because of their high asset turnover. So, they can quickly meet the recurring financing costs, and they have a small chance to fall into financial distress because of their operational efficiency. Apart from this, efficient firms in Bangladesh can take the tax shield advantages on debt financing costs and grab profitable investment opportunities because of their excellent management quality.

6. Conclusion

Bangladeshi firms' performance is changed considering the capital structure decisions. So, capital structure decision has to be taken cautiously. Otherwise, an ineffective decision harms the firm's performance and increases financing costs. As capital structure influences performance, so decision-makers must analyze the capital structure's nature.

The nature of the capital structure is dynamic, not static. For that dynamic feature, firms have to keep their debt-equity ratio in a range where they can solve agency problems and achieve more tax shield benefits than the bankruptcy costs. If the capital structure is static, firms have to adjust instantaneously when making capital structure choices. There are transaction costs and adjustment processes involved when changing capital structure towards the target point; therefore, the capital structure must be treated as a dynamic phenomenon rather than static. Because of that dynamic nature, capital structure may vary from firm to firm and industry to industry. Each sector has its core of doing business. Consequently, the management of capital structure may differ based on industry-specific effects. A detailed and comprehensive study will require all manufacturing industries to know about each industry's capital structure's impact on performance.

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Appendix: I

Multicollinearity Test		
Independent Variables	VIF	
Efficiency	1.492	
Size	1.492	
LTDR	1.237	
STDR	1.224	
AGE	1.206	
Mean VIF	1.33	
Wooldridge test for Autocorrelation		
Model 1	F (1,40) = 0.843	
	Prob>F = 0.364	
Model 2	F (1,40) = 1.705	
	Prob>F = 0.199	
Heteroskedasticity test (Wald Test for Group-wise Heteroscedasticity)		
Model 1	chi2 (38) = 2.0e+06	
	Prob>chi2 = 0.0000	
Model 2	chi2 (38) = 6.8e+06	
	Prob>chi2 = 0.0000	
Pesaran Cross-sectional dependence test		
Model 1	Pesaran's test of cross-sectional independence = 1.714	Probability = 0.0866
	Average absolute value of the off-diagonal elements = 0.394	
Model 2	Pesaran’s test of cross-sectional independence = -0.688	Probability = 0.4913
	Average absolute value of the off-diagonal elements = 0.395	

Source: Authors' Calculation

Appendix: II

Hausman Test	
Model 1 (ROA)	**Model 2 (ROE)**
chi2(5) = (Fixed-Random)'[(V_ Fixed V_ Random) ^ (-1)] (Fixed-Random)') = 15.06	chi2(5) = (Fixed-Random)'[(V_ Fixed V_ Random) ^ (-1)] (Fixed-Random)') = 14.72
Prob>chi2 = 0.0101	Prob>chi2 = 0.0116
Breusch-Pagan Lagrange Multiplier Test	
Pooled OLS Model VS Random Effects Model	
Model 1 (ROA)	**Model 2 (ROE)**
chibar2(01) = 124.49	chibar2(01) = 40.77
Prob > chibar2 = 0.0000	Prob > chibar2 = 0.0000
F Test	
Pooled OLS Model VS Fixed Effects Model	
Model 1 (ROA)	**Model 2 (ROE)**
F (40,241) =6.43	F (40,241) =3.60
Prob>F= 0.0000	Prob>F= 0.0000
Akaike's information criterion and Bayesian information criterion Test	
Pooled OLS Model VS Fixed Effects Model	

Model Name	**Model 1(ROA)**		**Model 2(ROE)**	
Test Name	AIC	BIC	AIC	BIC
Pooled OLS model	-777.97	-756.01	-406.33	-384.37
Fixed Effects Model	-986.28	-964.32	-540.71	-518.75

Source: Authors' Calculation

Appendix: III

Year	Company	LTDR	STDR	ROA	ROE	AGE	Size	Efficiency
2013	1	0.2676508	0.494366	-0.057377	-0.579543	32	19.502511	2.5998378
2014	1	0.2760823	0.3996295	0.0071275	0.057324	33	19.18639	4.4386519
2015	1	0.2985947	0.4887556	0.0214663	0.4109948	34	19.739817	2.4203023
2016	1	0.2644233	0.5050207	0.0628331	0.9654632	35	19.708789	3.0671881
2017	1	0.3959991	0.4136494	0.0279216	0.5018396	36	20.46451	1.7553159
2018	1	0.3385368	0.3371449	0.0051247	0.0574121	37	20.050933	1.5583196
2019	1	0.1983132	0.4439135	0.0355274	0.3519231	38	19.962378	1.4375108
2013	2	0.0288826	0.244502	0.0576649	0.0793609	17	20.791293	0.7334925
2014	2	0.0662184	0.2226432	0.0506179	0.0711787	18	20.888188	0.6736244
2015	2	0.0491386	0.2422898	0.0819323	0.1156302	19	21.018345	0.6103571
2016	2	0.0382477	0.2608293	0.0581295	0.0829328	20	21.116796	0.5175465
2017	2	0.0607605	0.2428181	0.0390174	0.0560256	21	21.181863	0.3709496
2018	2	0.0568374	0.2470955	0.0364966	0.0524325	22	21.243068	0.353962
2019	2	0.0513255	0.2663117	0.0463718	0.0679577	23	21.365918	0.5163563
2013	3	0.2653051	0.2577811	0.0932796	0.19559	36	21.271684	0.4951228
2014	3	0.2543954	0.2839897	0.0233314	0.0505431	37	21.313496	0.4642712
2015	3	0.2594408	0.2542528	0.0407162	0.0837254	38	21.389305	0.4828884
2016	3	0.2481665	0.3168094	0.063923	0.1469413	39	21.451925	0.462937
2017	3	0.2796003	0.2779554	0.0372277	0.084141	40	21.480772	0.4621156
2018	3	0.2775273	0.2657253	0.0479085	0.1048906	41	21.518374	0.5163904
2019	3	0.226936	0.3401482	0.0512239	0.118323	42	21.702653	0.4472307
2013	4	0.0639694	0.6415669	0.0082415	0.0279883	28	21.287814	1.8796872
2014	4	0.0531683	0.6148518	0.0100651	0.0303185	29	21.249785	2.2708888
2015	4	0.0296074	0.6206724	0.0476658	0.1362969	30	21.299849	1.5459902
2016	4	0.0278547	0.5713978	-0.008559	-0.021358	31	21.15862	1.3147419
2017	4	0.0138029	0.6129692	0.0050722	0.0135902	32	21.287728	0.9341886
2018	4	0.021971	0.5594962	0.0055057	0.0131548	33	21.350371	1.0266987
2019	4	0.0253896	0.5532221	0.0070217	0.0166632	34	21.243299	1.0181831
2013	5	0.0976613	0.498954	0.0483863	0.1199508	33	20.848285	1.3717689
2014	5	0.061688	0.4938721	0.0505736	0.1137918	34	20.814851	1.5760576
2015	5	0.2983139	0.358293	0.0369159	0.1075034	35	21.132531	1.2528995
2016	5	0.1489014	0.4780013	0.0363183	0.0973427	36	21.101201	1.4332893
2017	5	0.111688	0.4961194	0.0375506	0.0957454	37	21.10377	1.6273164
2018	5	0.0689747	0.5096974	0.0388057	0.0921032	38	21.081953	1.773398
2019	5	0.0244644	0.5218683	0.0416738	0.0918597	39	21.061022	2.0130078
2013	6	0.0830577	0.4481074	0.235277	0.5018334	35	22.029887	1.9203596
2014	6	0.1087437	0.3916368	0.1218858	0.2439572	36	22.342384	1.5692064

2015	6	0.0683464	0.3449357	0.1891143	0.3223258	37	22.474842	1.536072
2016	6	0.0326903	0.3742709	0.2125072	0.358336	38	22.756764	1.4350707
2017	6	0.0328006	0.3741519	0.1803725	0.3035832	39	22.932673	1.2393154
2018	6	0.0452971	0.3718962	0.1655797	0.2841073	40	23.10438	1.1952073
2019	6	0.0510389	0.2903697	0.1708305	0.2593877	41	23.117261	1.2533992
2013	7	0.0061433	0.0407633	0.0478177	0.0501711	10	20.635516	0.4720823
2014	7	0.0072275	0.0493006	0.0423676	0.044906	11	20.691608	0.482842
2015	7	0.0096729	0.0710639	0.0320829	0.0349006	12	20.753242	0.4547513
2016	7	0.0114579	0.0819292	0.0282107	0.0311166	13	20.78474	0.4649543
2017	7	0.0146579	0.0954049	0.0314989	0.0353945	14	20.839341	0.4740809
2018	7	0.0174027	0.1107105	0.0219788	0.0252084	15	20.87918	0.4823587
2019	7	0.0391954	0.1296069	0.0257029	0.0309227	16	20.9338	0.492226
2013	8	0.0675613	0.4503282	0.2636862	0.5469415	42	16.731323	1.6911709
2014	8	0.0557219	0.52088	0.2320191	0.5479928	43	17.114122	1.3134612
2015	8	0.0855341	0.4207481	0.1985099	0.4020717	44	17.202975	1.3482181
2016	8	0.0800065	0.3857963	0.2145115	0.4015585	45	17.380741	1.2378152
2017	8	0.0798174	0.4222254	0.1686942	0.3387724	46	17.653123	1.1195582
2018	8	0.0723609	0.4054041	0.1770687	0.3390593	47	17.850516	4.1228312
2019	8	0.1114316	0.2862916	0.1555832	0.2583251	48	17.900314	4.5406949
2013	9	0.0187601	0.073864	0.0758102	0.0835489	20	20.058761	0.2750379
2014	9	0.0200167	0.07645	0.0391094	0.0432849	21	20.107255	0.2437517
2015	9	0.0222219	0.0811078	0.0792663	0.0884008	22	20.092221	0.3764756
2016	9	0.0244949	0.0859088	-0.041731	-0.04691	23	20.076957	0.0537355
2017	9	0.0966568	0.0272263	-0.031034	-0.035423	24	20.057415	0.2372502
2018	9	0.0302259	0.1077516	-0.030311	-0.035163	25	20.039075	0.2278032
2019	9	0.03341	0.1226261	-0.030193	-0.035776	26	20.025096	0.2238161
2013	10	0.0212813	0.1839622	0.0431398	0.0542806	2	21.643793	0.1667683
2014	10	0.0637179	0.2655712	0.0279414	0.0416593	3	21.758266	0.1676944
2015	10	0.0696447	0.259345	0.0266943	0.0397823	4	21.779607	0.1810134
2016	10	0.1044293	0.2296113	0.0372174	0.0558854	5	21.845881	0.2032096
2017	10	0.1870228	0.2548597	0.0295482	0.0529426	6	22.094688	0.1590792
2018	10	0.2189656	0.1945673	0.0537475	0.0916462	7	22.145569	0.1785472
2019	10	0.189367	0.236042	0.0581547	0.1012106	8	22.152558	0.2089942
2013	11	0	0.0268926	-0.004476	-0.048073	12	21.045367	0.0251408
2014	11	0	0.0255318	-0.046592	-0.047813	13	18.706062	0.1761355
2015	11	0	0.0242527	-0.014852	-0.015221	14	18.689644	0.1991152
2016	11	0	0.0298317	0.0746695	0.0769655	15	18.775466	0.2445789
2017	11	0	0.0430004	0.0561954	0.0587204	16	18.849648	0.3106947
2018	11	0.0047109	0.0394404	0.0066507	0.0069238	17	18.852883	0.2990834

2019	11	0.0049049	0.036123	0.0218611	0.0227964	18	18.877597	0.3341812
2013	12	0.0974552	0.2918593	0.0686589	0.1124292	27	22.130337	0.8011612
2014	12	0.089382	0.271985	0.079353	0.1242545	28	22.246514	0.7589289
2015	12	0.0805554	0.3496886	0.0461984	0.0810845	29	22.338261	1.0189769
2016	12	0.046153	0.4225278	0.1066259	0.2006814	30	22.555207	0.8853847
2017	12	0.0346063	0.4755281	0.06449	0.1316483	31	22.767605	0.4698795
2018	12	0.0443265	0.4553162	0.0456345	0.0912039	32	22.8275	0.4776089
2019	12	0.1922922	0.3286628	0.0428045	0.0893539	33	22.930889	0.5314332
2013	13	0.2311303	0.5865054	0.0242982	0.1332396	26	22.151526	1.5855017
2014	13	0.2149288	0.5910044	0.027772	0.1431051	27	22.166949	1.1819279
2015	13	0.152944	0.6583901	0.0165972	0.0879711	28	22.07043	1.1743232
2016	13	0.0988312	0.7269368	0.0224502	0.1288522	29	22.24034	1.6425274
2017	13	0.0881241	0.73539	0.0139807	0.079217	30	22.266597	1.0642646
2018	13	0.2110751	0.6635971	0.0098099	0.0782742	31	22.652091	0.8041002
2019	13	0.2471831	0.6516143	0.0088965	0.0879079	32	22.817102	0.9498808
2013	14	0.1182026	0.503044	0.0587517	0.1551186	9	22.862888	0.7552368
2014	14	0.1486198	0.5142247	0.0519311	0.1540271	10	23.005997	0.769076
2015	14	0.2080065	0.4760316	0.0405297	0.1316578	11	23.034744	0.8026996
2016	14	0.2122191	0.3867881	0.063737	0.1622843	12	23.106854	0.8633494
2017	14	0.0863916	0.4995573	0.051368	0.1240621	13	23.07052	0.8874995
2018	14	0.0466533	0.6171722	0.0325921	0.0969499	14	23.330919	0.7407483
2019	14	0.200139	0.5291881	0.0325511	0.1202598	15	23.658501	0.6373886
2013	15	0.126282	0.2555899	0.0131338	0.0212477	16	22.651049	0.2825544
2014	15	0.0937324	0.2687568	-0.008615	-0.013513	17	22.623797	0.2530022
2015	15	0.1384622	0.2250086	-0.00035	-0.000549	18	22.622952	0.2510037
2016	15	0.11972	0.243545	0.0009293	0.0014594	19	22.592668	0.217733
2017	15	0.1038707	0.2518711	0.0012815	0.0019891	20	22.59061	0.2221987
2018	15	0.0895113	0.2583914	0.0095215	0.0146013	21	22.589535	0.2364806
2019	15	0.079538	0.2760484	0.0094688	0.0146937	22	22.613809	0.2314857
2013	16	0.0463882	0.3103923	0.0448683	0.0697559	30	22.741393	0.4428594
2014	16	0.0750347	0.2743881	0.0495157	0.0761104	31	22.770441	0.3498422
2015	16	0.1616272	0.281372	0.0270325	0.0485322	32	22.948881	0.3202534
2016	16	0.1614364	0.2902698	0.027341	0.0498656	33	23.004771	0.3116586
2017	16	0.2124987	0.3069385	0.0334162	0.0695355	34	23.191933	0.4041102
2018	16	0.2587778	0.3157068	0.0187195	0.0439925	35	23.340725	0.3513433
2019	16	0.2073493	0.4407879	0.0072413	0.02058	36	23.531678	0.1699298
2013	17	0.0327526	0.7204994	0.0469756	0.1903788	4	23.834766	1.7035833
2014	17	0.048404	0.6770816	0.0426071	0.1552088	6	23.875108	1.5496352
2015	17	0.048078	0.6811234	0.0385269	0.1422716	7	24.200852	1.1911476

2016	17	0.0690078	0.5669422	0.0736291	0.2022499	8	24.072627	1.1758391
2017	17	0.0645545	0.626193	0.0453474	0.1466355	9	24.350477	1.0103339
2018	17	0.0672557	0.6523427	0.0394215	0.1405894	10	24.544939	1.0571221
2019	17	0.1674987	0.5149539	0.0262601	0.0826966	11	24.91001	0.9278504
2013	18	0.1253352	0.4277439	0.0269545	0.0603116	61	23.547045	0.8339138
2014	18	0.1172037	0.4988248	0.0373012	0.0963977	62	23.774628	0.4068464
2015	18	0.2198217	0.4098104	0.0223619	0.0603775	63	23.848535	0.3535922
2016	18	0.1906885	0.4454048	0.0307228	0.084425	64	24.01688	0.2896051
2017	18	0.1477929	0.6252944	0.0043922	0.0193562	65	24.827718	0.6959721
2018	18	0.1501036	0.6271187	0.0430193	0.1931044	66	25.06182	0.89983
2019	18	0.1114734	0.5535155	0.027501	0.0820898	67	25.234863	0.9126815
2013	19	0.0774371	0.322162	0.0897812	0.1495355	12	21.668065	0.5979484
2014	19	0.0229191	0.322311	0.0768744	0.1174068	13	21.803546	0.5452982
2015	19	0.0181689	0.1647457	0.0693248	0.084844	14	21.564457	0.6062973
2016	19	0.1422426	0.1274224	0.0553488	0.0757856	15	21.759836	0.5954512
2017	19	0.4260117	0.2726588	0.0271939	0.0902464	16	22.757089	0.3397143
2018	19	0.4556892	0.3190303	0.0166934	0.0741006	17	23.098365	0.3762409
2019	19	0.4617331	0.3371169	0.0073428	0.0365042	18	23.212247	0.4885569
2013	20	0.1116707	0.5631888	0.0235104	0.0723086	26	20.935694	0.9785297
2014	20	0.0713509	0.6731498	0.0219716	0.0859948	27	21.266651	0.8643645
2015	20	0.0868332	0.5355368	0.0185205	0.049044	28	21.631242	0.6888926
2016	20	0.1245009	0.444978	0.0213887	0.0496809	29	21.551118	0.7687961
2017	20	0.0711914	0.5666589	0.023462	0.0647853	30	21.768714	0.6562043
2018	20	0.1389181	0.5543195	0.0177253	0.0577817	31	21.965191	0.683476
2019	20	0.182247	0.5388797	0.0304267	0.1091058	32	22.153764	0.7175712
2013	21	0.0500537	0.4030341	0.0368999	0.0674696	6	22.331411	0.1352528
2014	21	0.4052623	0.1965558	0.0366428	0.0920252	7	22.75543	0.2061914
2015	21	0.3872039	0.1804428	0.0681126	0.1575393	8	22.844524	0.4608343
2016	21	0.3767627	0.1365905	0.0701979	0.1442481	9	22.834002	0.3586378
2017	21	0.3079656	0.2020337	0.0695431	0.1419245	10	22.895688	0.3969976
2018	21	0.2415062	0.3026832	0.0443633	0.0973283	11	23.043084	0.3519142
2019	21	0.1623076	0.5585027	0.0236583	0.0847391	12	23.586605	0.231763
2013	22	0.4364657	0.2455596	0.023765	0.0747387	17	24.245455	0.656917
2014	22	0.4123274	0.2686251	0.0188848	0.0591912	18	24.290152	0.7059092
2015	22	0.3784742	0.2859785	0.0424167	0.1264106	19	24.375043	0.7255676
2016	22	0.4129754	0.2595162	0.0099752	0.0304578	20	24.523893	0.7129679
2017	22	0.4322544	0.2555427	0.003654	0.0117041	21	24.596855	0.7068985
2018	22	0.4752801	0.2348439	0.0091616	0.0316052	22	24.731317	0.6750099
2019	22	0.4975069	0.2215198	0.0168319	0.0599056	23	24.905435	0.6221145

2013	23	0.0080496	0.5752972	0.0820473	0.1969198	49	23.911889	0.0578674
2014	23	0.0065717	0.6140022	0.0738801	0.1947154	50	24.168756	0.0469157
2015	23	0.0086015	0.6332029	0.0534499	0.1492199	51	24.464622	0.0411099
2016	23	0.0094901	0.6964088	0.0363759	0.123685	52	24.709559	0.0161916
2017	23	0.0137938	0.6739701	0.0379763	0.1216267	53	24.801701	0.0210232
2018	23	0.0150837	0.6538798	0.0494663	0.1494285	54	24.763176	0.0235997
2019	23	0.0328968	0.5671903	0.0505529	0.1264098	55	24.557972	0.0282359
2013	24	0.1395117	0.3364546	0.1452343	0.2771469	16	23.329069	0.7568819
2014	24	0.0036453	0.4214786	0.0580032	0.1008968	17	23.385915	0.517176
2015	24	0.0196402	0.2546641	0.1897228	0.2614357	18	23.263163	0.9585817
2016	24	0.0196398	0.3482939	0.1810015	0.2863647	19	23.367884	0.906936
2017	24	0.0223572	0.3049655	0.1300904	0.193392	20	23.367255	0.7131997
2018	24	0.0035628	0.3510959	0.1376414	0.2132846	21	23.434281	0.8041668
2019	24	0.0051028	0.2022848	0.1100783	0.1388804	22	23.259874	0.6608599
2013	25	0.6226303	0.1072011	0.0092966	0.0344105	17	25.411504	0.0724307
2014	25	0.6073064	0.1405529	-0.00025	-0.000992	18	25.479234	0.074579
2015	25	0.699902	0.0427783	0.0034135	0.0132655	19	25.527395	0.0768629
2016	25	0.7011988	0.0419402	0.008887	0.0345985	20	25.650309	0.0922097
2017	25	0.6941904	0.0439897	0.0126259	0.0482236	21	25.78626	0.0909026
2018	25	0.6969106	0.0540873	0.010894	0.0437507	22	26.022253	0.0778981
2019	25	0.7630645	0.0455064	0.0037014	0.0193356	23	27.438227	0.026467
2013	26	0.1310274	0.2996565	0.1131791	0.1987983	49	25.109926	0.9306262
2014	26	0.1310925	0.2874631	0.113607	0.1953875	50	25.227398	0.8664784
2015	26	0.1259971	0.2870535	0.090341	0.1539162	51	25.311919	0.8408852
2016	26	0.1080702	0.3932766	0.0586931	0.1177032	52	25.54574	0.9157302
2017	26	0.1098124	0.4282084	0.0360088	0.0779447	53	25.669575	0.8937168
2018	26	0.1297055	0.4267867	0.0225886	0.0509316	54	25.734406	0.9472591
2019	26	0.1454514	0.4329323	0.0282482	0.0669998	55	25.82571	0.8614643
2013	27	0.067165	0.2902002	0.0224502	0.0349345	30	20.815327	2.0108113
2014	27	0.0961247	0.3354714	0.1064931	0.1873547	31	20.901562	2.2414284
2015	27	0.1535873	0.3309249	0.1101948	0.213768	32	21.203121	1.9572642
2016	27	0.1598959	0.3378198	0.1171671	0.2332685	33	21.271939	2.0166901
2017	27	0.1500127	0.337201	0.1085145	0.2116173	34	21.490974	1.8605498
2018	27	0.0622474	0.4351559	0.1852357	0.3685573	35	21.615975	1.9073924
2019	27	0.0727827	0.4045689	0.1188864	0.2274692	36	21.763002	1.8610627
2013	28	0.0613407	0.1188824	0.1320427	0.1610715	55	24.039329	0.7332407
2014	28	0.0615845	0.0771285	0.136912	0.1589621	56	24.158738	0.74948
2015	28	0.044784	0.0721471	0.168882	0.1912444	57	24.288023	1.0399818
2016	28	0.0238015	0.060765	0.1870392	0.2043177	58	24.514336	0.8650641

2017	28	0.0214965	0.0418876	0.1850177	0.1982385	59	24.68467	0.8015503
2018	28	0.0200926	0.0385397	0.1712156	0.1814513	60	24.838605	0.7488936
2019	28	0.0179406	0.0411816	0.1624579	0.1726663	61	25.001958	0.7050541
2013	29	0.1267478	0.1246429	0.0536559	0.0716741	33	23.925598	0.3777628
2014	29	0.1205871	0.1595363	0.0511367	0.0710353	34	24.036388	0.3818861
2015	29	0.1162942	0.1623332	0.052699	0.0730537	35	24.09058	0.3864373
2016	29	0.1639521	0.0957519	0.0347261	0.0469084	36	24.162045	0.6431848
2017	29	0.1644656	0.0999304	0.0301082	0.0409299	37	24.252098	0.4550146
2018	29	0.168474	0.2061823	0.0301997	0.048293	38	24.501503	0.4050564
2019	29	0.2579238	0.2406119	0.0115914	0.0231151	39	25.578829	0.1984029
2013	30	0	0.2359546	0.0491258	0.064297	11	20.280956	0.2737829
2014	30	0.0255958	0.1914145	0.7338422	0.9372308	12	20.354874	0.3252356
2015	30	0.0337996	0.2443681	0.0393782	0.0545532	13	20.593243	0.2543189
2016	30	0.0305043	0.1956684	0.0511048	0.0660416	14	20.557373	0.3152899
2017	30	0.0508551	0.2324796	0.047732	0.066603	15	20.703038	0.2661743
2018	30	0.2213241	0.2557631	0.0334652	0.0639976	16	21.084369	2.1680403
2019	30	0.2639803	0.2409707	0.024967	0.0504334	17	21.190877	0.29326
2013	31	0.0915587	0.2555899	-0.008383	-0.012841	29	22.651049	0.2479639
2014	31	0.0937324	0.2687568	-0.000349	-0.000548	30	22.623797	0.2507917
2015	31	0.0038888	0.2502627	0.0006787	0.0009097	31	21.838625	0.2482691
2016	31	0.074659	0.2204785	0.0007807	0.0011076	32	21.891057	0.2547701
2017	31	0.0596204	0.2368944	0.0008469	0.0012039	33	21.888924	0.267919
2018	31	0.0534867	0.2050189	0.0171353	0.0231091	34	21.854368	0.2923558
2019	31	0.1185537	0.194961	0.0231712	0.0337536	35	21.866046	0.3416001
2013	32	0.0247116	0.2322732	0.1924321	0.2589882	9	21.277202	0.7051999
2014	32	0.0266051	0.1001529	0.1136945	0.1301982	10	21.87353	0.441604
2015	32	0.0201017	0.1841423	0.1234339	0.1551153	11	22.029347	0.4682108
2016	32	0.0191567	0.2446813	0.1008562	0.1370027	12	22.284947	0.3972318
2017	32	0.0187277	0.2769668	0.0997369	0.1416103	13	22.437694	0.3833496
2018	32	0.0567523	0.2223611	0.0976551	0.1354653	14	22.605885	0.3280811
2019	32	0.0407212	0.2497304	0.094477	0.133151	15	22.742839	0.3210521
2013	33	0.0468963	0.2168817	0.0697401	0.094727	37	21.08523	2.2621633
2014	33	0.0536611	0.2108181	0.0565809	0.0769263	38	21.118697	2.5542799
2015	33	0.051793	0.3094166	0.0543481	0.0850797	39	21.284561	2.1516058
2016	33	0.0879153	0.307167	0.0487847	0.0806469	40	21.351291	1.151799
2017	33	0.0501334	0.4780583	0.0189512	0.0401671	41	21.588685	0.8214698
2018	33	0.0572204	0.4975542	0.01561	0.0350609	42	21.628605	0.9762068
2019	33	0.0550421	0.5614317	0.0078262	0.020406	43	21.734862	0.7422155
2013	34	0.4782077	0.0323194	0.1763571	0.3603001	51	22.251589	1.7089431

2014	34	0.4420421	0.0332828	0.1429874	0.2725257	52	22.312546	1.648292
2015	34	0.0339131	0.3998775	0.1588331	0.2805201	53	22.378937	1.6275469
2016	34	0.0428094	0.41455	0.1591368	0.2932638	54	22.603375	1.3402892
2017	34	0.0362049	0.4188016	0.1478116	0.2712172	55	22.771195	1.1662481
2018	34	0.0357857	0.4524612	0.1430989	0.279625	56	22.857588	1.1028541
2019	34	0.1596116	0.2915655	0.1330559	0.2424388	57	22.930354	0.9432605
2013	35	0.1825218	0.1651955	0.0021477	0.0032925	7	22.170566	0.2885738
2014	35	0.1438748	0.2313995	0.0052787	0.0084496	8	22.247108	0.3682849
2015	35	0.1488361	0.2378887	0.0081363	0.013267	9	22.279028	0.4332285
2016	35	0.1718672	0.2294633	0.0122448	0.0204534	10	22.33562	0.4969096
2017	35	0.1912757	0.2228817	0.0203163	0.0346788	11	22.353678	0.5774517
2018	35	0.117146	0.2715067	0.0256912	0.0420239	12	22.314216	0.7661922
2019	35	0.1179263	0.2704578	0.0241635	0.0395077	13	22.306566	0.9539853
2013	36	0.0329881	0.4474111	0.0591822	0.1138993	5	22.066887	0.5664882
2014	36	0.0279971	0.4221483	0.0733977	0.1334856	6	22.125847	0.6201335
2015	36	0.0266327	0.3994817	0.0855346	0.1490447	7	22.180378	0.7684075
2016	36	0.0254058	0.3790997	0.0964482	0.1619633	8	22.232089	0.9017366
2017	36	0.0287198	0.3329509	0.0757279	0.1186345	9	22.253279	0.6166237
2018	36	0.030245	0.3300347	0.0766078	0.119752	10	22.328991	0.6788053
2019	36	0.0348488	0.3380943	0.0685843	0.1093749	11	22.399389	0.645224
2013	37	0.0877172	0.3142089	0.04893	0.0818127	18	22.909467	0.4475295
2014	37	0.1159735	0.357595	0.030297	0.0575517	19	23.051768	0.4278829
2015	37	0.1712907	0.3338322	0.0486979	0.0984041	20	23.185442	0.467091
2016	37	0.2660025	0.3194487	0.0248681	0.0599884	21	23.377457	0.3344554
2017	37	0.2367901	0.387695	0.0199119	0.0530256	22	23.499619	0.3784938
2018	37	0.2242227	0.4178423	0.0188918	0.0527801	23	23.583444	0.432785
2019	37	0.2860356	0.352375	0.0311623	0.0861814	24	23.601993	0.5125175
2013	38	0.0402763	0.3311174	0.0227395	0.0361745	10	22.603038	0.2449482
2014	38	0.0287946	0.3346568	0.0235264	0.0369593	11	22.627672	0.2821671
2015	38	0.1775469	0.2242644	0.0086343	0.0144341	12	22.703964	0.2265847
2016	38	0.1709382	0.3033428	0.0072141	0.0137224	13	22.838505	0.2470443
2017	38	0.1806985	0.3211193	0.0083453	0.0167514	14	22.909535	0.4577376
2018	38	0.1348552	0.3948084	0.0120357	0.0255895	15	22.992715	0.4891221
2019	38	0.1207329	0.4391627	0.0028872	0.0065602	16	23.039023	0.4407533
2013	39	0.1809011	0.3879761	0.0201617	0.0467655	17	22.725051	0.5166248
2014	39	0.0878457	0.6918612	0.0127403	0.0618318	18	23.350833	0.302036
2015	39	0.1215985	0.3381579	0.0495973	0.0918055	19	22.94332	0.7306969
2016	39	0.1093006	0.3487635	0.086983	0.1667855	20	22.995501	0.8435
2017	39	0.0879708	0.4029069	0.054393	0.1068368	21	23.110137	0.5750875

2018	39	0.0653731	0.4416547	0.0460343	0.0933811	22	23.214584	0.6219377
2019	39	0.0494569	0.4536952	0.0305285	0.0638073	23	23.243039	0.6376083
2013	40	0.056772	0.3966668	0.0675851	0.1236552	18	22.026541	0.5760093
2014	40	0.2913145	0.0541408	0.0780951	0.1193121	19	21.973299	0.6298944
2015	40	0.0475189	0.1693947	0.0309333	0.0395017	20	22.200886	0.4067458
2016	40	0.1244673	0.15046	0.0193058	0.0266261	21	22.286234	0.2874344
2017	40	0.1076747	0.177942	0.0148503	0.0207876	22	22.302709	0.2725923
2018	40	0.0669289	0.2448886	0.0351201	0.0510332	23	22.373103	0.4486023
2019	40	0.045014	0.1999522	0.0234806	0.0310988	24	22.299548	0.4071656
2013	41	0.1585485	0.5685521	0.022379	0.0820045	32	20.16417	1.0013251
2014	41	0.1612911	0.5865414	0.032618	0.1293505	33	20.381696	0.809526
2015	41	0.168904	0.525248	0.0377432	0.1234049	34	20.252212	0.958801
2016	41	0.0849799	0.5576125	0.0661025	0.1849498	35	20.300929	0.9615223
2017	41	0.1731666	0.5774985	0.040143	0.1610003	36	20.836554	0.6406178
2018	41	0.1844142	0.6146741	0.0319001	0.1587766	37	21.188182	0.625644
2019	41	0.1353282	0.6868278	0.0270207	0.151935	38	21.424815	0.6293511

Source: Authors' Calculation based on raw data of Annual Reports

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A STUDY ON THE ADOPTION INTENTION FACTORS OF MOBILE COMMERCE APPLYING UTAUT MODEL

Md. Mynuddin*

Abstract

The growth of mobile commerce has transformed the mode of business transaction for an individual as well as organizations in Bangladesh. As a consequence, it has become worthy for the researcher to identify the behavior of the customers' adoption intension mobile commerce. The aim of this study is to evaluate the factors that effectively influence the behavior of adopting the intention of mobile commerce among the people of Bangladesh. To understand the intention of adopting m-commerce a model of technology acceptance has been used named Unified Theory of Acceptance and Use of Technology (UTAUT). 105 people have been selected from random sampling to be the respondents. A statistical tool like SPSS has been used for descriptive statistics and factor analysis to find and analyze the results generated from the 105 respondents. The key findings indicate that performance expectancy (PE), social influences (SI), effort expectancy (EE), and facilitating conditions (FC) contribute strongly to the adoption intention of mobile commerce.

Keywords: UTAUT, Technology, Intention, Social Influence, Mobile Commerce,

1. Introduction

The current business world is running based on strong competition with the assistance of innovation, technological adoption, and implementation. The incorporation of internet and mobile-based services are known as the staircase for the growth of businesses at present (Ismail *et al.* 2017). M-commerce is a comparatively new concept than e-commerce. High-end technologies and continuous innovation require enhancing the level of acceptance regarding m-commerce. From the customer point of view, m-commerce offers various services such as mobile payment systems, shopping applications, bar code scanning, real-time information browsing and sharing, and many more. On the other hand, according to the entrepreneur point of view, m-commerce is the media for better marketing campaigns, managing relationships with customers, and collecting demographic data. Bangladesh indicated it as one of the examples of an emerging nation in South Asia, which is successfully accelerating its annual steady growth rate of 7.3% by adopting m-commerce (Brock and Khan, 2017). The overall growth has been expanding day by day because of high-speed internet service and the latest mobile devices. Bangladesh entered into a new highway of connectivity of mobile internet that is fourth generation (4G) which was launched on February 19, 2018 (BTRC, 2018)

* Assistant Professor (Management), Open School, Bangladesh Open University

As per the information of BTRC, the total number of mobile phone subscribers in Bangladesh has reached 170.137 million at the end of December, 2020. The number of internet users also has been incarnated from 54.120 million to 111.875 million that is from at the end of December 2015 to at the end of December 2020. With this increasing trend of mobile internet from 2015 to 2020, m-commerce market is also booming in the context of Bangladesh. The researcher has successfully identified various factors that impact the rapid growth of m-commerce for its personalization and convenience. According to German based research institute Statista, there has been significant increase of revenue of M-commerce in the global market is from $50.92 billion in 2014 to $693 billion in 2019.

Therefore, it can be said that the number of adoptions of m-commerce in Bangladesh is growing surprisingly. The researcher found that consumers have more smartphones than having a personal computer at home. Most of the banks and financial institutions of Bangladesh have started online banking services with online financial transactions facility. Even app-based transport services such as Uber, Pathao, and several other MNCs have joined after a close watch on the significant increase of m-commerce in Bangladesh (Asiedu *et al.,* 2018).

2. Literature Review

Mobile Commerce

Mobile commerce is the act of purchasing and retailing products and services by means of wireless handset devices such as smartphones and tablets. Mobile commerce allows consumers online access to shops and other online transaction platforms without using a computer or laptop. It is an advanced version of e-commerce that assists people in dealing with goods and services anywhere at any point in time using a handheld device. According to Acheampong *et al.* (2017), m-commerce is a faster means of purchase, and it is reported 1.5 times faster in generating data and search results on smartphone devices.

M-commerce is a fairly new phenomenon in the context of many developing countries all over the world. According to Chandra and Kumar (2018), the applications of m-commerce are divided into three main types and these are - (1) selling and purchasing of goods that requires online payment to complete the entire transaction process, (2) selling and purchasing of services such as investment, business stocks, and service rendered by online doctors, (3) delivering information services like news, stock quotes, and stock market information, etc.

The services of m-commerce have been widely classified into different types according to end-users who use the services of m-commerce. The types are B2C, C2C, and B2B. The scopes of m-commerce are mobile financial services, location-centric services, user services, mobile advertising, mobile inventory management,

wireless business re-engineering, and interactive mobile session. As commented by Kurnia *et al.* (2015), the inception of m-commerce has particularly popularised the wireless infrastructure to a great extent. In the future, the services of m-commerce in Bangladesh look forward including advanced mobile banking services like account balance check, transfer money online, etc, stock markets mobile trading services like purchasing and selling of shares, stock quotations, etc, application for a credit card, airline services for instance booking of online flight tickets, viewing flight timing, travel tickets and many more.

Due to the simplicity and the speed purchase and sale of goods, people are using m-commerce at a large scale. The adoption of m-commerce technology is very easy and an entrepreneur can be directly connected with the customer.

Push notification is a useful means in smartphones that send instant and customized messages to each definite customer that become a fair method of promotion for the businesses. Thus, all major e-commerce brands have m-commerce app to engage more customers all the time.

Mobile commerce is an electronic commerce portal that delivers products or services to customers through wireless technology. M-Commerce has been widely used in all developed and developing nations in context to mobile marketing, mobile ticket booking, mobile gaming, hotel reservations, entertainment, and many more. As opined by Lee and Wong (2016), m-commerce aims to provide all the information and requisites that people require transacting and conveniently using mobile commerce and adopt the technologies of m-commerce into daily life.

M-commerce contributes a lot in distributing and sharing information to the business. M-commerce uses various applications such as location-based services to facilitate customers in browsing required services according to their location. Information about a business and its products and services can be easily generated through m-commerce that improves customer services, productivity, and mobility. On the other hand, businesses can share information with their customers and suppliers round the clock. The m-commerce platform collects information connected to mobile devices and monitors the important KPIs of a business such as total mobile traffic, the average order placed by customers on a particular online platform, the value of orders over a definite period, and total traffic on a mobile application. In the case of mobile payments, the principle of peer-to-peer (P2P) sharing is used. When a mobile device is paired with banking information then the phone becomes a payment terminal to pay for any product or services (Rowley and Hartley, 2017).

Unified Theory of Acceptance and Use of Technology Model (UTAUT)

The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model created by Venkatesh et al. (2003). Here unified means the integration of eight theories of technology adoption and provides a comprehensive view of the factors affecting users' adoption behavior. The UTAUT model consisted of four main constructs – performance expectancy, effort expectancy, social influence, and facilitating conditions – and four moderating variables: gender, age, experience, and voluntariness of use." (Soo Kang, 2017: Abstract). The eight theories or models are described as follows- First one is the technology acceptance model (TAM), theory of reasoned action (TRA) is the second one , third is the theory of planned behavior (TPB), fourth is the motivational model (MM), the combined TAM and TPB (C-TAM-TPB) the fifth one, the social cognitive theory (SCT) the sixth one, the seventh and eighth are the innovation diffusion theory (IDC) and the model of personal computer utilization (MPCU) respectively. On the other hand, among the four main constructs, the first three constructs that is performance expectancy, effort expectancy, social influence are direct determinants of usage intention and behavior. The fourth construct that is facilitating condition is a direct determinant of user behavior. To moderate the impact of the four key constructs on usage intention and behavior are age, gender, experience and voluntariness is used. UTAUT can near about for an impressive 50 percent in actual use and 70 percent in the intention of behavior (Venkatesh, Thong, & Xu, 2012).

To identify the behavioral intention and usage behavior four moderators like experience, age, voluntariness, gender and four constructs like performance expectancy, effort expectancy, social influence and facilitating conditions of UTAUT model are used. The constructs in the model were defined and moderating variables in the eight models as follows:

Performance Expectancy (PE): It is a kind of platform to where a person thinks that to use system will help him/her to achieve gains in job (Venkatesh et al., 2003). This construct is also represented in the following models: perceived usefulness (TAM, and combined TAM-TPB), extrinsic motivation (MM), job-fit (MPCU), relative advantage (DOI), and outcome expectancy (SCT). The model UTAUT undertakes that the expectancy of performance influences the intension of behavior and its moderating behavior is age and gender. About gender differences the researcher demonstrates that male enthusiasm to complete the job is stronger than female. About age differences, the researcher identify that older persons have less expectation of performance than younger persons (Venkatesh et al., 2003).

Effort Expectancy (EE): It is a sort of platform that related with the system and uses it easily (Venkatesh et al., 2003). This construct is also pertained in the following models: perceived ease of use (TAM), and complexity (DOI and MPCU).

Expectancy of effort will be inclined by experience, gender and age. The result of the research Venkatesh and Morris shows about the gender difference that female have stronger expectancy of effort than male (Venkatesh, Morris, & Ackerman, 2000).

Social Influence (SI): It is a kind of stage where a person understands how vital others perception about the new system (Venkatesh et al.,2003). The influence of social (SI) construct used by the researcher to examine intention of usage technologies of the customers' related to the internet, mobile banking, online banking online purchases, and mobile chat (Amin, 2008, Kleijnen et al., 2004; Nysveen, 2005; Venkatesh et al., 2012).

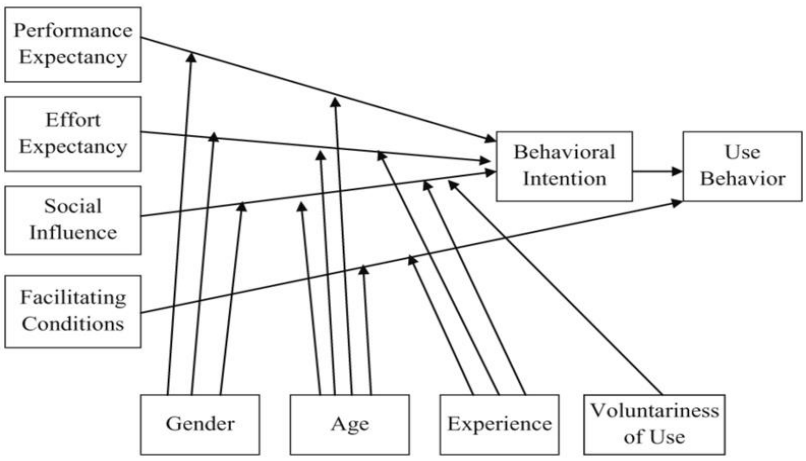
In a study about wireless finance by Kleijnenet al. (2004) in Netherland, a burden like normative one was seen in a massive way to the progress of intention of the individuals to use mobile commerce. In the adoption of organizational technologies, the research outcome of Venkatesh and Morris (2000) was directed to social influence (SI). The constructs are represented in several models: social influence (SI) act like a element of intension of behavior (BI) is represents as norms of subject in TPB/DTPB, TRA, TAM2 and combined TAM-TPB model, social factor in a PC utilization model (MPCU) and image in the diffusion of innovation (DOI) model.

All moderators like age, experience, voluntariness of use and gender are influenced the social influence. In other research, the researcher suggests that about opinion female is more conscious than male, and their intention are stronger to use a system (Miller,2012; Venkatesh et al., 2000). From the UTAUT model, it is observed regarding age that older persons are more sensitive to social influence.

Facilitating Condition (FC): It is a sort of platform where a person thinks that a technical and administrative structure needs to support the system to use. (Venkatesh et al., 2003). In the context of mobile commerce, the construct facilitating condition (FC) is not under customers' control but utilization or their performance of mobile commerce would perceive. These constructs are represented in several models: perceived behavioral control in TPB/DTPB and combination of TAM-TPB model, conditions of facilitating in the model of PC utilization model (MPCU), and compatibility in the diffusion of innovation (DOI) model. Other three constructs are different from facilitating condition (FC) construct. It does not affect the intention of behavior but directly influences the user behavior. Age and experience moderated Facilitating conditions. In UTAUT model, the outcome of experience and age are stronger for older people, especially with experienced person.

Table I: Key elements and moderators of UTAUT model and its description

	Variables	Description
Main Construct	Expectancy of Performance	It is a kind of platform to where a person thinks that to use system will help him/her to achieve gains in job
	Expectancy of Effort	It is a sort of platform that related with the system and use it easily
	Influence of Social	It is a kind of stage where a person understands how vital others perception about the new system
	Conditions of Facilitating	It is a sort of platform where a person thinks that a technical and administrative structure needs to support the system to use.
Moderators	Gender	Male and Female
	Age	Age should be Continuous
	Experience	Experience should be Ordinal
	Voluntariness of use	It should be a category wise



Source: (Venkatesh et al., 2003)

3. Rationale Of The Study

The magical characteristics of mobile like easy use, anytime and anywhere use makes the device more popular for banking services and strong payment channel. In

term of privacy and security Mobile commerce offers an excellent service. Fixed based internet like desktop or at a cyber café cannot provide much security and privacy as mobile commerce does. (Rakhi Thakur, Mala Srivastava; 2013)

Similar to other technologies, m-commerce also has some flaws or drawbacks that restrict common people to adopt it successfully. Among various major drawbacks, the small screen of mobile and limited criteria in keyboard activity. Moreover, mobile phones can be easily stolen, which calendars to certain discrepancies, such as misuse of information of data. Most importantly, the mobile phone comes with a limited amount of bandwidth and memory, which prevents many websites to load and limits the work that needs for m-commerce purpose. The users also face problems about security and trust, which are the most commendable challenges for any m-commerce activities (Chandra and Kumar, 2018). Moreover, a consumer also faces technological restrictions due to the rapid up-gradation of mobile devices to adopt m-commerce. Thus, the advancement of technology is also creating a challenge for m-commerce and also influencing the adoption intention (Chen *et al.*, 2018).

Thus, here found an emergence to find out some factors which are related with adoption intension of the about m-commerce in Bangladesh. This research study has gone through all the factors that can restrict or influence consumers' intention to use their smartphones for m-commerce. Thus, researchers had decided to investigate the factors after applying the Unified Theory of Acceptance and Use of Technology (UTAUT), to mitigate the drawbacks associated with M-commerce (Acheampong *et al.,* 2017). This theory successfully considers the factors as its components that can influence m-commerce adaptation. The component of the model helps to understand the attitude of people towards acceptance of this technology.

4. Objectives Of The Study

Recently, mobile-commerce is considered as a significant element and potential market for customers and businesses. Consequently, it becomes essential to identify customers' intention and the behavior to adopt mobile commerce for the researcher. The main purpose of this research is as follows:

1. to acquire basic knowledge about mobile commerce;
2. to understand the concept of the Unified Theory of Acceptance and Use of Technology (UTAUT) model; and
3. to find out the influencing factors that are related with the intention of adopting mobile commerce.

5. Methodology of The Study

5.1 Research Method

5.1.1 Population: in this study population are all the people who are related to m-commerce in Dhaka city.

5.1.2 Sample/Sample Size: The study sample consists of 105 respondents who have smartphones or tablets.

5.1.3 Sampling Frame: In this study, the sample frame mainly refers to the accurate source of data, from where we can get the information of m-commerce users.

5.1.4 Sampling Technique: Random sampling technique is used to find out the effectiveness of adoption intention of m-commerce. This sampling technique is also helpful to find out accurate as well as reliable information on the adoption intention of m-commerce customers.

5.1.5 Sampling Design Process: Using a questionnaire primary data was collected. The first section covers the demographic information (gender, age, income, academic qualification, etc). The second part contains m-commerce using factor; the variables includes performance expectancy (PE), social influence (SI), effort expectancy (EE), and facilitating condition (FC). Five-point Likert-type scale was used to collect data; from totally disagree to totally agree. From Venkatesh et al., 2003. four factors of UTAUT were adapted.

5.1.6 Method of Data Collection: To collect the data Survey method is used for this research.

5.1.7 Data Type: Primary sources of information have been considered for this research, and it is collected from field surveys.

5.1.8 Data Analysis Methods: Three main techniques are introduced into particular research including quantitative, qualitative, and mixed approach (Antwi & Hamza 2015). In this research study, a primary quantitative method has been used for data collection. Statistical Package for Social Science (SPSS) has been used to analyse the collected data like descriptive frequencies, reliability of the data, and validity of the data set, factor analysis, etc.

5.1.9 Type of Method: Research methodology is a process through which data are collected to complete the study in an effective manner (John; 2012). Additionally, it also deals with the research design, research approach, and philosophy.

Research design: Research design deals with the ways through which a research study is being carried out to make the study authentic and error-free (Bernard; 2017). There are three types of research designs such as explanatory design, exploratory

design, and descriptive design. In this study, a descriptive research design issued to understand the adoption intention of mobile commerce.

Research Approach: As opined by Cheng *et al.* (2016), the research approach suggests the method of data collection and analysis so that the outcome of the study becomes authentic. There are two types of research approaches that are generally used in the study such as inductive research approach and deductive research approach. In this study, the researcher used an inductive approach to derive the desired result.

Research Philosophy: As per the viewpoint of Allen (2016), research philosophy deals with the process through which the data of the study are being collected and analysed. There are four types of research philosophies such as positivism, post-positivism, realism, and interpretive. In this research study, realism research philosophy is used to understand the adoption intention of mobile commerce.

5.2 Validity scale and Reliability scale

5.2.1 Scale of the Validity

To certify the validity of the scales, these were sent to an expert academician and their constructive comments and suggestions were taken into consideration.

5.2.2 Reliability Scale

The test of reliability or Cronbach's alpha is the measure to evaluate the internal consistency of a set of data framed for a group (Bonett and Wright, 2015). Cronbach's alpha is used as a scale of reliability under a selected data set. A high value of reliability means that all the data set that has been derived from the respondents are reliable to make it useful for the research purpose, and they do not contain any kind of business.

Table II: Test of Reliability

Variable	Items	Cronbach's Alpha
Expectancy of Performance (PE)	4	.78
Expectancy of Effort (EE)	4	.84
influence of Social (SI)	4	.77
Conditions of Facilitating (FC)	4	.79

The table above shows a test of reliability for the given research study. Four factors significantly affect the adoption intention of m-commerce. Hair et al. (2006) suggest that the rule of thumb for a good reliability estimate is 0.7 or higher. The

value of reliability for performance expectancy (PE) is 0.78; the test of reliability for effort expectancy (EE) is 0.84. The third social influence (SI) is 0.77 and facilitating conditions (FC) related to m-commerce is 0.79. In all the cases, the Cronbach's Alpha value is greater than 0.7 and thus, the data generated from 105 respondents is reliable.

6. Findings and Observation of The Study

Table III: General information of respondents

	Frequency	**Percentage**
Survey cases	105	100
Gender		
Man	48	45.72
Women	57	54.28
Age		
18 to 30	45	42.86
31 to 40	30	28.57
41 to 50	15	14.28
>50	15	14.28
Marital status		
Married	55	52.38
Unmarried	50	47.62
Education		
Graduates	44	71.8
Post Graduates	61	28.2
Income Range		
Below Tk. 50,000	27	20.00
Tk. 50,001- Tk. 70,000	41	55.45
Tk. 70,001- Tk. 80,000	17	15.45
Tk. 80,001- Tk. 100,000	15	04.55
Above Tk. 100,000	15	04.55

Frequency of using M-Commerce		
1 year or less	24	21.8
2 to 4 years	77	70.0
5 to 7 years	09	8.2
Source: Field survey, 2018		

The table above shows the demographic profile of 105 respondents in terms of six factors and they are gender, age, marital status, education background, income level, and frequency of using m-commerce. Out of 105 respondents, 54.28% are female and 45.72% are male. It suggests that females are more interested in adopting m-commerce technology. The respondents are between 18 years to more than 50 years aged. It can be seen that 42.86% of them belong to 18 years to 30 years age. Between 31 years and 40 years age, 28.57% of respondents.15 participants are between the age group of 41 years and 50 years, and 15 respondents are above the age of 50 years. The third criteria evaluated to understand the marital status of the respondents. The majority of them are unmarried that is 52.38%. Thus, 47.62% of married have supported adopting mobile commerce. Regarding educational qualification, it is observed that approximately 72 percent of respondents are studying Bachelor's degree. The income range starts from below BDT 50,000 to more than BDT 100,000. 70 percent of respondents have a total experience of 2 to 4 years of using mobile commerce.

Table IV: Descriptive Statistics

Variable	**Items**	**Mean**	**SD**	**N**
	Performance Expectancy (PE)			
1	Mobile payment services are useful in my life	4.73	.797	105
2	Mobile payment services quicken transactions	4.37	.888	105
3	Mobile payment services growth my output	3.51	.775	105
4	Mobile payment services increase my effectiveness	4.28	.875	105
	Effort Expectancy (EE)			
5	Mobile payment services are transparent	4.08	.940	105
6	Mobile payment services make me skillful	3.22	.675	105
7	Mobile payment services are user friendly	3.39	.873	105
8	Mobile payment services are easy to use	3.59	.685	105
	Social influence (SI)			

9	Mobile payment services have supported by my behavior	3.34	.870	105
10	Mobile payment services have supported by others behavior	4.06	. 966	105
11	Mobile payment services have supported by the environment	3.35	.765	105
12	Mobile payment services have supported by the bank	3.64	.695	105
	Facilitating conditions (FC)			
13	Mobile payment services need resource	3.61	.795	105
14	Mobile payment services need knowledge	3.65	.885	105
15	Mobile payment services need compatibility with other systems	3.15	.975	105
16	Mobile payment services need online assistance	3.49	.689	105

From table IV, we found the following results:

Performance Expectancy (PE): Examination of the mean value listed in the table (IV) reveals that the most important items in the performance expectancy (PE) factor as indicated by the respondents was: Learning to operate mobile payment services is useful in my life (4.73). The results also show that the less important items in performance expectancy (PE) factor in terms of mean value was: Mobile payment services growth my output (3.51). The standard deviation for performance expectancy (PE) factor lies between (0.775-0.888).

Effort Expectancy (EE): Based on the mean values the results show that the most important item was: Mobile payment services are transparent (4.08). The results also show that the least important item was: Mobile payment services make me skillful (3.22). The standard deviation lies between (0.685-0.940).

Social influence (SI): The mean value in the same table shows that the most important item in the social influence (SI) factor was: Mobile payment services have supported by others behavior (4.06). While the least important item was: Mobile payment services have supported by my behavior (3.34). The standard deviation for the social influence (SI) factor lies between (0.695-0.966).

Facilitating conditions (FC): According to the mean value, the result shows that the most important item was: Mobile payment services need knowledge (3.65). The least important item in terms of mean value was: Mobile payment services need compatibility with other systems (3.15). The standard deviation lies between (0.689-0.975).

Factor Analysis

Upon sample size appropriateness of factor analysis largely depends. Hair et al. (1998) suggested that size of sample is appropriate for more than 50 for factor analysis and the 100 or more is preferable sample size. In this research, the sample size is 105, which is quite satisfactory. Another useful method to show the appropriateness of data for factor analysis is Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy. Kasier (1974) suggested that values are more than 0.5 within the acceptable limit. mediocre values are between 0.5 and 0.7, good Values are between 0.7 and 0.8, superb values are between 0.8 and 0.9 (Field, 2005). Bartlett's test of sphericity (Bartlett, 1950) is another statistical test applied to verify the appropriateness of the study. This test should be significant if its value comes less than 0.05.

Table V: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	245.97
	df	89
	Sig.	.000

The KMO value of the above table shows the overall matrix value is 0.784, which is greater than 0.5, that is within acceptable limit (Kasier, 1974). In this study, the test value of Chi-Square is 245.97 signifies the appropriateness of the data for the factor analysis.

Table VI: Total Variance Explained

Variable (Component/Factor)	Initial Eigen Values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.806	26.268	26.268	4.806	26.268	26.268
2	2.480	13.555	39.823	2.480	13.555	39.823
3	1.758	9.609	49.432	1.758	9.609	49.432
4	1.362	7.444	56.876	1.362	7.444	56.876
5	1.171	6.400	63.276	1.171	6.400	63.276
6	0.899	4.914	68.190			
7	0.827	4.520	72.710			
8	0.740	4.045	76.754			

9	0.684	3.739	80.493			
10	0.681	3.722	84.215			
11	0.593	3.241	87.456			
12	0.537	2.935	90.391			
13	0.457	2.498	92.889			
14	0.446	2.438	95.327			
15	0.443	2.421	97.748			
16	0.412	2.252	100			
Extraction Method: Principal Component Analysis.						

This study Principal Component Analysis (PCA) is used followed by the varimax rotation for the sixteen items relating to the Unified Theory of Acceptance and Use of Technology (UTAUT), a technology acceptance model. In the case of factor analysis, it is very important to determine the cut off point of factor loading. Stevens (1992) suggests a minimum cut-off point of 0.4, according to sample size. As suggested by Hair et al. (1998). factor loading cut-off point is used 0.5 in this study. When the 16 items are analyzed by the Principal Component Analysis (PCA), five factors are extracted from the analysis with an Eigenvalue of greater than 1. Extraction sums of squared loadings show variables that are retained are shown in the table. Five components are retained which have a total of 63.276% percent of the total variance. We noticed that the first factor accounts for almost 26.268 percent of the variance, the second is 13.555 percent, the third is 9.609 percent, the fourth is 7.444 percent and the fifth is 6.400 percent.

Table VII: Rotated Component Matrix

		Component/Factor				
Variable		1	2	3	4	5
V4	Mobile payment services increase my effectiveness	.767				
V8	Mobile payment services are easy to use	.709				
V12	Mobile payment services have supported by the bank					
V16	Mobile payment services need online assistance	.651				
V1	Mobile payment services are useful in my life		.682			
V5	Mobile payment services are transparent					
V9	Mobile payment services have supported by my behavior		.614			

V2	Mobile payment services quicken transactions			.641		
V6	Mobile payment services make me skillful					
V10	Mobile payment services have supported by others behavior			.749		
V3	Mobile payment services growth my output				.621	
V7	Mobile payment services are user friendly					
V11	Mobile payment services have supported by the environment				.639	
V15	Mobile payment services need compatibility with other systems					.673
V14	Mobile payment services need knowledge					.636
V13	Mobile payment services need resource					
	Rotation Method: Kaiser Normalization Varimax **Extraction Method:** PCA (Analysis of Principal Component)					
	16 iterations converged Rotation					

According to table VI &VII, factors loadings and the factors represent as follows:

Factor-1: This factor comprises with four variables and its factor loading ranges from .767 to .651. They are mobile payment services increase my effectiveness, Mobile payment services are easy to use and Mobile payment services need online assistance. Factor-1 reveals for 26.268% of the whole variance. Out of the five, factor-1 represents the maximum percentage of the whole variance alone.

Factor-2: Three variables are there in this factor and its factor loadings range starts from 0.682 to 0.614. They are Mobile payment services are useful in my life and Mobile payment services have supported by my behavior. Among five factors this one describes the 13.555% of the whole variance.

Factor-3: This factor consists of three variables and its factor loading ranges from .749 to .641 that describes 9.609% of the whole variance. In this factor the included factor are Mobile payment services quicken transactions and Mobile payment services have supported by others behavior.

Factor-4: This factor includes three variables and the ranges of this factor are 0.723 to 0.621. The variables are Mobile payment services growth my output and Mobile payment services have supported by the environment. Factor-4 explains 7.444% of the total variance.

Factor-5: This factor is consisting of three variables and its factor loadings starts from 0.749 to 0.673. The variables are Mobile payment services need compatibility

with other systems and Mobile payment services need knowledge. This factor is related to facilitating condition of UTAUT model. Factor-5 explains 6.400% of the whole variance.

7. Conclusion

This research investigates the factors influencing the technology adoption of mobile commerce. The results show that the factors such as mobile payment services increase my effectiveness, Mobile payment services are easy to use and Mobile payment services need online assistance have a remarkable relationship to make consumer decisions in adopting m-commerce.

8. Recommendation of The Study

To make good at M-Commerce, an organization can follow the below step:

1. Mobile friendly website: If the website of an organization is not mobile friendly, customer will not visit the website. So, an organization should make the website mobile friendly to optimize M-Commerce.
2. Analysis of Product and Align Organization: Those who are working with same product like your organization in the market place, it needs to observe them. How to improve the product quality, minimize the product cost and how to get the acceptance of the buyer all things need to consider.
3. Mobile friendly Email Design: Most of the customer read email in smart phone. But because the email is not optimized by mobile, customer delete it without reading and make the subscription off. So, an organization must have to make email campaign supportive to the mobile device.
4. Introduction of Mobile Pay Per Click (PPC): Google already have introduced Pay Per Click (PPC) in mobile device to show advertise. When a customer will use search engine by mobile, then product page will come in front of them through advertisement. You can use this strategy through Mobile Commerce.
5. Incretion of Page Speed: If a website takes more than 3 seconds to load, than visitor back from this website. So, an organization can use PINGDOM site to check the page speed, because page speed is very important in Mobile Commerce. To increase the site speed, it needs to minimize the picture of the website and to improve the application coding.
6. Make the payment procedure easy: Customer will be habituated with M-Commerce, if they can easily make the payment of the product. So, it needs to make the payment procedure easy to flourish the M-Commerce.
7. Use of right technology: Among the various technologies, it needs to make right use of the technology of an organization to boost the sales of their product in M-Commerce sector.

In the last five-years M-Commerce have got much acceptance to the customer. If an organization wants to success in this market place, they can follow the above step.

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DETERMINANTS AND ITS IMPACT ON NON-PERFORMING LOANS OF COMMERCIAL BANKS IN BANGLADESH

Dr. Prahallad Chandra Das[1] and Dr. Leyaket Hossain Mahmood[2]

Abstract

The purpose of the study is to identify the influencing factors and its impacts on non-performing loans of commercial banks in Bangladesh. The study used both primary and secondary data. Primary data were collected through close-end structured questionnaire from the executives of selected banks who are working in the area of credit risk management. The study used factor analysis extracted method of principal component analysis to identify the representative factors of poor credit risk management then used regression analysis to estimate the result. The study found that the credit analysis, CRG and documentation, external pressure, unhealthy competition and integrity, and role of top management are the significant factors for the non-recovery of loans of commercial banks. The study found that credit analysis, credit culture, loan concentration, recovery performance and monitoring, and unhealthy competition and integrity have negative impact on non-performing loans of commercial banks. The study also found that CRG and documentation, interest rates and lending types, external pressure, legal environment, and role of top management have positive impact on non-performing loans of commercial banks. The study suggested that commercial banks and regulators should take care of the factors that are identified by the current research in order to maintain the non-performing loans at optimum level.

Key Words: Non-performing loans (NPL), Credit risk management, Credit risk, Credit analysis.

1. Introduction

The flow of credit is the life blood of economy[1] (Obama, 2009). This flow of credit is provided and maintained by financial intermediaries and growth of credit noted remarkably in the banking industry in the last few decades (Cingolani, 2013). This growth of credit may contributed in the financial development of the country as a whole. But the concerning issue is that the non-recovery of distributed credit due to verities of reasons. The non-recovery of distributed credit is turn into credit risk. From the existing literature have found that credit risk is increased among the competitors that ultimately effect on the credit portfolios due to poor credit analysis procedures and comforting lending benchmarks (Michael, Padilla, and Pagano, 2001; Bolt and Tieman 2004; Jeong and Jung 2013). Non-performing loans is one of the

[1] Associate Professor, Department of Accounting and Information Systems, Jatiya Kabi Kazi Nazrul Islam University, Trishal, Mymensingh-2224.
[2] Professor, Department of Accounting and Information Systems, Jagannath University
[1] The president Barak Obama said this message in the USA congress.

key indicators to detect credit risk. From the inception of global financial crisis in the banking systems and financial markets between mid-2007 and early 2009, non-performing loans have increased notably around the globe. Indeed, as per analysts, the amount of credit risk would be increased tremendously in the coming period that will ultimately influence on the bank's financial health, financial soundness, and sustainability of the banking sector. Even though number of reform initiatives are taken by the central bank and respective banks to control and decrease the credit risk as it was carried more than 80% risk of banks and it was correlated with the bank liquidation and financial crisis. Currently, commercial banks in Bangladesh has been facing of huge non-performing loans. Considering this problem, the study would like to find out the detect factors of non-performing loans and their influence on credit risk. More specifically, the study focused on the state-owned commercial banks and private commercial banks in Bangladesh based on primary and secondary data. A number of studies investigated the determining factor of non-performing loans (Lis, Pagés, and Saurina 2000; Abdelkader, Taktak, and Jellouli, 2009a; Espinoza, Raphael, and Prasad 2010). Though, divergent to the immense widely held of the standing literature, this is the first empirical study that presents findings regarding the factors of credit risk and its impact on credit risk of commercial banks in Bangladesh. The present study contributed to enrich the existing knowledge regarding determining factors of credit risk on a gross basis, in the commercial banks in Bangladesh. Moreover, findings of the study come to an understanding with the existing literature as both bank-specific factors and macroeconomic factors look as if to apply a influential factors on the credit risk.

The rest of the paper is structured as follows. The next section presents the existing literature on non-performing loans, and its determinants. Section 3 describes the sample and the empirical methodology. Section 4 presents the empirical results of analysis and Section 5 offers concluding remarks.

2. Objectives of the Study

The main objectives of the study are:

i. To identify the factors of non-performing loans of commercial banks;
ii. To investigate the impact factors of non-performing loans of commercial banks;
iii. To suggest how to overcome the problems of poor credit risk management.

3. Review of Related Literature

In this section the previous related research works are reviewed regarding factors of credit risk and other relevant studies. The study reviewed most of the studies related with the factors that causes of credit risk of commercial banks and those

factors are linked between bank specific factors and macroeconomic factors. For the purpose of the study, a modest attempt has been made to review the relevant articles, research works, seminar papers etc. Some reviews are cited below:

Basel Committee (1999) Credit risk is the probability that a bank debtor or counterparty will be unsuccessful to meet its commitments in accordance with granted terms. The aim of credit risk supervision is to make best use of a bank's risk-adjusted rate of return by preserving credit risk disclosure within satisfactory limits. As the Basel II put it, banks need to accomplish the credit risk characteristic in the whole selection and the risk in discrete credits or dealings. Banks should also deliberate the connections between credit risk and other risks. The active supervision of credit risk is vital to the long-term achievement of any banking establishment.

Gerlach, Peng and Shu (2005) investigate the movements of credit risk in Hang Kong through a regression equation by using price of equity, price of property, interest rate, CPI, number of bankruptcies, rate of unemployment, and GDP as independent variables. They found that credit risk has positive relationship with interest rate, number of bankruptcies. Conversely, the study found that credit risk has negative influence by CPI inflation, GDP and property price inflation.

Jakubik (2007) argued based on empirical evidence that the non-performing loans are influenced by exchanged rate, loan-GDP ratio, rate of unemployment, and interest rate.

Gambera (2000) used VAR estimation of time series analysis and suggested that filings of bankruptcy, farm income, annual products of state, permits of housing, and rate of unemployment are the most important predictors of non-performing loans.

On the other hand, Louzis, Vouldis, and Metaxas (2011) study used panel dataset to recognize of credit risk manners. They incorporate both macroeconomic and bank-specific factors to know the reasons of credit risk. As per their studies, the quality of credit can be described mostly by macroeconomic variables like GDP, interest rate, debt of public, and unemployment rate.

Tehulu and Olana (2014) used panel data of 10 state-owned commercial banks as well as private owned from 2007 to 2011. They found that credit growth, banks size, operational incompetence, capital adequacy, and bank liquidity have influence on credit risk. They argued that poor management of the banking companies would result in banks inefficiency and touched the procedure of yielding loans.

Mehmed (2014) investigated the influence of bank-specific elements on credit risk for commercial banks in Bosnia. The study used a multivariate panel regression model to discovery the significant relationship between credit risk and the bank-specific variables. In this research, bank-specific variables were incompetency, profitability, credit progress and deposit rate, solvency, loans to deposit ratio, market

power, profitability, and reserve ratio. The study found that credit risk of banks was injuriously affected by incompetency and credit progress.

According to Chaibi and Ftiti (2015) cost efficiency, ratio of capital, non-interest income, bank size, and return on equity as explanatory variables. He found that cost efficiency and bank size were positively related with credit risk. However, the ratio of capital, non-interest income, and return on equity was negatively linked with credit risk. The study showed that cost inefficiency and bank profitability were determining factors of the credit risk level and the declined of loan quality, which were contrarily prejudiced by bank size and capitalization.

Makri, Tsagkanos, and Bellas (2014) opted that the robust correlations between non-performing loans and macro-economic factors which were public debt, unemployment rate, and yearly percentage growth rate of the gross domestic product. Out-of-the-way from macroeconomic factors, they also found that momentous association between non-performing loans and bank-specific elements such as capital adequacy ratio, the rate of non-performing loans of the preceding year and return on equity.

Ghosh, Islam & Hasan (2014) decided that credit risk supervision grips a positive affiliation with credit nursing, dependability and assurance factors. They suggested that to achieve financial goals of banks, it is needed to minimize credit risk by considering credit nursing, dependability, and assurance factors.

Jiménez and Saurina (2004) found that collateralized advances have a greater PD (probability of default). Loans granted by savings banks are riskier, and they also found that a close banker-customer affiliation enhances the willingness to take more risk.

In the above mentioned studies opted that both macroeconomic and bank specific factors appear to govern the credit risk. Nevertheless, it is noticeable that there is enormous gap in factors of credit risk in contemporary literature in the commercial banks in Bangladesh, hope the current study will fill this gap. In this perspective, the present study will contribute in three way. Firstly, the study focus on the opinion of the bank executives regarding factors of credit risk of commercial banks in Bangladesh. Secondly, the study investigates the influence of factors of credit risk. Finally, the study identifies the new factors of credit risk. As a result, this study enriches the existing literature by providing new determining factors of non-performing loans of commercial banks in Bangladesh.

4. Research Questions

The research questions of the study are-

i. Why have commercial banks been facing huge non-performing loans?

ii. To what extent does determining factors influences the non-performing loans?

5. Methods of the Study

This section gives a clear idea about the methodology used in this research. It is designed for carrying out the objectives of the study. It consists of research strategy, population, sample, sampling techniques, sources of data, research model, reliability and validity of data, and finally statistical techniques used in analyzing the data.

5.1 Research Strategy

The study has conducted through **correlational research method** of strategy. Correlational research is used to find relation between two set of variables. Regression is generally used to predict outcomes of such a method. It can be positive, negative or neutral correlation (Kumar, 2007). In this approach, quantitative data are collected, organized and analysed which from secondary and primary sources.

5.2 The Population of the Study

The population of the study has covered two categories of commercial banks-state owned commercial banks and private commercial banks. It is mentioned that there are 55 commercial banks in Bangladesh. Out of 55 commercial banks, 6 are SCBs, 40 are PCBs and 9 are FCBs. Population of the study is to 46 commercial banks, here SCBs and PCBs are included. FCBs are not included in the population of the study because of their insignificant amount of credit risk. They are not severely affected with the problem of non-performing loans. That's why, FCBs are excluded from the population of the present study.

5.3 Sample Design

Sampling design depends on researcher's decision about population/universe, sampling technique, sample size etc. The concept of population has been used rather than universe in the study. It is difficult on the part of the researcher to create a sampling frame of the target population. One of the suitable sampling methods was where the population would be divided into clusters. The study is limited to State-Owned Commercial Banks (SCBs) and Private Commercial Banks (PCBs). The risk management rules and regulations are framed at the banks head offices and the same is executed at all the regional and branch levels. Out of the total SCBs (6) and PCBs (40) in banking sector, 10 banks (4 from SCBs and 6 from PCBs) were selected on the basis of market share.

5.4 Sampling Unit

The study has covered data of 10 selected commercial banks in Bangladesh from state-owned commercial banks and private commercial banks. Banks have been selected on the basis of market share for proper comparison.

5.5 Sampling Techniques

As stated earlier the population has been divided into two categories SCB and PCB. A proportionate number of respondents have been selected based on **Anderson** formula to collect primary data through questionnaire those who are engaged in the functioning of credit risk management whether directly or indirectly. Sample banks have been chosen for the study subject to their exposure to strategic and operational issues related to credit risk management system and practices in the banking industry.

5.6 Sample Size

The study selected 10 banks out of 46 SCBs and PCBs in the finite cluster of the population. Using without replacement method, 4 State-Owned Commercial Banks namely: Sonali Bank Limited, Janata Bank Limited, Agrani Bank Limited, and Rupali Bank Limited; and 6 Private Commercial Banks includes: National Bank Limited, Pubali Bank Limited, City Bank Limited, United Commercial Bank Limited, Arab-Bangladesh Bank Limited, and IFIC Bank Limited have been selected to study. The study has used annual reports of each bank from 2000-2020 as secondary data. Therefore, there is a total of 210 observations (10 banks×21 years) were used in the quantitative data analysis.

For opinion survey, sample has been limited to 100 respondents with rational proportion from each category of banks by using the Anderson formula (1996, 820).

Table-01: Determining Sample Size

Sample size, $n = \frac{N.p(1-p)}{N(\frac{\alpha^2}{4})+p(1-p)}$ $n = \frac{74292 \times .5(1-.5)}{74292\left(\frac{.10^2}{4}\right)+.5(1-.5)}$ $= \frac{18573}{185.98}$ =100	Where: N = Number of known population = 74,292(actual); p = Proportion of belonging to a specific Category =.5 (Assumed); (1-p) = Proportion of not belonging to a specific category = 1- .5 = .5 ; α = Level of significance =10% (i.e., level of significance; n = Sample size.

Sample allocation according to strata

Total number of employees (officers), N=74,292

Total number of employees (officers) in SCB_s, N_1 =51,662

Total number of employees (officers) in PCB_s, N_2 =22,630

Overall sampling fraction is $f=\frac{n}{N} = \frac{100}{74292}$ =0.0013460

Thus, applying the formula $n_h \propto N_h$ or $n_h = \frac{n}{N} \times N_h$ (h=1,2)

Sample size of employees (officers) in SCB_s , $n_1 = \frac{n}{N} \times N_1 = \frac{100}{74292} \times 51{,}662 = 69.53911 = 70$

Sample size of employees (officers) in PCB_s, $n_2 = \frac{n}{N} \times N_2 = \frac{100}{74292} \times 22{,}630 = 30.46088 = 30$

Out of 100 respondents, 70 respondents have from SCB and 30 respondents from PCB.

5.7 Opinion Survey, Scale and Measurement

The descriptive part of the study is carried out using a survey research method which involves a structured questionnaire. It was divided into 2 sections. The following table provides a detail description of the questionnaire:

Table-2: Structure of the Questionnaire

Sections	Details
Sections-A	General information of the respondent.
Sections-B	Perception of respondents about the factors of credit risk.

The questionnaires were filled up by the respondents which were sent personally as well as through email. The researcher has used close-ended questions, in which the respondents were asked to choose between different levels of agreement. The study used 5 point-Likert scale, to increase the rate and quality of the responses. The diagrammatic rating scales used in the questionnaire are as follows:

Strongly Agree=5	Agree=4	Indifferent=3	Disagree=2	Strongly Disagree=1

5.8 Sources and Collection of Data

This research has based on both primary and secondary data. So, different data collection techniques, tabulation, and analysis tools has been used in different stages. Primary data have been collected through opinion survey by a close-ended structured questionnaire. The secondary data are collected from annual reports of selected SCBs and PCBs from 2000 to 2020.

5.9 Variable Description

The variables listed in the following cannot be categorized as independent or dependent variables. But the study variable can be categorized as credit risk indicator, factors of credit risk management. Categorized dependent and independent variables are presented below:

5.9.1 Dependent Variable

The study has decided to use non-performing loans ratio, as the indicator of the credit risk because this indicator has been widely used in earlier research (Park, 2012; Elnahass et al. 2014; Skala 2015; Hyun & Rhee 2011). Details about credit risk indicator are described below:

5.9.1.1 Non-Performing Loans (NPL)

Non-performing Loans is the ratio of non-performing loans to total loans (Yang 2010, 2017). Non-Performing Loans reflects the quality of the loans made by banks. It consists of sub-standard, doubtful, and bad & loss assets. The equation of NPLR is, NPLR= $NPLs / Total\ Loans$. It is calculated as, the value of total classified loans as the numerator and the total outstanding loans as the denominator. The study has been identifying the non-performing loans as a major indicator of credit risk based on previous research (Park, 2012; Elnahass et al. 2014; Skala 2015; Hyun & Rhee 2011).

5.9.2 Independent Variables

5.9.2.1 Determining Factors of Credit Risk

Based on opinion survey the present study identifies the nine (09) determining factors of credit risk. It is noted that out of 43 factors the study identify the nine (09) factors by using factor analysis extracted method of principal component analysis. At this stage, nine representative factors are considered as determining factors of credit risk which are credit analysis, CRG and documentation, loan Concentration, recovery performance and monitoring, interest rates and lending, credit culture, unhealthy competition and integrity, external pressure, legal environment, top management. It is noted that there is no multi-collinearity effect among the variables.

5.10 Research Model

Based on previous literature, the study undertakes Non- performing loans is the indicator of credit risk which is affected by the numerous factors of poor credit risk management (Park 2012; Elnahass et al. 2014; Skala 2015; Hyun & Rhee 2011). The study assumes that factors of poor credit risk management have influence on non-

performing loans of banks (Dalton et al. 1999; Chou and Buchdadi 2017; Weir et al. 2002; Goddard et al. 2004). The model has used to find out the impact of determining factors of credit risk on non-performing loans of commercial banks in Bangladesh.

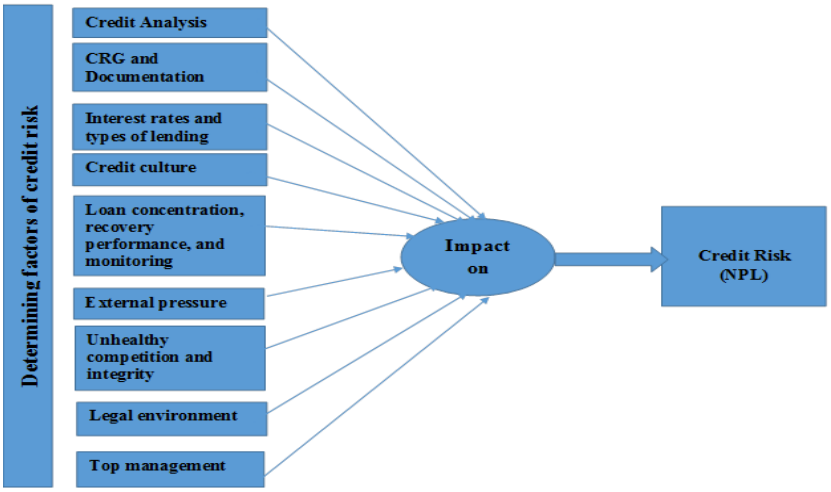

Figure: Research Model

5.11 Model for the Analysis

Regression equation model for the dependent variable and independent variables-

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots\ldots + \beta_i X_i + \varepsilon$$

$Where\ \alpha = Intercept$

$X_i = Independent\ \ \text{var}iables$

$\beta_i = \text{Re}\, gression\ \ co - efficients; i = 1,2,\ldots\ldots,k$

5.12 Reliability and Validity Test:

Reliability and validity test are frequently used in qualitative and quantitative studies. Reliability mentions the accuracy and consistency of the research outcomes based on the data used. In quantitative research, reliability is the strength of the measurement over time, the similarity of the measurements during the given period, and also the degree to the equivalent results of the measurement given repetitively. Validity means the accuracy of the measurement of which it is intended to be measured and how truthful the results of the research are (Golafshani 2003). To test the reliability of the data collected Cronbach's Alpha test has been undertaken. To ensure the accuracy of the results, the study has triple checked the data collection and

calculation process. The reliability of the SPSS results has been proved by many studies. Thus, the theories, findings and the results obtained through the statistical analysis are replicable which consequently guarantee the reliability and validity of the study.

5.13 Statistical Techniques

Statistical tools have become a common phenomenon in the area of research as well as in management to analyze and interpret the data. The main base of the study is to find out the impact of factors of poor credit risk management on non-performing loans of the sample banks. Verifying and testing the hypothesis, some techniques have been used. The used statistical techniques are average, standard deviation, t-test, f-test, KMO and Bartlett's test, correlation analysis, multiple regression analysis, factor analysis, ANOVA, Diagrammatic and Graphical techniques like bar diagram, Pie Charts, etc. has been used for the presentation of the data in the present study.

5.14 Hypothesis of the Study

"Hypothesis is a special proposition formulated to be tested in a certain given situation as a part of research which states what the researcher is looking for." (Michael, 1985). For the study, the researcher has formulated two types of hypotheses viz. Null hypothesis and Alternative hypothesis. Hypotheses were tested with the help of statistical tools. Hypotheses are as under:

H_0: Credit risk is not associated with the factors of poor credit risk management.
H_1: Credit risk is associated with the factors of poor credit risk management.

5.15 Limitations of the Study

The study is limited to find out the impact of determining factors of poor credit risk management on non-performing loans of commercial banks in Bangladesh. Therefore, the other risks mentioned in Basel Accords are not examined. The study sample comprehends only 10 commercial banks (4 from SCBs and 6 from PCBs) and their data for 21 years pull-out from annual reports from 2000 to 2020. The constraint of the secondary data and its findings depend completely on the accurateness of such data. Primary data are collected through the close end structured questionnaire from the executives of head office only. The number of independent variables could be more than the mentioned variables in the study. Additionally, the independent variables are chosen based on factor analysis and therefore the statistical model could be subjective. Therefore the quality of this study depends on superiority and reliability of data published in mentioned reports.

6. Empirical Results

6.1 Descriptive Statistics

The descriptive statistics of the variables used in this empirical analysis are presented in Table-03.

Table-03: Descriptive Statistics

Variables	Mean	Std. Deviation	N
Non-Performing Loans	17.6953	10.50183	100
Credit Analysis	4.7205	.57184	100
CRG and Documentation	4.8183	.25234	100
Interest rates and Lending	4.2258	1.20879	100
Credit culture	4.2203	.99756	100
Loan Concentration, recovery performance and monitoring	3.8785	.99568	100
External Pressure	3.8848	1.50008	100
Unhealthy competition and Integrity	3.3434	1.19784	100
Legal Environment	4.0816	1.13418	100
Top Management	4.3023	1.01666	100

Source: Author's own analysis by SPSS-24.

From the above table-03, it is found that the average value of dependent variable 'non-performing loans' is 17.6953 with the standard deviation of 10.50183. It is also found that the highest value of independent variable 'CRG and documentation' is 4.8183 with the variation of 0.25234. On the other hand, the lowest average value of independent variable 'Unhealthy competition and integrity' is 3,3434 with the disparity of 1.19784.

6.2 Estimation Results

In the following table shows the result of regression analysis regarding the impact of factors of poor credit risk management on non-performing loans of commercial banks in Bangladesh:

Table-04: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.825[a]	.680	.649	6.22592	.680	21.298	9	90	.000

a. Predictors: (Constant), Top Management, Credit Analysis, CRG and Documentation, Loan Concentration, recovery performance and monitoring, Unhealthy competition and Integrity, Interest rates and Lending, Credit culture, External Pressure, Legal Environment

Source: Author's analysis by SPSS-24.

Table-05: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7429.968	9	825.552	21.298	.000[b]
	Residual	3488.587	90	38.762		
	Total	10918.554	99			

a. Dependent Variable: Non-Performing Loans

b. Predictors: (Constant), Top Management, Credit Analysis, CRG and Documentation, Loan Concentration, recovery performance and monitoring, Unhealthy competition and Integrity, Interest rates and Lending, Credit culture, External Pressure, Legal Environment

Source: Author's analysis by SPSS-24.

Table-06: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-32.355	13.817		-2.342	.021		
	Credit Analysis	-4.390	1.605	-.239	-2.735	.008	.465	2.151
	CRG and Documentation	9.829	2.730	.236	3.600	.001	.825	1.212

Interest rates and Lending	1.171	.830	.135	1.410	.162	.389	2.573
Credit culture	-0.111	.976	-.011	-.114	.910	.413	2.423
Loan Concentration, recovery performance and monitoring	-0.116	.785	-.011	-.147	.883	.641	1.561
External Pressure	2.077	.730	.297	2.846	.005	.327	3.060
Unhealthy competition and Integrity	-1.995	.590	-.228	-3.382	.001	.784	1.275
Legal Environment	1.165	1.322	.126	.881	.381	.174	5.738
Top Management	3.075	1.413	.298	2.176	.032	.190	5.274

a. Dependent Variable: Non-Performing Loans

Source: Author's analysis by SPSS-24.

Interpretation:

H_0: β's = 0 i.e Non- performing loan is not dependent on factors (Credit Analysis, CRG and Documentation, Interest rates and Lending, Credit culture, Loan Concentration, recovery performance and monitoring, External Pressure, Unhealthy competition and Integrity, Legal Environment , Top Management)

H_1: β's $\neq$ 0 i,e Non- performing loan is dependent on factors (Credit Analysis, CRG and Documentation, Interest rates and Lending, Credit culture, Loan Concentration, recovery performance and monitoring, External Pressure, Unhealthy competition and Integrity, Legal Environment , Top Management)

The estimated regression model is:

$$Y = \alpha+\beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5+ \beta_6X_6+ \beta_7X_{7+} \beta_8X_8+ \beta_9X_9 +\varepsilon$$

The estimated model is-

$$\hat{y}= -32.355–3.490\ X_1 +9.829\ X_2 +1.171X_3 –0.111\ X_4 – 0.116\ X_5 + 2.077\ X_6 – 1.995X_7 +1.165X_8+ 3.075\ X_9 +\varepsilon$$

Or, Non-Performing Loans Ratio =-32.355–3.490 (Credit Analysis) +9.829(CRG and Documentation)+1.171(Interest rates and Lending)–0.111(Credit culture)–0.116(Loan Concentration, recovery performance and monitoring)+2.077(External Pressure)-1.995(Unhealthy competition and Integrity)+ 1.165(Legal Environment) + 3.075(Top Management)

Interpretation: Estimated value of F = 21.298 and p value = 0.000 indicates that the model fit is appropriate and null hypothesis is rejected. The empirical results

depicted that the value of VIF (Variance Inflation Factor) is greater than 1 but less than 10. That means variable are free from multi-collinearity problem.

The estimated value of β_1 = -4.390 which implies that for a 1% increase in the variation in 'credit analysis' affects non-performing loan on an average 4.39% negatively. P-value 0.008 indicates 'credit analysis' has statistically significant impact on non-performing loan in banks of Bangladesh. It says that rigorous credit analysis can contribute to reduce non-performing loans of commercial banks.

The estimated value of β_2 = +9.829 which implies that for a 1% increase in the variation in 'CRG and documentation' affects non-performing loan on an average 9.829 % positively. P-value 0.001 indicates 'CRG and documentation have statistically significant impact on non-performing loan in banks of Bangladesh. It says that manipulated CRG and making documentation can enhance the non-performing loans of commercial banks.

The estimated value of β_3 = +1.171 which implies that for 1% increase in the variation in 'interest rates and lending' affects non-performing loan on an average 1.171% positively. P-value 0.162 indicates 'interest rates and lending' has a positive impact on non-performing loan in banks of Bangladesh. It says that higher interest rates and types of lending can contribute to increase the non-performing loans of commercial banks.

The estimated value of β_4 = –0.111 which implies that for a 1% increase in the variation in 'credit culture' affects non-performing loan on an average 0.111% negatively. P-value 0.910 indicates 'credit culture' has no statistically significant impact on non-performing loan in banks of Bangladesh. It says that present credit culture can contribute to reduce non-performing loans but it is statistically insignificant.

The estimated value of β_5 = – 0.116 which implies that for 1% increase in the variation in 'loan concentration, recovery performance and monitoring' affects non-performing loan on an average 0.116% negatively. P-value 0.883 indicates 'loan concentration, recovery performance and monitoring' has no statistically significant impact on non-performing loan in banks of Bangladesh. It states that loan concentration, recovery performance and monitoring can contribute to decrease the non-performing loans which is insignificant.

The estimated value of β_6 = +2.077 which implies that for a 1% increase in the variation in 'external pressure' affects non-performing loan on an average 2.077% positively. P-value 0.005 indicates 'external pressure' has impact on non-performing loan in banks which is statistically significant.

The estimated value of β_7 = -1.995 which implies that for a 1% increase in the variation in 'unhealthy competition and integrity' affects non-performing loan on an

average 1.995% negatively. P-value 0.001 indicates 'unhealthy competition and integrity' has impact on non-performing loan in banks which is statistically significant.

The estimated value of β_8= +1.165 which implies that for a 1% increase in the variation in 'legal environment' affects non-performing loan on an average 1.165% positively. P-value 0.381 indicates 'legal environment' has no statistically significant impact on non-performing loan in banks. It states that lack of proper legal environment can enhance non-performing loans which is statistically insignificant.

The estimated value of β_9 = +3.075 which implies that for 1% increase in the variation in 'top management' affects non-performing loan on an average 3.075% positively. P-value 0.032 indicates 'top management' has a statistically significant impact on non-performing loan in banks. It shouts that role of 'top management' can accelerated the non-performing loans of banks.

The study found that the credit analysis, CRG and documentation, external pressure, unhealthy competition and integrity, and top management are the significant factors for the non-recovery of loans of commercial banks. The study found that credit analysis, credit culture, loan concentration, recovery performance and monitoring, unhealthy competition and integrity have negative impact on non-performing loans of commercial banks. The study also found that CRG and documentation, interest rates and lending types, external pressure, legal environment, and top management have positive impact on non-performing loans of commercial banks.

7. Conclusions

In the current study, the researcher applied an econometric model that contributes to identify the factors of poor credit risk management of commercial banks in Bangladesh. Using aggregate data from 10 commercial banks, the study found the associationship between non-performing loans and factors of poor credit risk management. It is worthwhile to mention that it is the first empirical study, which explores the possible cause of poor credit risk management based on opinion from bank executives who are directly working in the area of credit risk management and the identified factors have effect on the non-performing loans. The study found that the credit analysis, CRG and documentation, external pressure, unhealthy competition and integrity, and role of top management are the significant factors for the non-recovery of loans of commercial banks. The study suggested that commercial banks and regulators should take care of the factors that are identified by the current research in order to maintain the non-performing loans at optimum level. The researcher hope that if the non-performing loans amount kept at minimum level that will ensure sustainable development in the banking industry in Bangladesh.

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ASSOCIATION BETWEEN ENVIRONMENTAL POLICIES AND POVERTY REDUCTION: MEDIATING ROLE OF ENVIRONMENTAL SUSTAINABILITY

Md. Mizanur Rahman[1] and Dr. Md. Miraj Hossen[2]

Abstract:

Environmental sustainability is a much-talked issue over the last century all over the world. Nowadays, it is extended that environmental policies can help to improve the per capita income through ecological sustainability. The present study aims to build a bridge between environmental policies and poverty reduction. To conduct the study the researchers have considered some selected coastal areas of Bangladesh and collected data through a questionnaire survey over 264 respondents. The study found positive connectivity between environmental policies and environmental sustainability. In addition, the study outcomes reveal that environmental policies, and environmental sustainability has significant effects on people's income generation and poverty reduction of the coastal areas of Bangladesh. The study concludes with some recommendations for the government policy makers, implementers, mass people, and other related parties. The authors believe that if all the related parties play their role consciously at the time of policy formulation and implementation; surely it will be helpful to reduce people's suffering, improve health and well-being of the people which ultimately contribute to reduce the level of poverty.

Keywords: Environmental sustainability, environmental policy, coastal areas, poverty reduction, Bangladesh.

1.0 Introduction

Bangladesh is a developing country in Asia who is facing extreme level of challenges to ensure the environmental sustainability. About one-third people of the country are still in under poverty level though the success of Government's poverty reduction is significant. Due to the natural calamities and vulnerable environmental conditions, people of coastal areas of Bangladesh suffers most in their financial and non-financial lives. (Bing, Islam, & Hossen, 2019). To improve the livelihoods of such vulnerable people, it is important to make a bridge between the implementation of environmental policies and poverty reduction. Over many years, different national and international communities have endeavored to discourse many environmental challenges and possible solutions but still a significant number of the world population passing their lives under vulnerable environment with sufferings of poverty. So, it is an obvious need to plan for development initiatives to ensure

[1] Professor, Department of Management Studies, Jagannath University, Dhaka- 1100
[2] Associate Professor, Department of Management Studies, Jagannath University, Dhaka- 1100

environmental sustainability and poverty mitigation. In case of Bangladesh, the inhabitants of the coastal areas most often experienced different types of environmental hazards and natural calamities which is one of the most important reasons of their ill-health and financial backwardness. The Government of the country is also conscious about their lives and has given emphasizes on the environmental sustainability and economic development especially for the vulnerable coastal parts at the time of formulating and implementing environment policies.

The first international gathering on an environmental issue was the United Nations conference on the human environment which was held in 1972. Following this event, many international conferences and seminars were arranged to set out the major objectives, agenda, to protect the global environment and poverty alleviation. Over the passage of time, many researchers are putting their restless efforts to develop new and better policies regarding management of environmental sustainability which can help to lessen poverty. Among different approaches of creating public awareness; the most effective one is to share the ideas and thinking among different parties, policymakers, practitioners and academicians. In many cases, the innovative climate-governance can't bring notable solutions due to ongoing change of environment (Bulkeley, Broto, & Edwards, 2014). Over last 50-years, the world ecologies has changed an extraordinary level due to over growing number of population and their intrusion to meet the needs of extra unit of population (Palmer & Di Falco, 2012). Observing the world's imbalanced ecosystems and its effects on poverty. Adams et al. (2004) suggested to initiate a factual framework expressing the relationship between environmental policies and poverty reduction. In 2011, World Food and Agriculture Organization (FAO) published a report mentioning the relationships between degraded land and poverty level which indicate the degraded land areas are 40%, 30%, and 20% in the highly poor, moderately poor, and slightly poor regions. Thus, the much talked two interlaced constituent poverty reduction and environmental sustainability should be faced one to one to accomplish sustainable development goals (Reardon & Vosti, 1995). Observing the prevailing condition, the researchers feel interest to investigate the matter whether the implementation of environmental policies can ensure environmental sustainability and reduce poverty through income generation or not. Many previous literatures demonstrated that there is a linkage between implementation of environmental policies and citizen's income generation and poetry reduction.

1.1 Research objectives

The researcher expects to have a look on the degree of the implementation of environmental policies and its impact on environmental sustainability which will ultimately help the citizens to be healthier and hard worker. Besides, the researchers assumed that the implementation of environmental policies will help to reduce the

level of poverty and improve the economic development of the country. Moreover, the study mainly based on following two research objectives:

- To measure the effect of environmental policies upon ensuring sustainable environment;
- To investigate the role of environmental policies on poverty reduction in coastal areas of Bangladesh.

1.2 Research questions

Following research questions are used to reach the targeted outcomes:

RQ1. How do the environmental policies increase the different segments of people's living?

RQ2. How do different slices of environmental policies ensure environmental sustainability?

RQ3. How do environmental policies help to increase people's income and reduce poverty?

2.0 Theoretical Concepts and Literature Review

2.1 Environment and Environmental Policies of Bangladesh

Environment is considered as all the natural substances in a particular geographic region which affects human lives and also affected by people's activities. It also comprises biotic factors such as air, water, soil and all other living things which determines the people's lives and survivals. Environment is one of the most crucial issues all over the world and Bangladesh is not exception of it though there was no precise environmental policy in the early years of independence. The country's concerns for environment protection were, however, mirrored in all the Five-Year national plans which was started in 1973 and till date 8th Five-Year plan is formulated. Under the first three five-year plan it was emphasized to upgrade the human environment such as sanitation, public health, nutrition, water supply and housing so that people can get a good health and better lives. In 2003, an environment policy was formulated following the poverty reduction strategic paper-PRSP-I, and PRSP-II for the years of 2008-2011 as fourth and fifth environmental plans accordingly. Besides, over the period of time Sixth Five-Year Plan (2011-2015), Seventh Five-Year Plan (2015-2020), Eighth Sixth Five-Year Plan (2020-2025) were formulated chronologically. In addition, some other environment related policies- National Environment Policy 2018, Bangladesh Bio-diversity Act 2017, Environmentally Critical Area Management Rules 2016, Environmental Court Law 2010, Environmental Protection Rules 2010, National Water Policy- 1999, Industrial Policy, 1986, National Land Use Policy- 2001, Forest Policy, and Environment Policy on the issue of Energy of 1996 are formulated in a regular basis..

All environmental policies of the country have given emphasis on environmental sustainability with some other specific objectives such as- preserve ecological balance, protect the country against natural disasters, ensure environmentally sound development in all sectors, and confirm supportable and wide-ranging use of all national resources. To implement and to get the optimum benefits from environmental police the country faces some challenges which are- inconsistency with other policies, lack of regulatory and institutional capacity, limitations of the environment laws, and Politician- Polluter nexus.

2.2 Literature Review and Development of Research Model

Over the last half century, human intervention on the worldly ecologies has brought an extraordinary revolution as the production of food grains and consumptions increases due to the increased number of population (Palmer & Di Falco, 2012). In support of the previous statement Hassan, Scholes, and Ash (2005) argued that 'about one fourth of the cultivable land already been occupied by the increased number of population'. Observing the situations, Adams et al. (2004) argued that it is essential to develop a conceptual framework relating the poverty reduction and proposed policies regarding environment; whereas Dubois (2011) argued that ecological balance and level of poverty are meticulously linked each other. Therefore, two interconnected constituent poverty reduction and environmental sustainability should be tackled carefully to attain sustainable development goals (Reardon & Vosti, 1995). Environment management is the basis of environmental sustainability and economic progress of any nation which should be experienced from household to each slice of public actions (Hossen, Begum, & Sultana, 2018). Agarwal and Narain (2002) claimed that there is enough evidence to be sure that poverty is one of the vibrant causes of the degradation of environment and vice-versa; whereas Zhen, Fu, Lu, and Wang (2014) defended with evidence that poverty is not the only reason for environmental degradation.

As natural resources are important to meet the social benefits, every slice of natural resources over the world are decreasing day by day which make the environment imbalance (Teytelboym, 2019). As economic development is one of the rudiments availing environment friendly products and services, people should be much more conscious for consuming the natural resources (Greenstone & Jack, 2015). The relations of natural resources, per capita income, and poverty reduction are somewhat debated as different studies have found different results. Some studies direct that there is a incremental effects (Clements, Suon, Wilkie, & Milner-Gulland, 2014; Miranda, Corral, Blackman, Asner, & Lima, 2016) whereas some other studies concluded that natural resources strengthen the level of poverty in the local inhabitants (Adams et al., 2004; Cernea & Schmidt-Soltau, 2006). Vedeld, Jumane, Wapalila, and Songorwa (2012) defended that the prime motive of reservation of

natural capital is to balancing the environmental issues over to alleviate the poverty. There also have also more arguments- that the poverty reduction and natural preservation has positive relations (Roe, Mohammed, Porras, & Giuliani, 2013). In many previous literatures, it is also well-defined that there is a positive relation and direct effects of natural reserver on poverty mitigation (Ferraro & Hanauer, 2014; Job & Paesler, 2013).

The use of environment friendly products and tumbling the consumption of resources help to safeguarding sustainability for longer time. The environment related public policy and awareness of mass people can help to lessen carbon-dioxide and improve the ecological balance which can also help improve citizens' health, human well-being, and national production (Chen, Hossen, Muzafary, & Begum, 2018). Green management is the basis of environmental sustainability and economic progress of any country which should be practiced by each individual to every part of government actions (Hossen et al., 2018). In a study Zhen et al. (2014) have defended the contradictory views regarding the rapport between poverty level and ecological degradation, and established that the development of the ecosystem can help to protect environment and alleviate poverty together. In developing or even in some developed countries, the balanced environmental amenities are often important to enduring livings, societies and indorsing human right (Greenstone & Jack, 2015). The impact environmental service on ecological upshots and local people's incomes are contrary and have been usually argued. After reviewing the literature and observing the countries overall envirnomenatl policies, the authors have conceptualized the following model to conduct this study:

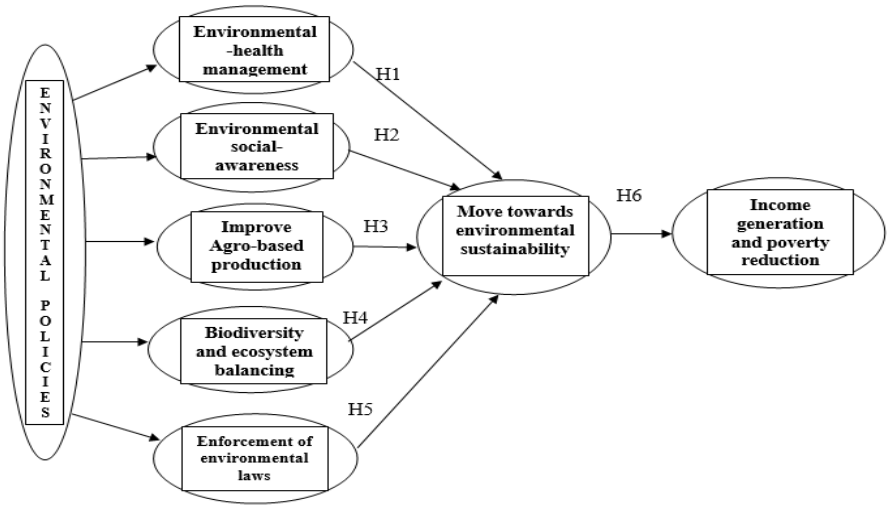

Figure- 1: Proposed research model

Based on the above research model the study formulates the following hypotheses-

H1: Environmental-health management positively forward environmental sustainability.

H2: Environmental-social awareness plays positive role to ensure environmental sustainability.

H3: Improved agricultural production has a significant effect on environmental sustainability.

H4: Biodiversity and ecosystem balance have positive impact on environmental sustainability.

H5: Enforcement of environmental laws positively affects the environmental sustainability.

H6: Environmental sustainability positively affects citizen's income and poverty reduction

3.0 Research Methods

3.1 Study area and sample

To conduct the present study the authors have considered the inhabitants of the coastal areas of Bangladesh especially the inhabitants of Cox's bazar, Luxmipur, Barguna, Patuakhali, and Bhola districts. These selected regions are considered as some of the most vulnerable geographical areas because most often different types of natural disaster visit these areas. To select sample from theses population it was considered some professions such as government and non-government service holders, farmer, fishermen, and businessmen who have some experiences to face natural disasters and effects of environmental policies on their lives. The study is conducted covering 264 samples considering at least 50 respondents from each of the five districts. For sampling, the authors have adopted simple random sampling technique; then three non-probability sampling techniques; quota sampling for each district equal (50) numbers of respondents, judgmental sampling to select the respondents; convenience sampling for distribution the questionnaire to respondents.

3.2 Data Collection and Analysis

The present research mainly grounded on primary data which are gathered through using a semi-structured questionnaire. To prepare close-ended questionnaire the five-point Likert scale is used (staring from 1= strongly disagree to 5= strongly agreed whereas 3= neutral position). Data were collected from the sample respondents of the selected coastal areas with taking help from a number of data collectors who are the local people of that area and those people were appointed for 2

weeks. The researcher used MS-Word, MS-Excel, and SPSS (Statistical Package for Social Science) to process and analyze the data for the study.

4.0 Data Analysis and Discussion

4.1 Respondents' Biography and their Responses

Though the targeted sample was 250 at last the study used 264 samples. Among 264 respondents the highest number at least 179 are male and 124 are holding some jobs whether government or non-government, other respondents are businessmen, fishermen, and farmers and their number is 140. In terms of age group, the major portion is in between the age of 20-40 years which is about 86% of total respondents. Roughly, it is to be said that the respondents are equal numbers at least 50 from all the five districts.

In terms of general questions all the respondents are somewhat concern about the environmental policies of Bangladesh and they think it has significant impacts on people's health and livelihood, increase the agro-based production, balancing bio-diversity and eco-systems. Moreover, all the respondents believe that governmental proper policy regarding environment can play a significant role to ensure environmental sustainability which can ultimately ensure good health and sound mind. The ultimate impacts of such type of environmental policies can help to generate income and reduce poverty as the good health and sound mind can help to make people able to work more and face challenges.

4.2 Statistical Analysis

To test the data variability and validity the authors have tested Cronbach Alpha and some other descriptive statistics which are presented in table-1. The calculated results exposed that all the constructs of considered variables are reliable as meet the minimum level of standard value for Cronbach Alpha 0.70 suggested by Kline (1999). Besides, the calculated values for the descriptive statistics represented the mean values are greater than 4 except 3.87 for the improved agro-based production (IAP) variable that is also connected with lowest value of standard deviation ± 0.471 and variance 0.222.

Table-1. Descriptive Statistics for Variables

Variable	Mean	Std. Deviation	Variance	Cronbach α
EHM	4.360	0.575	0.330	0.734
ESA	4.185	0.490	0.240	0.758
IAP	3.871	0.625	0.390	0.761

BEB	4.168	0.471	0.222	0.878
EEL	4.483	0.580	0.336	0.794
MFES	4.117	0.477	0.228	0.767
IGPR	4.097	0.491	0.241	0.791

Source: Developed by author

Here, EHM- Environment Health Management, ESA- Environmental Social Awareness, IAP- Improved Agro-based Production, BEB- Bio-diversity and Ecosystem Balancing, EEL- Enforcement of Environmental Laws, MFES- Move-forward Environmental Sustainability, and IGPR- Income Generation and Poverty Reduction.

The table-2 denotes the correlations among all the considered variables for this study. The calculated values of the correlations show that all the variables are significantly related positively with each other.

Table-2. Correlation Coefficient for Variables

Variables	EHM	ESA	IAP	BEB	EEL	MFES	IGPR
EHM	1						
ESA	0.879**	1					
IAP	0.637**	0.621**	1				
BEB	0.856**	0.897**	0.575**	1			
EEL	0.979**	0.887**	0.579**	0.879**	1		
MFES	0.726**	0.973**	0.519**	**0.987****	0.775**	1	
IGPR	0.734**	0.892**	**0.471****	0.973**	0.711**	0.958**	1

** Correlation coefficient are significant at 0.01 level (two-tailed).

Table-3 denotes the multiple-linear regression analysis on income generation and poverty reduction (IGPR). In model-1 only the variable- education has positive effect on IGPR which is also have significant effects at 5% level of significance; whereas the other variables like age, gender, occupation have negative effect. In model-2, all the five independent variables are considered and their calculated values indicate the variable EHM, ESA and EEL have inverse effects on IGPR whereas IAP, BEB have positive impacts on IGPR. As stated in the table 3 (model 2), the influences of ESA, and BEB on IGPR are significant at 0.1% level and two hypotheses (H2 and H4) are accepted. Later on, the mediating variable move forward environmental sustainability (MFES) is considered in model 3 and found there is a positive and significant effects

of it on the income generation and poverty reduction (IGPR). Thus, the related hypothesis (H6) also is accepted here at 0.1% significant level**.** Oppositely, the hypotheses (H1, H3, H5) related to the variables EHM, IAP, and EEL with IGPR are rejected due to their greater p-value ($P \geq 0.05$).

Table-3. Multiple Linear Regression Analysis of IGPR

Model Variable	Model 1	Model 2	Model 3
Control variables			
(Constant)	3.875***	0.041	0.033
Gender	-0.178*	-0.018	-0.017
Age	-0.054	-0.005	0.007
Education	0.053	-0.007	-0.013
Occupation	-0.029	-0.00053	0.005
Independent Variables			
Environmental-health Management (EHM)		-0.087	0.093*
Environmental Social Awareness (ESA)		-0.768***	-0.671***
Improved Agro-based Production (IAP)		0.013	0.007
Biodiversity and Ecosystem Balancing (BEB)		1.935***	0.792***
Enforcement of Environmental Laws (EEL)		-0.110	-0.078
Mediator			
Move to Environmental Sustainability (MFES)			0.796***

Source: Author developed

Note. N= 264, Entries are standardized regression coefficients.

Dependent variable: Income Generation Poverty Reduction (IGPR).

*** $P \leq 0.1$, ** $P \leq 0.01$, * $P \leq 0.05$ (two tailed).

The study found significant effect of environmental social awareness (ESA) and bio-diversity and ecosystem balancing (BEB) on environmental sustainability. Besides, environmental sustainability also has significant effect on income generation and poverty reduction. Though other variables (EHM- environmental health management, IPM- improved agro-based production, and EEL- enforcement of

environmental laws) didn't have significant effects but their effects also positive towards environmental sustainability. At the end of the analysis it is concluded that environmental policy execution plays a vibrant role in environmental sustainability which also helps people to have good health and be hard workers and the ultimate effects go to their income generation and poverty reduction (IGPR).

5.0 Conclusions and recommendations

As poverty is one of the main reasons of the development of the nation, the Government of Bangladesh is adamant to make the country hunger free and fight against poverty. To ensure healthy nation and poverty free country it is badly needed to make a balanced ecosystems and environmentally sustainable country. For this reason, proper policy making, and implementation of polices should be emphasized. The authors expect that the proper implementation of the environmental policies will really help to increase the income of that particular areas people and help the country to be a middle-income country. At the end of the present study the authors recommended some suggestions to the policy makers and the implementing bodies of the Government level, and hopes that if the concerned authority take care of it; surely the research outcome will help to build a better economy of the country as the supportable ecological policy can save the living and income of the mass people of the remote areas.

For furthering environmental policy development and implement, the government, policy maker, and all other related parties should consider the above-mentioned issues at the time of any decision making. If the government take necessary steps and ensure proper implementation to preserve environment; surely the inhabitants of coastal areas will get support and be safe from the natural disaster and water related diseases which will help them to work for the betterment of the greater economy of the country. Though the present study is a good one but it has some limitations namely- time, budget, geographic areas, respondents' illiteracy and many more. Besides, COVID-19 situation affects the data collection and geographic coverage for this study. To get more reliable and up-to-date findings such type of research should be continued. Future researchers can do the same research extending the areas in coastal zone, adding more variables, or even covering a large number of respondents.

After completing the study, the authors proposes the following recommendations for the government, policymakers, inhabitants of the coastal areas and all other related parties:

- The government should assess the feasibility through pilot testing for each and every project before implementing it in mass level.

- The implementing bodies such as local government should act sincerely and proactive way so that the general people will get the highest level of benefits.
- The local leaders, journalist, environmental activists, Government and NGO professionals, and general people should come forward to help the government authorities to implement the policies.
- The people of the coastal areas should be more responsible to follow the government guidelines to preserve environment which is prescribed in the formulated policies.
- The government should always consider the health-related issues before formulating and implementing any environmental policies.
- The common people should take actions to preserve environment, do eco-friendly business and always be conscious and be proactive for each and every step taken by national and local government.

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ACTORS ACTIVE IN MAINTAINING INDUSTRIAL RELATIONS IN READY-MADE GARMENT INDUSTRY IN BANGLADESH

Md. Shawan Uddin[1] A.K.M. Moniruzzaman[2] and Md. Mahabub Alam[3]

Abstract

The purpose of this study is to identify the specific actors in industrial relations (IRs) in Ready-Made Garment (RMG) industry in Bangladesh. Following the interpretive research paradigm and cross-sectional design, this study adopts qualitative approach using qualitative interview on the parties involved with the 100% export oriented RMG industry. The data were collected from the in-depth interview of 22 participants from the trade union (TU) leaders, employers, government agents (GAs) and international buyers (IBs) and subsequently transcribed them using the content analysis. This study identified the roles of the actors for establishing their activeness in maintaining sound IRs in the RMG industry in Bangladesh. This study also revealed that the IBs as the active actor along with the other three actors TUs, employers and government. This study makes an important contribution to the existing industrial relations system model originally developed by John Dunlop in 1958 by integrating IBs as another actor. The outcome of the study will be useful to the stakeholders of the Bangladeshi RMG industry to create productive relationships among the actors involved. Finally, this study will serve as a basis for better understanding of the intricacy of the IRs situations in any industry in any country across the globe.

Key words: RMG, TU, Employers, GAs, IBs, IRs

1. Introduction

Industrial development propels global economic growth by providing a large number of people with high-wage jobs and thus increasing social productivity through mass-production of high-value goods (Islam, Rakib & Adnan, 2016). The RMG industry plays a significant role in industrialization in both developed and developing countries (Akterujjaman, 2013; Rakib & Adnan, 2015). Bangladesh's economy has a distinct competitive advantage based on low-cost labor, real estate, and services, making profitable expansion into new strategic markets possible (Hoshen, 2014). Bangladesh's Ready-Made Garment (RMG) industry serves as a catalyst for the country's growth. Bangladesh has also benefited from the Made in Bangladesh label, which has developed the country as a globally renowned brand (Gaffar, UlHuq & Islam, 2019). From spinning to weaving, from knitwear to leisurewear, and high stitching fashions, this industry is Bangladesh's largest exporting source of income (Islam, Jantan, Hashim, Chong & Abdullah, 2018). The RMG industry continues to play an important role in Bangladesh's industrialization and economic expansion cycles, accounting for more than 35 billion United States Dollar (USD), or 84.21% of overall export (Anner, 2020; EPB, 2019; Hossain, 2019).

[1] Assistant Professor, Department of Management Studies, University of Rajshahi
[2] Professor, Department of Management Studies, Jagannath University, Dhaka.
[3] Associate Professor, Department of Management Studies, University of Rajshahi

Industrial relations (IRs) is a concept used to characterize the practical relationships that occur as a consequence of various contacts amongst workers, employers, trade unions (TUs), government agents (GAs), and international buyers (IBs). In order to protect the interests of all production parties, actors in IRs must have harmonious relationships (Salamon, 2000). To maintain market stability and viability, each organization's main roles have been to deter or settle any dispute between them as soon as possible (Hyman, 1975). The actors argue over their respective interests when working together (Rose, 2008). In the area of IRs in Bangladesh, the Bangladesh Labor Act (BLA) 2006 and its amendments in 2013, 2015, and 2018 apply, covering the roles of the actors in IRs in order to create a harmonious and tranquil working atmosphere in the industry (Al Faruque, 2009; Kabir, Singh & Ferrantino, 2019; Mia, 2016).

Sound IRs among the four actors in the RMG industry, such as TUs, employees, GAs, and IBs, are vital for ensuring a sustainable RMG sector (Al Faruque, 2009; Rahman & Kashem, 2017). The TU is a workers' organization (Headey, 1970; Stansbury, 2008) that bargains with employers on behalf of union members and negotiates labor contracts with them (Ewing, 1982). Employers are constitutionally responsible for initiating working procedures, including labor law enforcement and other administrative measures involving workers (Moss & Tilly, 2001; Venn, 2009). GAs serve as umpires, conciliators, arbitrators, and supervisors in the industrial relations system (IRS) by formulating, regulating, and controlling rules, legislation, settlements, and court awards (Badejo, 2011; Howell, 2005; Hyman, 2008). In the sense that they can compel RMG businesses in Bangladesh to meet compliances set by them, IBs are the most powerful RMG actors (Hossain & Arefin, 2015). Previous research examined at a selection of actors or players who helped boost the overall IRs phase in Bangladesh's RMG. The active roles of these actors in IRs are not well documented. In the present context, the degree to which each of these actors participates in the systems of IRs remains unknown. As a result, this research uses a qualitative approach to classify the actors involved in creating an IRs in RMG in Bangladesh. The basic research question of this paper based on the literature and problem statement was to investigate who are the active actors in maintaining IRs in the RMG industry in Bangladesh.

2. Objectives of the Study

The objective of this study is to identify the actors active in the maintenance of Industrial Relations in Ready-Made Garment industry of Bangladesh.

3. Literature Review

3.1 Ready-Made Garment Industry of Bangladesh

The RMG is one of the main export earning industries in Bangladesh playing a special role within its economy (Islam & Haque, 2018). At present, the total listed numbers of RMG enterprises are 4621 (BGMEA, 2019). Nonetheless, the sector has opened opportunities for employment to many individuals in direct and indirect

economic activities that ultimately support social growth, empowerment of women and alleviation of poverty in the world (Rahman & Chowdhury, 2020). Particularly more than 4.4 million employees are directly employed in this sector and the trend of the employment is upward, increasing at faster rates (Heath & Mobarak, 2015).

Bangladesh has set an ambitious goal for reaching a target of 50 billion USD exports of apparels by 2021 and it seems to be on the right path (Rahman & Chowdhury, 2020). To achieve this target more than 4.7 thousand garments factories are to be established in Bangladesh by that time (Hasan et al., 2018). Bangladesh plans to achieve its middle-income status by 2021 wherein the RMG sector will play a significant role (Khatun & Afroze, 2019). However, the RMG sector in Bangladesh has yet some problems such as lack of proper working environment and its ignorance to labor rights, which the IBs are continually harping to uphold (Nuruzzaman, 2013). Such kinds of acts and events potentially have a negative effect on the Bangladesh RMG industry (Ansary & Barua, 2015).

3.2 Industrial Relations

A conceptual aspect of IRs includes the organizational interactions and relationships among its actors i.e. employers, employees, buyers and the government (Tapia, Ibsen & Kochan, 2015). It is a multidisciplinary field of Human Resource Management (HRM) with orientation towards organizations' harmony and wellbeing. According to the John Dunlop (1958), three actors are in IRS to maintain dynamic employment relationship, which includes employer and its association, employee and its association, and government and its agents. The IRs also include industrial life of all concerned parties such as working condition, discipline and codes of conduct (CoC), terms of employment, compliance of labor laws and its interpretation, workers' presence in management issues, profitability sharing, industrial conflicts and grievances, unfair labor practices and, TUs and collective bargaining (Kochan, Katz & McKersie, 2018). John Dunlop has also set out the notion of actors, and but he focused on just three actors such TUs, employers, and GAs. After the Rana Plaza collapse, all IBs are very much concern regarding the workplace environment and the rights of the workers (Hasan, 2017). They are imposing the compliance issues with their CoC regarding the environment of workplace and workers rights before placing their orders for the RMG of Bangladesh. Shumon, Rahman and Ahsan (2018) mentioned that in future the stability of RMG industry of Bangladesh depends on the satisfaction of IBs. The sellers or the manufacturers pay significant attention to the IBs because they are most powerful actor (Bellemore, 2000).

3.3 Trade Unions

The trade union is a voluntary employee association to defend and uphold their mutual interests through collective bargaining and solve their problems created by the industry (Bellemare, 2000). The central function of TUs is to bargain with their employers to ensure fair wages, security of job and better working conditions for

their members (Dundon, Wilkinson, Marchington & Ackers, 2004). They also protect their members from any injustice and exploitation, and against any violation by their employers (Chen, 2003). TUs mean union of employees or employers organized and registered in compliance with chapter XIII of BLA 2006 which includes a TU federation (BLA, 2006). The TUs negotiate employee contracts with the employer or government on behalf of the members of the unions to strengthen working conditions and help employees achieve job protection (Bryson, Barth & Dale-Olsen, 2013). Until June 30, 2020, total 909 of TUs were registered in the RMG sector (Department of Labor, 2020). TUs play a valuable role in establishing jovial relationships between owners and employees in the Bangladesh RMG market (Hasan et al., 2018).

3.4 Employers

The person or entity who hires other person to perform services based on express or implied agreement is called as employer (Clark, 1968). The employers have the powers and rights to manage their employees. They have the ability to keep the workers in works under their supervisions (Moss & Tilly, 2001). The employers define the terms of employment and specify the contract (Summers, 2000) and also legally responsible for practices of working laws and regulations (Noe, Hollenbeck, Gerhart & Wright, 2015). The responsibilities of the employers are to ensure the satisfactory work environment for the employees (Backhaus, Stone & Heiner, 2002). They have other privileges and responsibilities, such as setting off redundant staff, making business steps such as mergers, purchasing or closing down the company, and incorporating technical developments in operations. Employers motivate the employees to give their best and gaining their trusts and commitments (Cappelli, Bassi, Katz, Knoke, Osterman & Useem, 1997). They have the opportunity to improve the overall efficiency and ensuring effective communication among the employees and the management. The employers also deal with the issues of TUs, together with the bargaining of terms and conditions of employment with the employees' representatives, in order to allow for a sound IRs (McCleary, Goetzel, Roemer, Berko, Kent & Torre, 2017).

3.5 Government Agents

Government refers to a group of people that governs a community or unit (Fallon, 1992). It establishes and administers policies, programs, and exercises executive, political, and sovereign powers through state customs, institutions, and laws (Sarooshi, 2003). Uzoh (2015) defined government as a collective that exercises sovereign control over a country, community, society or other body of citizens and is responsible for law making and regulation, currency management and protection of the population from external threats, and may have other duties or advantages. Government plays a central role in the development of IRs systems by implementing and systematizing structural reform through a collection of specific public capacities; narrating an objective analysis of the crisis in IRs; solving the joint action problems

of employers and TUs; and predicting and establishing partnerships among private industrial actors; though it is necessary to not neglect the explicit repressive force of the government (Hayter & Lee, 2018). It plays roles of umpires, conciliators, arbitrators and administrators in the IRs (Badejo, 2011). Maintaining a positive IRs in society is fundamentally dependent on the position of the government as an agent in the structure of IRs as it is the government's responsibility to devise labor laws and regulations, to enforce them, and therefore to maintain fairness such that neither the employees nor the employers suffer (Müller-Jentsch, 2004).

3.6 International Buyers

Bellemare (2000) concluded that end-users (buyers) also constitute actor within IRs in an essential contribution, to the degree that they have a persistent and substantial impact on the type of the working relationship and the actions of employees, employers and state institutions. There is also new space for exploring the role of fourth parties in settling conflicts (Heery & Frege, 2006). The combined consequences of the system as a part of the working arrangement and the outsourcing of conflict settlement have created new entrants with resources (Kochan, 2004). If they influence the IRs mechanism or the causal forces employed by other actors in the IRs directly or indirectly by their actions, IBs may also be called bonafide actor in the IRs. In the apparel sector, IBs are considered as the important actor because without IBs no transactions will be held. In this respect, IBs holds supreme power to influence sellers (Hossain & Arefin 2015). A number of scholarly and media articles have pointed to the plea of Bangladesh as an prospect for IBs from the United States (US) and the European Union (EU) to branch out their sources of RMG in the world market (Abernathy, Volpe & Weil, 2006). A large, mostly qualitative and descriptive literature has studied by Appelbaum and Gereffi (1994), Bernard, Moxnes and Ulltveit-Moe (2018b), Cajal-Grossi, Macchiavello and Noguera (2019) argued that as one of the key actors in the RMG industry, IBs produce more demand for a safe, productive, innovative work climate because it develops meaningful employee relationships, decreases employee attrition rates and workplace strife, boosts employee morale, raises outsider involvement, develops desirable business prestige.

4. Methodology of the Study

4.1 Research Design

Using a qualitative field research approach and a semi-structured interview, this study examined the actors and their relationships with IRs in Bangladesh's RMG industry. The face-to-face interview was used in this approach to further understand and analyze the thoughts, attitudes, perceptions, and phenomena of the research subjects. The researchers discovered the current model of IRs by John Dunlop (1958) after performing a literature analysis. In addition, another IRs actor in Bangladesh's

RMG industry was discovered during the literature review, and a field study was performed to validate this. A literature review and an existing model of IRs were used to figure out how to build the semi-structured questionnaire. The in-depth interview consisted of five key questions and fourteen probing questions. Since the qualitative method was used to include real-world viewpoints, the development of interview questions was deemed highly significant. The discussion on the roles of TUs in the RMG industry has 5 questions, the topic on the roles of employers has 3 questions, the topic on the roles of GAs has 3 questions, and the topic on the roles of IBs has 3 questions. The researchers verified the actors involved in IRs in Bangladesh's RMG industry based on input from respondents. Earlier research by Bellemere (2000) listed IB as an actor, but it was not included in John Dunlop's IRS model. After that, the results of the literature review were revised and supplemented with reviews from the qualitative field study.

4.2 Sampling Technique

In this analysis, convenience sampling was used. There are no computations or power analyses that can be performed a prior in qualitative analysis to determine the minimum number and types of sampling units needed (Fugard & Potts, 2015). In a qualitative study, sample size adequacy is relative. Twenty two participants were chosen to be interviewed for this study based on personal connections, out of them 6 respondents are from TU representatives, 6 are from employers, 5 are from GAs, and rest 5 respondents are from IBs.

4.3 Data Collection Procedure

The interviews were scheduled as per the participants' convenience. Any respondents used the questionnaire to prepare ahead of time and presented the interviewer with a precise date and time for the interview. E-mail and phone calls were used to reach the respondents. The participants were sent a semi-structured questionnaire prior to the interview, which explicitly defined the objective of the study. Each interview lasted somewhere from half an hour and an hour. The participants were asked to allow the mobile recorder to record their speech during the interview. All of the participants agreed, but only one refused. When respondents declined to authorize the use of the recorder, key points were written down. To ensure reliable data from participant conversations, verbatim transcriptions of all recorded interviews were performed for data analysis. To ensure reliable data from participant conversations, body language, and other variables, verbatim transcriptions of all reported interviews were provided for data analysis.

4.5 Data Analysis Procedure

To analyze the data obtained during the field analysis, the interviews were first transcribed from cell phone records and notes made during the interviews. The content analysis method (Lune & Berg, 2017) was then used to analyze and interpret the gathered data, evaluating the relationship between the concepts, the interview

data, and the theoretical meaning (Siltaoja, 2006). The content review method is often used to scrutinize the transcripts and analyze constructs, sub-variables, key objects, and their relationships. The transcriptions of the performed interviews were closely analyzed during the content review in order to identify key words. During the content analysis, the transcriptions of the conducted interviews were carefully examined for key words or patterns that could be used to classify the involved actors in Bangladesh's RMG industry's industrial relations.

5. Data Analysis and Interpretations

The views and opinions of the participants regarding the acknowledgement and identification of the active actors in IRs in the RMG industry of Bangladesh through the content analysis of the data obtained from the interviews. The views of the participants were considered very carefully because their views based on their expertise and real-world experience. The data captured reflected the participants' responses in the sense of IRs in the Bangladesh RMG industry. In fact, as stated earlier, the emphasis of the field study was on validating the actors defined in the literature. The views and opinions of the participants are given in the quotations from the transcripts below.

During the interview the most of the respondents stated that "*in earlier particularly before the Rana Plaza dissenter there were very little scope for the trade unions to play their roles in the industry but after the Rana Plaza tragedy the foreign buyers are very much concern regarding this for why now we are getting some opportunities to play our roles in the RMG industry reading our rights and benefits. Though we think yet we are facing many problems but it can be told that the scenario is now better than earlier. Even now the government and the employers are also paying their attention towards their employees and the working conditions of the factories and benefits of their employees.*"

Regarding the activeness of trade unions and foreign buyers all most all the participants mentioned, "*The changing situations after the Tazreen and Rana Plaza disaster the foreign buyers are the key players here their compliances bound the employers to make the factories safe and good. It is true that the labors are adaptive with any environment. We see some factories there is the arrangement of collective bargaining between the TUs and the employers. It can be said that the factories are better than the 10 years ago particularly after the Rana Plaza collapse because of the pressure of foreign buyers."*

The participants also stated regarding the actors of industrial relations in RMG industry of Bangladesh like, "*For maintaining the buyers order and their audit, the employers are very much attentive to maintain the work environment of the factory. We always try to stand side the employees as the leaders of them. The factories try to act in accordance with the compliances issues prescribed by the foreign buyers because if the audit report of the representative of the buyers will negative, then the buyers cancel their orders. It is true that government agents are more favorable to*

the employers because most of the members of the parliament are businesspersons. We are trying to bring up good relations with the workers. We welcome the trade unions. We think trade unions are very much needed to ensure and bargain regarding their rights prescribed by the laws. Compliance factors prescribed by the foreign buyers work environment and others are most significantly influence the workers in Bangladesh.

During the interview many participants addressed the questions and stated that, "*in some factories trade unions are doing well for their members, they participate meetings for problem solving in the industry. They also plays role to counseling the workers so that they will be aware regarding their works and rights. Government are now very much concern regarding the working environment and labor rights in this sector. Moreover, government always monitors the implication of labor laws and regulations. After the Rana Plaza disaster the foreign buyers are now acting as the check post."*

The participants mentioned that, "*We cannot say that the owners are not following the labor laws, now they are trying to follow the laws. However, this will be better if there creates the trust between employers and TUs. I positively think that in future the employers will do better for the industry. If the labors and union creates trust in the mind of the employers that TUs are not harmful for his organization then they feel comfortable to do union in his organization. In case of dispute, the employers always stay in the win position. If there any dispute in the factories then the owners has the more responsibilities to solve the problems by the discussion with the TUs. Now the TUs are aware regarding the working environment of the factories but it needs more awareness."*

Regarding the activeness of the actors all respondents gave their opinions, "*the buyers have given more attention towards the healthy environment because it builds positive employee relations, reduce employee turnover rates and labor unrest, enhances worker productivity, increases outsider interest, create valuable reputation for the company. The owners are always aware that there should not be the gap between the employees and employers. They have given the opportunity to one to one communication. After Rana Plaza Building collapse the whole condition of the RMG sector have been changed because the whole world buyers and other countries give their attention on workers working condition, health & safety, labor right and the wages of RMG workers. Moreover, after this disaster in RMG sector, government also took some steps for improving the work environment and wages of RMG worker of Bangladesh."*

After scrutiny and combination, the results presented in Table 1 shows the frequency of the views mentioned by the participants during the field study.

Participants acknowledged the actors and their roles in IRs in Bangladesh's RMG industry. Particularly, from the interviews with the respondents the roles and actions of the actors are clearly identified. The involvement of IBs can be characterized regarding the intensity of their present roles in the IRs in RMG industry of Bangladesh along with the TUs, employers, and GAs. Therefore, a new relationship that have developed between the IRs and TUs, employers, GAs and IBs that compel us to consider the idea that these four actors indeed constitute IRs as the active actors particularly in the RMG industry of Bangladesh. In the field study, 14 items were finally identified. Remarkably, all participants recognized 8 items relating to the active roles of trade unions, employers, government agents and international buyers and the results o rest of the items shows that most of the respondents provided their positive opinions. Along with the roles of TUs, employers and GAs, all participants recognized regarding the roles of IBs in protecting the unfair labor practice, ensuring sound working environment, promoting freedom of associations, focusing on the collective bargaining and their codes of conduct. Moreover, the all participants recognized the appreciations of the industry for dispute resolution and the scope for collective bargaining in the sector.

However, industrial relations derived from the literature recognized the actors, which are used to establish the active roles of the actors and notable support from participants interviewed in the field study. Both participants agreed that the players in Bangladesh's RMG industry play important roles in IRs. During the field study some participants belong to the TUs, one or two of them have the negative views regarding their activeness in RMG. On the other hand, the employers as the actors also have some negative observation regarding the roles of workers and TUs in the industry under study.

1. Conclusion

The RMG industry has a special role in the economy of Bangladesh. IRs means the relationships among the actors. From the model of IRs by John Dunlop, three actors such as TUs, employers, GAs were found this study identified another actor such as international buyers, which are playing active roles in maintaining the sound industrial relations in the RMG sector in Bangladesh. This study attempts to identify the specific roles of the actors and measure their roles association with the present state of IRs in RMG industry in Bangladesh. The analysis of the field study data shows that there are significant roles of the actors and the state of IRs in the RMG industry in Bangladesh. Bangladesh plans to achieve the country's middle-income status by 2021 in where the RMG sector will play a significant role. To fulfill these targets by the roles of RMG industry, it needs to have active and effective roles of the actors with the congenial relationships among them. This study contributes to the

literature and theory of IRs particularly to the industrial relations system by John Dunlop where three actors considered regarding their activeness, this study identified another actor to IRs based on literature reviews and qualitative study. As the study has identified the influential actors involved and examined their roles resulting in a state of IRs in RMG industry in Bangladesh. The outcome of the study is useful to various stakeholders involved with maintaining a pattern of IRs in RMG sector for creating a positive image, which can help to boost far better relationships among them. The government of Bangladesh and the Bangladesh Garments Manufactures and Exporters Association, in coordination with the International Labor Organization has to undertake more programs to aware and promotes the employers, employees, TU leaders and IBs for their more activeness in playing constructive role in RMG to ensure sound industrial relations. Future research needs to measure the reciprocal relationships among the actors relating to IRs using the quantitative approach.

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IMPACT OF E-RELATIONSHIP MARKETING ON CUSTOMER SATISFACTION, LOYALTY AND RETENTION IN BANKING SECTOR OF BANGLADESH

Dr. Shameem Ahmed[1] and Dr. Md. Golam Mostafa[2]

Abstract

Bangladesh is a developing country and its banking sector is gradually improving. Different strategies emerge in the banking sector from time to time. E-RM has emerged as the latest marketing strategy in the banking sector. The banking sector of Bangladesh is gradually practicing this strategy but staying at the inception level. For the last few years, RM and E-RM have attracted both customers and bankers. Data was collected by taking personal interviews of 600 respondents and the response rate was 96%. Empirical tests using factor analysis and tests of hypothesis using SEM were applied. The study contributes to the existing body of banking and marketing literature by introducing ten E-RM dimension. These dimensions of E-RM are considered to play a significant role in customer-banker relationships, relationship marketing strategies, and particularly customer satisfaction, loyalty, and retention. Most of the variables except ease of use, customization, service expense showed a significant and positive relationship between E-RM dimensions and customer satisfaction. The impact of customer satisfaction on customer loyalty and retention is positive and customer loyalty on customer retention is also positive. The study suggests some recommendations to increase the effectiveness of E-RM dimensions and customer satisfaction. Finally, the research setting out an agenda for future research.

Key words: Relationship Marketing, Electronic Relationship Marketing, Banking Sector, Customer Satisfaction, Customer Loyalty, Customer Retention**.**

1.0. Introduction

Marketing is increasingly concerned with the establishment and maintenance of a mutually satisfying long-term relationship with consumers rather than just producing, selling, and delivering goods (Buttel, 1996). Relationship marketing was first introduced in American literature. Berry (1983) considered relationship marketing as attracting, maintaining, and enhancing customer relationships. He focuses on customer retention through investing the company's resources to existing customers, not attracting new customers. He also stresses that attracting new customers should be an intermediary level of the marketing process and build the relationships with those customers. According to Gronroos (1996), RM is the process of forming,

[1] Associate Professor, Department of Business Administration, Institute of Progressive Meritocracy, Under National University.
[2] Professor, Department of Management Studies, Jagannath University.

affirming, potentiating, and, where appropriate, terminating profitable relationships with consumers and other stakeholders to achieve the goals of all parties involved, where it is done by reciprocal sharing and prospect fulfillment. One similarity has been established between Berry and Gronroos definitions, i.e to build up customer relationships. Gronroos added more ideas to his definition by adding relationship termination and fulfillment of promises. Additionally, Gronroos focuses that if the relationship is not profitable, it should be terminated and both parties' objectives should be fulfilled, otherwise RM will not be possible. Due to price sensitivity, customers' needs, preferences, and buying behavior vary. As a consequence, it is important to develop good customer relationships (Buttel, 1996). Customer satisfaction is important in any business because the satisfied customer never switches to competitors; if they switch, it is for another reason. To acquire a new customer, a huge cost is required, so that existing customers have to be kept to boost the profit (Gronroos, 1996). The value of RM in the banking sector to satisfy and maintain customers can not be overstated because best practice shows that client satisfaction and retention have strong economic health for banking companies with a direct impact on profitability. Payne and Richard (1993) showed in the American industry, 5% rise in customer retention rate would result in a profit increase of 25% to 80%.

For the long-term success of the business, customer satisfaction is a must (Tsoukatos and Rand, 2006). According to Anderson et al. (1994), there are two ways of measuring customer satisfaction. One is transaction-specific and the other is cumulative. Transaction-specific is a post-choice evaluative judgment and cumulative is the after purchase judgment of a product or service. Attracting a new customer is costly, so customer retention is better (Kaura, 2013).

Bangladesh is a densely populated country because its population is approximately 163.05 million (World Bank Group, 2020). Banking sector infrastructure and marketing performance are gradually increasing. Bangladesh Railways own and operate a high-speed fiber-optic network (1800 km.) parallel to the network route that runs through much of Bangladesh. The main backbone of e-banking and e-marketing is a high-speed optical fiber network. The mobile phone operator of Bangladesh is currently using an optical fiber network (Islam and Kamruzzaman, 2015). The total number of mobile phone subscribers in Bangladesh is now 170.217 million (BTRC, 2020). The total number of internet users in Bangladesh is currently 111.875 million (BTRC, 2020). The total number of smartphone users in Bangladesh is 5 crore 3 million (New Zoos, 2020). From the perspective of internet users, Bangladesh is now fully converted to the internet revolution (Anwar, 2012). As an internet-using country, Bangladesh is now 9th in the world ranking (Internet World Status, 2020). Bangladesh's government is focusing on creating a digital Bangladesh by establishing ICT parks, funding for ICT park

facilities, eliminating taxes on computer peripherals, and other initiatives, such as a banking sector automation program.

In international research for the development of marketing performance, a new strategy has emerged, i.e., E-Relationship Marketing. E-RM refers to marketing practices, tools, and strategies that can be used to create and strengthen consumer relationships through the use of internet networks (Lee-Kelly and Gilbert, 2003). Bangladesh is currently at the inception level of this strategy implementation. Research has been conducted in Bangladesh on RM, SMS banking, online banking, internet banking, electronic banking, email marketing, etc. The traditional RM approach has been replaced by the E-RM strategy to make banking customers more satisfied, more loyal, and more retained. It is comparatively less time-consuming and emphasizing the need for E-RM, the benefit to the bank, and the benefit to clients. Hence, organizations must ensure customer satisfaction regarding E-RM.

2.0. Statement of the Problem

The banking sector of Bangladesh is gradually developing and different strategies and policies are adopted. E-RM is such a strategy that arrived in the world business which should be adopted extensively to retain customers of the bank and boost profit. E-RM is a relatively new idea in Bangladesh's banking sector. Customer satisfaction, loyalty, retention, and an increase in the profitability of banks are the main objectives of E-RM. E-RM tools play a vital role in maintaining a relationship in this technological and information age. Developed countries are enjoying the facilities of electronic technology to maintain E-RM strategies for their clients. The rate of adoption in developed countries has increased because of infrastructural facilities, skilled bank employees, educated clients, and the government’s support. Bangladesh is advancing in the adoption of the E-RM strategy in its banking sector.

Relationship marketing has given an advantage to all kinds of businesses. It is difficult for a business to capture customers if the product or service quality is poor. RM can provide benefits to the company in this case, though it is not possible for all customers. Some customers always believe in quality. Over time, various strategies have emerged in the field of banking. Due to technological advancement, it has become possible for a bank to launch an E-RM. E-RM dimensions (commitment, conflict management, responsiveness, ease of use, service expense, security, communication, bonding, and trust) have an impact on customer satisfaction, loyalty, and retention, so, from the view point of service and social responsibility, the banking sector of Bangladesh should extensively use E-RM tools and strategy to overcome all the barriers for the betterment of the banking sector and its clients. The researcher tries to find out the relationship among the variables in the context of Bangladesh.

3.0. Research Questions

In light of the problem statement, some specific questions have been raised and the researchers will try to answer the following questions throughout the research.

1. Does the relationship between E-RM dimensions and their consequences demonstrate strong outcomes such as customer satisfaction amongst the Bangladesh banking industry?
2. Are there any correlations between the consequences of effective E-RM dimensions and customer loyalty, customer retention in the banking industry of Bangladesh?
3. Is there any correlation between customer loyalty and customer retention?
4. Is the relationship among variables is positive or negative?
5. What are the problems with E-RM in Bangladesh?

4.0. Literature Review

Over the past few years, RM has been an important topic of discussion among practitioners and academicians (Christopher et al., 2002). The controversy is still ongoing about the origin of RM. There is a contradiction that Berry (1983) was the first to introduce the term RM as a modern marketing concept. During the 1990s, RM evolved as a general term in marketing (Christopher et al., 2002). According to Grönroos (1994), the shift towards RM has been found vivid in industrial marketing, service marketing, and managing distribution channels.

4.1. Electronic Relationship Marketing Dimensions

Commitment: While Ndubishi (2007) stated that commitment helps to realize customer needs and provide better service to customers, this will improve customer satisfaction, loyalty, and retention, and ultimately bring both parties close to each other.

Conflict management: Conflict handling is a unique action taken when dealing with customers, and dealing with customers, conflict resolution should necessitate concrete actions (Ball et al., 2004). When a business solves a customer's dilemma, customer satisfaction and loyalty increase (Ndubishi, 2007).

Responsiveness: Client trust is increased as a result of responsive practices, which have a direct impact on customer satisfaction, engagement, and retention (Chen et al. 2009). The customers of a bank are delighted to see the sufficient responsive attitude of employees (Rafiq et al., 2013).

Ease of use: Davis's perceived ease of use is characterized as a person's belief that using a particular system would be painless, and it is suggested that perceived ease of use has a positive impact on perceived usefulness **(**Davis, 1989).

Customization: According to Khan (2016) receiving customized service, the customer thinks they have given special attention and feels proud as a result of the satisfaction that arises in their mind. Only technology can support customers immediately, such as customized support, and the number of services can increase through electronic relationships (Rahman and Ramli, 2016).

Service expense: In fact, many customers consider service expense when they receive banking services (Krasnikov et al., 2009).

Security: If there is no protection of client information and money there will not occure any customer satisfaction (Davis, 1989). Customers will become loyal if you have better protection (Rexa et al., 2003).

*Communication***:** The formal and informal exchange and sharing of meaningful and timely information between buyers and sellers is known as communication (Sin et al., 2002).

Bonding: Bonding is the aspect of a business partnership that results in two parties (buyer and seller) working together for a common purpose (Callaghan et al., 1995).

Trust: The willingness to depend on each other is known as trust (Adamson et al. 2003). Reichheld and Sasser (1990) provide a succinct conceptualization by stating that to win a customer's loyalty, you must first earn their trust.

4.2. Relationship Marketing and Customer Satisfaction

Relationship marketing is primarily concerned with establishing relationships between businesses and their customers at any possible point of contact. In today's competitive marketplace, marketers are trying to deliver customer satisfaction to improve the relationship with customers (Singh and Sirdeshmukh, 2000). It generates a win-win situation for both businesses and consumers. Overall, RM focuses on recognizing and addressing issues that influence consumer relationships with businesses to attract customers (Huntly, 2006).

4.3. Customer Satisfaction and Customer Loyalty

Customer satisfaction is one of the most important predictors of consumer loyalty. Customer satisfaction is the basis for customer loyalty in the banking industry (Bloemer et. al., 1998). Leverin and Liljander (2006) found that, in a sales-oriented approach, relationship satisfaction still leads to higher loyalty among banking customers. The most commonly used concept of loyalty is a long-term behavioral response (Oliver, 1997). Loyalty is a deep commitment to repurchase a product or service over time.

4.4.Customer Satisfaction and Customer Retention

Many researchers have an interest in studying the retention of current customers (Ganesh et al., 2000). Emphasis has been given to retaining current customers because it costs less than attracting new ones (Fornell, 1992). By keeping current customers, banks can avoid or reduce their advertising costs, set up new accounts, and explain business procedures and learning processes (Mittal and Lassar, 1998). The company can also increase profits from its existing customers by adopting policies to increase sales (Colgate et al., 1995).

4.5.Customer Loyalty and Customer Retention

Customer retention refers to the company's ability to maintain relationships with customers over a specified period. It is concerned with the maintenance of a supplier-customer relationship (Gerpott et al., 2001). In the marketing concept, customer retention derives from a loyal customer. According to Keiningham et al., (2016), Relationship marketing significantly predicts customer retention. It is an important remark which shows the distinction between customer loyalty and customer retention.

4.6. E-RM Practice in Banking Sector of Bangladesh

E-RM practice commences in Bangladesh since the adoption of the internet and automation of banks (Islam and Mahfuz, 2014). In that sense 2001 can be the starting year of E-RM in the banking sector of Bangladesh. Due to the high internet charge and high computer price and nonavailability of smartphones, the E-RM services did not get momentum (Islam and Mahfuz, 2014). Practicing E-RM in Bangladesh is at its inception level in most of the sector. E-RM practices are more or less commences in private as well as government banks in Bangladesh.

5.0. Objectives of the Study

The broad objective of the study is to develop a theoretical model and test it among the customer of banking sector in Bangladesh.

The Specific objectives of the study are:

a) to identify the impact of E-RM dimensions on customer satisfaction;

b) to learn more about how customer satisfaction affects and impacts customer loyalty and customer retention;

c) to find out the impact of customer loyalty on customer retention.

d) to find out the relationship type among the variables.

e) to identify the problems and solutions of E-RM in the banking sector of Bangladesh from the view point of the customer; and

f) to recommend sustainable development of the Bangladesh banking industry through more implementation of E-RM.

6.0. Research Gap

Gap 1: A lot of research has been conducted in the area of RM considering its dimensions in various sectors all over the world. In this study, the researchers have made an attempt to apply the dimension of relationship marketing to the electronic relationship marketing perspective in the banking sector. No scholarly research has yet been found in marketing literature regarding the issue of electronic relationship marketing.

Gap 2: Marketing literature revealed that taking mentionable ten dimensions of electronic relationship marketing simultaneously, no research has yet been conducted on customer satisfaction, customer loyalty, and customer retention in the banking sector. Readers and practitioners will see a great picture at a time about E-RM dimensions. This is another research gap that researchers will try to conduct from Bangladesh's perspective.

Gap 3: One of the important services of the bank is to maintain a proper relationship with its clients. Relationship marketing practices are gradually increasing in the banking sector of Bangladesh, but are not yet able to reach the expected satisfaction level. There are available studies on relationship marketing, SMS banking, online banking, internet banking, e-mail marketing, and electronic banking from an international and Bangladesh perspective. As no scholarly research explores the use of E-RM in the Bangladesh banking sector. This research calls attention to the gap in the research literature by providing an acceptable research model.

7.0. Hypotheses

Based on the above literature and research title the following hypotheses were developed:

Table 1: Research Hypothesis

No.	Hypothesis
H1	E-RM dimensions have a positive influence on customer satisfaction.
H_{1a}	The commitment dimension of E-RM has a positive influence on customer satisfaction.
H_{1b}	The conflict management dimension of E-RM has a positive influence on customer satisfaction.

H_{1c}	The responsiveness dimension of E-RM has a positive influence on customer satisfaction.
H_{1d}	The ease of use dimension of E-RM has a positive influence on customer satisfaction.
H_{1e}	The customization dimension of E-RM has a positive influence oncustomer satisfaction.
H_{1f}	The service expense dimension of E-RM has a positive influence on customer satisfaction.
H_{1g}	The security dimension of E-RM has a positive influence on customer satisfaction.
H_{1h}	The communication dimension of E-RM has a positive influence on customer satisfaction.
H_{1i}	The bonding dimension of E-RM has a positive influence on customer satisfaction.
H_{1j}	The trust dimension of E-RM has a positive influence on customer satisfaction.
H_2	Customer satisfaction has a positive influence on customer loyalty.
H_3	Customer satisfaction has a positive influence on customer retention.
H_4	Customer loyalty has a positive influence on customer retention.

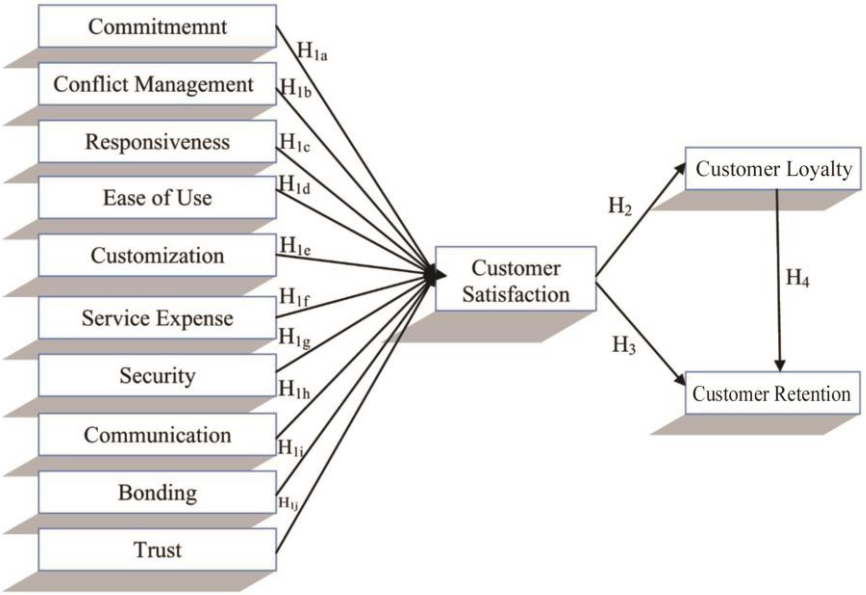
Source: Literature review 4.1

8.0. Developing Research Conceptual Framework

The conceptual framework of the study is as follows:

Figure 1: Conceptual Framework of the Research

E-RM Dimensions



Source: Developed by the researchers, 2021

9.0. Research Methodology

This is a survey based quantitative research because information collected from sample of individuals through their responses to questions for neumerical data. A structured questionnaire was prepared for data collection. The researchers collected primary data through structure questionnaire from customers of bank who have at least one bank account operating in Bangladesh. In this regard, a multistage sampling technique was adopted in the study. It is a sampling technique that divides the population into groups or clusters. In this study population is divided into division, district and upazila basis. The target population for this study is all banking clients of Bangladesh. A pilot study was conducted with a sample of 70 respondents. Based on the pilot study, a minor alternation was made in the questionnaire. A total of 600 customers from 32 banks (private, government and specialized) participated in the interview. The researcher has taken three government commercial banks out of six, twenty one Pvt. commercial banks out of forty, four foreign commercial banks out of nine and four specialized banks out of nine because this number represents others. Total 600 samples has been selected according to the formula (Cochran, 1993; Mugenda, 2003). To determine sample size by considering a 5% precision level and the calculation was as follows:

$$n = Z^2pq \div d^2$$
$$= (1.96)^2 * (0.5)\ (0.5)/(0.05)^2$$
$$= 385$$

Moreover, Cochran (1963) suggested where the total population is unknown or large such as population>100000; then the researchers can go for considering the sample size at least of n = 400 at a 5% level of significance. Finally, the researcher decided around 600 respondents to make a sharp number of sample size for this research.

Data has been collected from 1st January 2021 to 29th June 2021 (six months). The exogenous variables of the study are commitment, conflict management, responsiveness, ease of use, service expense, security, customization, communication, bonding, and trust because it has influence on indogenious variable customer satisfaction. The indigenous variables are customer satisfaction, customer loyalty, and customer retention. The questionnaire includes the respondent's demographic background, 52 preliminary measures for 13 latent constructs. Minor alternations were made to the estimation scales to guarantee reasonableness for the setting. The designated constructs were rated on the 7-point Likert Scale. Empirical tests using factor analysis and tests of hypothesis using Structural Equation Modeling (SEM) were applied. In this regard, SPSS (version-25) and AMOS (version-25) were used to analyze the data collected from field-level interviews. In this research, the following Table 2 were adopted from different kinds of literature:

Table 2: Research Constructs, Its Scales and Sources

Construct	Scales	References
Commitment	Personal information is often used by your bank to provide personalized services.	Mithas et al., (2005); Rygielski et al., (2002)
	Your bank assesses customer satisfaction.	Padmavathy et al., (2012)
	Your bank carefully focuses on customer needs.	Jani et al., (2007)
	Your bank's employees work with customers regularly to determine service quality.	Jayachandran et al., (2005)
Conflict Management	Your bank makes the necessary steps to solve customer complaints instantly.	Cho et al., (2003); Ndubisi (2007)
	Your bank solves customer problems.	Padmavathy et al., (2012)

	Your bank always ensures to avoid conflict.	Developed by Author
	Your bank is co-operative.	Padmavathy et al., (2012)
Responsiveness	E-RM helps both bankers and customers to be more responsive.	Developed by Author
	Your bank provides timely information regarding services.	Kornerand Zimmerman (2000)
	The transaction process of your bank is very correct and rapid.	Chen et al., (2009)
	Your bank delivers services at a convenient time.	Padmavathy et al., (2012)
Ease of Use	E-RM is very easy to adopt.	Developed by Author
	The use of electronic processes saves time for both customers and banks than traditional banking.	Chu et al., (2012)
	Your bank effectively uses electronic services to ensure proper customer service.	Padmavathy et al., (2012)
	You can easily utilize information using E-RM.	Farnaz et al., (2012)
Customization	Personalized services are available for you.	Ndubisi et al., (2011)
	Your bank always ensures your claims.	Ndubisi et al., (2011)
	You will turn into a valuable customer by receiving properly customized service.	Developed by Researcher
Service Expense	The service expense of your bank regarding E-RM is reasonable.	Developed by Researcher
	Gradually, service expenses should be reduced by your bank.	Hakim et al., (2017); Farnaz et al., (2012)
	Customers affordability should be considered while adopting technology.	Chen et al., (2003)
	Your bank always provides incentives to encourage you to adopt the services.	Mahapatra et al., (2020)
Security	Your security systems do not permit unauthorized access to your account.	Chellappa (2003)
	Your bank provides enough privacy.	Developed by Researcher
	Your bank's security policy is satisfactory.	Nupur (2010)
	Security for every transaction is ensured by your bank.	Hakim et al. (2017)

Communication	Your bank effectively maintains communication with customers.	Padmavathy et al., (2012)
	Your bank provides trustworthy information.	Hakim et al., (2017)
	Your bank employees fulfill the services requested by customers.	Hakim et al., (2017)
Bonding	The best service is always ensured by your bank.	Hasan (2019)
	Your needs regarding banking services are always understood by your bank.	Hasan (2019)
	Your bank's policy is enough to build strong bonds with customers.	Developed by Author
	Your bank employee honored you properly.	Hasan (2019)
Trust	Your bank maintains service standards.	Chen et al.(2003)
	Your bank provides trustworthy services.	Padmavathy et al., (2012)
	The reputation of your bank is satisfactory.	Hasan (2019)
	Maintain mutual trust is easy through E-RM.	Developed by Author
Customer Satisfaction	You are satisfied with both the technical and functional services of the bank regarding E-RM.	Akroush et al., (2012); Olsen and Johnson(2003)
	You are satisfied with the electronic relationship marketing capabilities of a bank employee.	Payne and Frow (2005); Eisingerich and Bell(2007); Huang et al., (2007)
	You are satisfied with the banking rules and regulations regarding E-RM.	Developed by Researcher
	You support the electronic relationship marketing concept introduced by the bank.	Developed by Researcher
Customer Loyalty	For any banking services, you will give the best priority to your bank.	Hasan (2019)
	Regular relationships are maintained by you.	Hasan (2019)
	Banking service through E-RM turned you into a loyal customer.	Developed by Author

	You have no switching tendency.	Hakim et al., (2017)
Customer Retention	Your attachment is permanent.	Rootman et al., (2011)
	You would encourage others to become a client of this bank.	Almohaimmeed (2019)
	You always positively represent your bank.	Almohaimmeed (2019)
	You consider my bank as my first choice.	Almohaimmeed (2019)

Source: Literature review, 2020

10.0. Analysis of the Data

The sample size of the survey was 600 and an error-free questionnaire was finally selected through face-to-face data collection. Six hundred respondents' data was entered into the SPSS-25 version for analysis. After data entry, missing values were checked and no missing values were found, but 24 respondents were excluded from the study due to outlier problems which prevented further processing of the data into SPSS and AMOS for SEM analysis. Finally, (600-24) = 576 respondents' data has been considered for analysis of the study. The analysis section of the study consists of the demographic profile of the respondents, structural model-CFA, model fit indices and hypothesized results.

10.1. Demographic Profile

The respondents were 66.32% male and 33.68% female. The reason behind this is that a male client is more than a female client. Besides this, the tendency to get banking services is high for males because of business and other purposes. The age group of participants shows that 13.54% aged between 18-28, 41.49% aged between 29-38, 27.78% aged between 39-48, 10.24% aged between 49-58, 4.51% aged between 59-68, and finally 2.43% aged 69 or above. The result shows that the majority of the respondents lie in the age group between 29-38 years old.

The education level of respondents showed that 13.19% is at the undergraduate level, 69.27% of the respondents completed graduate level, whereas only 17.53% completed the post-graduate level. In these studies, undergraduate level respondents are few because naturally poor-educated people are not capable of maintaining and using such technology-oriented relationship marketing tools, and the researchers intentionally rejected this type of group for the better interest of the study result. Those respondents will not accurately answer the research questions because they have some knowledge about the research.

The occupation level of respondents showed that 61.11% of respondents are service holders, self-employed is 13.72%, students are 6.77%, house wives are

14.76%, and finally, retired respondents are 3.64%. The service holders are very high in number and percentage.

The demographic profile of the computer knowledge of respondents showed that 13.19% are experts, 39.76% are advanced and 47.05% are just beginners. Advance and beginner respondents are the same in number. In this study, if more and more respondents had expert computer knowledge, it would be easier for the bank to perfectly deal with communication through E-RM.

The respondents' attachment to the bank showed that 10.94% have involvement for 1-5 years, 6-10 years have 43.05%, 11-15 years have 27.26%, 16-20 years 10.94%, 21-25 years 5.55%, and finally, 26 or more is 2.26%. The maximum involvement of the respondents was 43.05%.

Table 3: Demographic Factors of the Respondents (N=576)

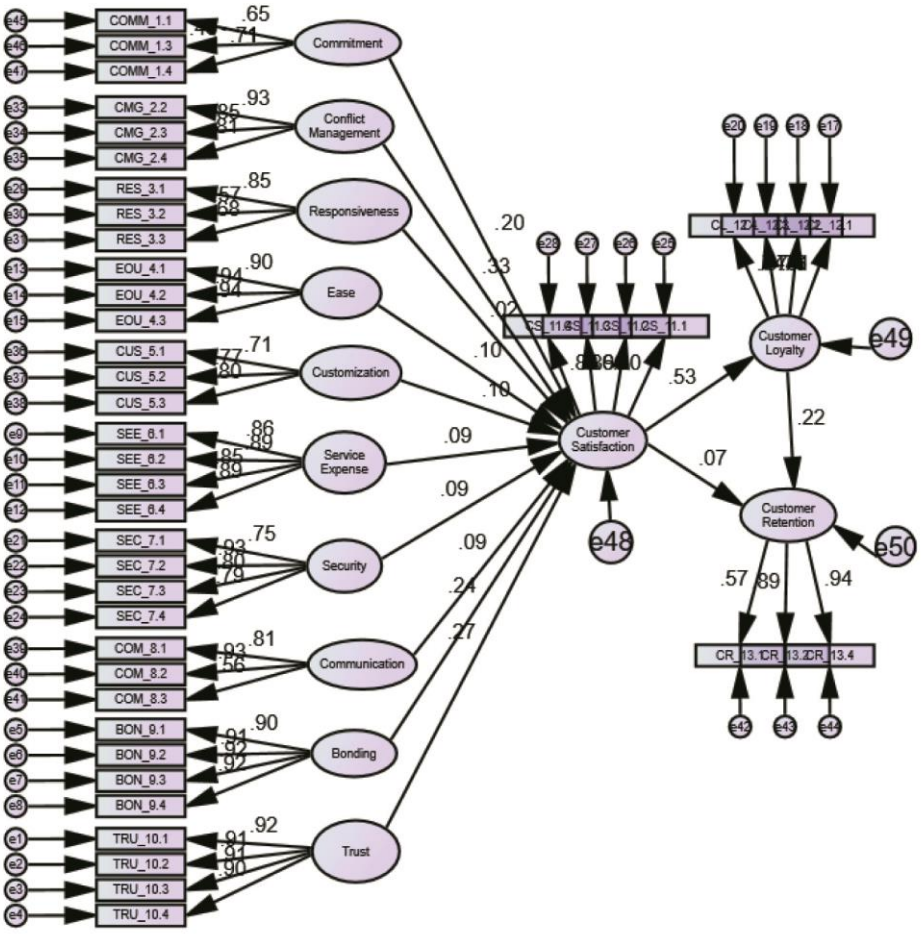
Variables	Frequency	Percentage
Type of Bank		
Govt. Commercial Bank	3	9.37
Pvt. Commercial Bank	21	65.62
Foreign Commercial Bank	5	15.63
Specialized Bank	3	9.37
Total	**32**	
Age		
18-28	78	13.54
29-38	239	41.49
39-48	160	27.78
49-58	59	10.24
59-68	26	4.51
69+	14	2.43
Total	**576**	
Education		
Under-Graduate	76	13.19
Graduate	399	69.27
Post Graduate	101	17.53
Total	**576**	

Gender		
Male	382	66.32
Female	194	33.68
Total	**576**	
Occupation		
Service	352	61.11
Self Employed	79	13.72
Student	39	6.77
House Wife	85	14.76
Retired	21	3.64
Total	**576**	
Computer Knowledge		
Expert	76	13.19
Advance	229	39.76
Beginners	271	47.05
Total	**576**	
Duration of Attachment to bank		
1-5	63	10.94
6-10	248	43.05
11-15	157	27.26
16-20	63	10.94
21-25	32	5.55
26+	13	2.26
Total	**576**	

Source: Primary data analysis, 2021

10.2. Structural Model-CFA

Centered on path analysis, a structural model checks all possible hypothetical dependencies. (Hoyle 1995; Kline, 2005). Confirmatory factor analysis is a multivariate statistical method for determining whether a measured variable accurately reflects the number of constructs. CFA is the measurement part of structural equation modeling. The figure below shows the relationship position through path analysis.



Source: Primary data, 2021

Figure 2: Structural Model Output of CFA Weighted SERVPERF with Standardized Loading.

10.3. Model Fit Summary

To run, the Structural Equation Modeling model should be fitted with different measurement criteria. Model fit indicates how well a model represents the observations. It focuses on the dissimilarity between observed and expected results supported by the model (Bollen and Long, 1993). To measure how well the model represents the observations in this study, two types of indices that fit the features of the model have been employed. These are absolute fit indices and incremental fit indices.

Table 4: Structural Model of Fit Indices

Measurement	Values in this study	Recommended	Source	Indication
χ^2/df	2.549	≤ 3	Gifen (2000)	Excellent
P-value		P≥ 0.05		
CFI	0.93	≥ 0.90	Byrne (1994)	Excellent
IFI	0.92	≥ 0.90	Bollen (1989)	Good
NFI	0.88	≥ 0.90	Byrne (1994)	Acceptable
GFI	0.90	≥ 0 .90	Hoyel (1995)	Good
AGFI	0.91	≥0.90	Chau and Hu (2001)	Good
PClose	0.111	>0 .05	Byrne (1994)	Excellent
RMSEA	0.052	≤ 0.06	Bazzogiand Yi (1988)	Excellent

Source:Primary data, 2021

10.4.Hypothetical Result

Result obtained from hypothesis test are presented in the table 5 below:

Table 5: Results of the Hypotheses Test

Associations between Variables			Regression Weights				
			Est.	S.E.	C.R.	P	
COMM	→	CS	.123	.020	3.980	***	Accepted
CMG	→	CS	.160	.022	7.434	***	Accepted
RES	→	CS	.112	.035	3.426	***	Accepted
EOU	→	CS	.234	.036	1.700	.030	Rejected
CUS	→	CS	.080	.026	1.367	.040	Rejected
SEE	→	CS	.049	.022	2.216	.023	Rejected
SEC	→	CS	.263	.022	4.234	***	Accepted
COM	→	CS	.143	.028	3.231	***	Accepted
BON	→	CS	.103	.018	5.695	***	Accepted
TRU	→	CS	.122	.019	6.358	***	Accepted

CS	→	CL	.642	.065	9.952	***	Accepted
CS	→	CR	.227	.056	3.840	***	Accepted
CL	→	CR	.227	.057	3.950	***	Accepted

Source: Primary data, 2021

The results showed that customer satisfaction is influenced by commitment, conflict management, responsiveness, ease of use, service expense, security, communication, bonding, and trust, which have both positive and negative effects. The findings are logically and empirically compatible with previous research.

11.0. Findings

It is worthwhile to review the most recent developments and strategies in Bangladesh's banking sector. The literature in this regard recognizes the shift from traditional strategies towards new and dynamic strategies. The traditional strategy was based on low cost and the latest strategy is technology-oriented. There are different reasons which are bound to shift the ownership of banks, namely high competition, market saturation, the emergence of new technology, and the expectations of customers.

Thus, the banking sector is now relying on dynamic strategies, which include online banking, mobile banking, internet banking, E-banking, and all necessary technology. A few years ago, the banking sector focused on RM-based traditional procedures, but nowadays it goes for technology-oriented E-RM strategies because the latest technology-oriented service is time-saving for both customers and banks.

In this regard, the main findings of this study confirmed and proved a positive and negative relationship between E-RM dimensions and customer satisfaction, customer satisfaction on customer loyalty and retention, and finally, the relationship between customer loyalty and customer retention. The results obtained from data in the model showed there is a direct relationship between E-RM dimensions and customer satisfaction, and other constructs of the study of the bank. Hence, the key findings of the research model support the assumption that E-RM dimensions have a significant impact on customer satisfaction, and customer satisfaction has a positive impact on customer loyalty and customer retention, and finally, customer loyalty has a positive impact on customer retention in the banking sector of Bangladesh.

Data analysis found that the E-RM dimension influences customer satisfaction positively and negatively. i.e customer satisfaction was the strongest and most significant outcome of the E-RM dimensions. The value is significance because $P< 0.05$ indicates acceptance of hypothesis and $P> 0.05$ indicates rejection of hypothesis. The impact of ten dimensions of E-RM on customer satisfaction are as follows:

a. Commitment, positive impact, P<0.05
b. Conflict management, positive impact, P<0.05
c. Responsiveness, positive impact, P<0.05
d. Ease of use, negative impact, P>0.05
e. Customization, negative impact, P>0.05
f. Service expense, negative impact, P>0.05
g. Security, positive impact, P<0.05
h. Communication, positive impact, P<0.05
i. Bonding, positive impact, P<0.05
j. Trust, positive impact, P<0.05

The impact of other variables showed below:

a. Customer satisfaction ➜ Customer loyalty, positive impact, P<0.05
b. Customer satisfaction ➜ Customer retention, positive impact, P<0.05
c. Customer loyalty ➜ Customer retention, positive impact, P<0.05

The study's broad objective was to test a model of E-RM showing E-RM dimensions, customer satisfaction, customer loyalty, and customer retention in the banking sector of Bangladesh. To do so, a model was developed and shows the linkages among variables, indicating a discussion to show the direction among variables. The study's first objective, to find out the impact of E-Relationship Marketing dimensions on customer satisfaction, was met because hypothesis were tested and result were presented in table 4. The study's second objective is to find out how customer satisfaction affects customer loyalty and retention is also met because the study showed customer satisfaction positively affects customer loyalty and customer retention. The result is available in table 4. The study's third objective, customer loyalty's impact on customer retention, was met and the result was shown in table 4. The study's fourth objective, was also met because accepted hypothesis has positive impact and rejected hypothesis has negative impact and this picture is clearly presented in table 4. the study's fifth objective also achieved which is presented below:

E-RM Problems in Bangladeshi banks according to customers. (1) The customer is less aware of the concept. (2) An employee of the bank is not dedicated to maintaining E-RM. (3) An employee of the bank has lack of knowledge using technology, basically in government bank. (4) An employee of the bank is not dedicated to maintaining E-RM. (5) Publicity by the bank is not satisfactory. (6) Most of the customer has limited personal support to adopt these services. (7) Internet facilities are not satisfactory. (8) Customers fear E-RM services because it involves

technology and customer have lacking using it. (9) some other miscellaneous problem.*E-RM Problems solutions in Bangladeshi banks according to customers.* (1) Customers have to be more aware of the concept. (2) Proper relationship-building training is necessary for banking employees. (3) The technological expertise of bankers should be increase. (4) Investment behind technology by the bank has to increase. (5) More educated (technology oriented) client is needed as banking customer. (6) Internet, mobile, computer facilities have to increase, in this situation government can charge few on a business man so that private internet service provider can chare few to their user. (7) The government can reduce more tax on electronic products which is related to E-RM services. (8) The government can reduce tax on electronic products which is related to E-RM services. (9) The banking charge regarding electronic services should reduce. (10) The government should encourage the bank to launch this service to the fullest extent possible.

Finally, the sixth objective of the study was also met and presented in the next contribution section.

12.0. Contribution

*Theoretically:*A lot of research has contributed to the literature regarding RM. The relationship marketing dimension's impact on customer satisfaction, customer loyalty, customer retention, market share, and profitability, etc. So there is no doubt that a significant theoretical contribution is available. The study is new thinking in the area of relationship marketing. The study developed a conceptual framework regarding E-RM and showed a relationship between E-RM dimensions and customer satisfaction. The study also showed the relationship between customer satisfaction and loyalty, customer satisfaction and retention, and finally, customer loyalty and customer retention of the bank. In marketing literature, the adoption of E-RM in the banking sector will contribute enormously. Taking literature support, we think this is the first study in the banking sector regarding E-RM in Bangladesh. There are a lot of opportunities regarding the issues for further studies. As more and more studies are conducted, more theoretical contributions are possible in this area to develop the banking sector of Bangladesh.

Practically: The results of the study have important managerial and practical consequences for the banking sector as a whole. The contributions are as follows:

a) Analytical results will contribute to understanding banking customers and banks about the E-RM dimensions, their relationship, and their impact on customer satisfaction, loyalty, and retention.

b) The findings of the study will help managers and customers of banks, particularly inthe development of the bank-customer relationship.

c) The findings of the study may be applied to other e-retailing sectors where firms provide services to their customers through mobile devices and maintain sound relationships.

d) Research results will improve communication efficiency between banks and customers.

e) From the literature review, it was seen that the dimensions developed and applied in various country perspectives and maximum dimensions showed a positive result.

f) To implement and improve electronic relationship marketing in banking sector as well as other sector of Bangladesh only publicity is nedded mentioning its benefits to customers. Besides this if there is any risk it must be reduced and practically have to understand the client.

g) Finally, in this study, the policymakers and customers of the bank will get the scenario in the context of Bangladesh.

Furthermore, the adoptionof the research findings by the BBI (Bangladesh Banking Industry) will enable the optimized implementation of modern e-marketing communication methods across the banking organization. The contribution of the study will be reflected in sustainable socio-economic development by implementing E-RM in the banking sector.

13.0. Limitations and Future Research Directions

The study is not free from flaws. Mentionable flaws of the study are: (1) The data collection was based on the entire country, so distance is another obstacle to collecting data. The data collected through a face-to-face survey questionnaire was very time-consuming as well as funds needed. (2) The budget limitation was a major obstacle to this research because it was completed through the researcher’s fund. (3) The choice of the population was limited to a single banking industry, which tends to limit the generalization of the findings in the context of other industries.

A lot of questions have arisen in the minds of the researchers during this research work, but there is no scope to include them in the study. It is recommended for future study by other researchers. Those questions involve: (1) While this research study assumes a relationship between E-RM and customer satisfaction, The E-RM strategy has changed rapidly since this study was conducted. Therefore, further research can include other factors of E-RM. (2) This study was a paper-based survey. The country which is advanced in internet use can do research through an internet-based survey because more respondents' opinions are possible to collect for generalization of the results. (3) The results of this research study may be applied to other countries with similar levels of E-RM deployment in the tourism industry or to other industries. (4)

This study focuses on E-RM in the banking sector of Bangladesh; further study may extend to other sectors of Bangladesh.

14.0. Conclusion

The success of the banking business depends on long-term relationships with customers. The model represented in the study can be used as a practical as well as a theoretical platform for the development of electronic relationship marketing. This model can be applied to other service sectors both within and outside of Bangladesh. The findings of the study will contribute to the growing body of knowledge in E-RM and service marketing. The findings will also be beneficial for customers and bankers in Bangladesh.

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