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Editorial

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With thanks,

Editor in chief

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The Impact of COVID-19 on Bank Performance: A Study on Commercial Banks in Bangladesh

Mst. Ishrat Jahan Tanne¹, and Md. Mahtab Uddin^{2*}

Abstract

Global financial sector has been affected by COVID-19 pandemic, as consequences, banking sector of Bangladesh contend with huge financial losses. This paper contemplates the effects of COVID-19 focusing on State-Owned Commercial (SCB), Private Conventional (PCB) and Islamic Bank's (IB) technical efficiency and profit efficiency. The output-oriented Malmquist DEA model and panel OLS model have been used to measure the factor productivity changes due to technical changes. I have selected 23 listed commercial banks as sample. According to DEA test, the technical efficiency changed in 2020 for SCB, PCB & IB by -5.36%, 82% & - 83.86% respectively. ROE declined by 13.85%, 5.06% & 13.82% for SCB, PCB & IB respectively. In terms of regression analysis, Private conventional and Islamic bank's dependent variable, Return on Equity (ROE) was affected by selected independent variables during pandemic period but for State-owned Commercial Bank this scenario wasn't same.

Keywords: *Technical efficiency, scale efficiency, Pure efficiency, Factor productivity changes, non-performing loan, Return on Equity, Cost income ratio, loan to deposit ratio, pandemic.*

1. Introduction

The Financial institutions are the most influential and key player of the economic activities of any countries. The amplitude of the novel corona virus has been declared as a global pandemic. This pandemic affected financial sector so negatively than the past all financial crisis. With the wide scale global transmission of COVID-19, all financial players are confronting an unexpected emergency. Monetary establishments' staffs as banks, depository foundation, and insurance agency have experienced a quick shock which expects them to be ready for sensitive and unsure future difficulties. Since lockdown, the world faced a serious de-globalization across the world, which are adversely affected the capital flow, trades, business and international transactions. The chief of the IMF stated that the world will face vast global monetary fall out within 12 months in 2020 and our analysis found a great connection with this statement (Gill, 2020). Bangladesh has no exception from the IMF projection. Our Banks already have faced the threat of overburdened with non-performing loan and poor collections. The non-performing loan ratio and cost to income ratio are very high for our overall banking sector. These problems have been elaborated by a recent cross by central bank to cap lending rate at 9% or in single

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digit. Though the NPL was in stable position in starting of 2020 but it increased overall more than 7%, BDT 950.85 billion during first quarter of 2021 from 887.34 billion from preceding quarter of 2020(Shohana Ahmed, 2020).

The IMF world economic outlook predicted in April,2020 that world economy will face a shrink of 3% and developed economies will shrink by 6.1%. This crisis largely impacts on financial sectors and health sectors. It compared as more difficult situation than financial crisis 2007-2008. The main focus of our study is to analyze the effect of COVID-19 pandemic on banking sector and how efficiently they handled this uncertain crisis. Since our banks already are facing so much difficulties because of high percentage of NPL and less efficiencies in regularities. That's why this study has tried to unearth the impact of COVID-19 on the banking sector of Bangladesh.

We have found different results among three different bank types like Islamic bank, private conventional bank and state-owned commercial bank. Among them private commercial banking sector has the high return on equity at with high cost, for some Bank like Janata bank, Sonali bank, AB bank, Meghna bank & National bank, the non-performing loan became so high like almost 20%-33%. Cost income ratio is almost 35%-90%, and loan to deposit ratio decreases by a huge percentage. For State-owned commercial bank, this scenario is different, most of the state-owned banks are in decreasing position in case of their return on equity and their loan to deposit ratio is in decreasing position. But their non-performing loan percentage against total loan is in stable position in terms of previous years, although this NPL percentage still in risky area. In case of Islamic Banks, the return on equity or profitability is in great position than conventional bank. Their profitability was in increasing position except IBBL, Al Arafa and Union bank even though their return on equity is higher than state owned bank or private commercial bank. The cost against income became higher and investment to deposit ratio is in decreasing position after pandemic hit.

2. Literature Review

Amplitude of any global pandemic has a serious dominance on job sector, human health, economy, education, environment, social life and so on. Global economy already affected by the prevalence of COVID-19 pandemic adversely. Like other crisis, the COVID-19 pandemic has negative effect on Business, production, consumption and service sector so that it also affects the banking sector. An investigation by (Boone, 2020), Financial development declined pointedly in the first half of 2020, and afterward recuperated unassumingly. The primary learns about the effects of the COVID-19 pandemic on a bank's efficiency and monetary strength, offering worldwide proof to additionally foster existing endeavors. The initial concepts of stability and efficiency is that it measures how much a firm is capable to covert its inputs into outputs according to their behavioral objectives. The fundamental focal point of efficiency analysis is that any misuse of input to be kept away from so there are no missing of output. Financial institutions and commercial banks are probably going to be vincibly to shocks as far as both the worldwide and homegrown financial frameworks.(Harimaya and Takahashi) (Fu, 2014) (Montgomery, 2018).

According to (Koopmans, 1951), Efficiency was quick to give the meaning of specialized effectiveness where the maker is actually proficient when it is skilled to expand their output with their best level without expanding the sources of input. (Ariff, 2008) expressed that, cost efficiency refers that a firm can lessen its expenses of contributions while delivering similar measure of output sold at certain.

(Humphrey, 1997) argue that the vast majority of the past investigations were about only on cost efficiency, there is almost zero research on technical efficiency, pure efficiency and scale efficiency. Nonetheless, studies propose that Cost efficiency isn't to the point of estimating the wellbeing of monetary establishments that is the reason they fostered the models of specialized proficiency and benefit productivity. In the Malaysian banking cases,(Yahya, 2013) concentrated on profit proficiency on the two

banks' possession. This research utilized with Data Envelopment Analysis (DEA) technique on the sample of 39 Islamic and conventional banks. They found that Islamic Banks the degrees of benefit and cost productivity are lower than conventional banks in light of the variables of bank-points of interest qualities and macroeconomic circumstances.

(Kamarudin N. M., 2014) analyzed the productivity level in GCC on Islamic and conventional banks on the 74 banks throughout the years 2007-2011. The outcome implies that lower proficiency of Islamic banks level because of the greater level on banks income inefficiency. One study constructed by (Kamarudin S. a., 2015) additionally observed the comparable outcomes where the Islamic banks revenue proficiency has more prominent effect on the profit efficiency. According to (Elnahass, 2021) bank normal execution and financial stability over quarterly periods, recognizes a sign of recuperation for bank steadiness during the second quarter of 2020. They found a solid proof that the ramifications of Covid-19 for banking soundness are intervened by institutional variables and the sort of banking plan of action utilized among elective financial frameworks. (Fare G. a., 1985) stated on efficiency investigation that firms can effectively apportion all its resources in a proficient way comparative with the limitations forced by the design of the production technology, by the construction of inputs and outputs markets, and comparative with anything conduct objectives ascribed to the producers. If they concentrated on their technical management efficiency, they can earn their desirable goals without further cost expansion.

(Srinivasan, 2014) expressed on their exploration paper on Indian bank that the benefit shortcoming of banks has been disintegrated into specialized and designation failure utilizing directional distance work. The review recommended that banks benefit shortcoming was because of failure from the component of allocative and this demonstrates banks expected to zero in on ideal use of info yield blend. (Jayaraman, 2014). In 2002, a study on USA by (al G. e., 2002) found that profitability affected by interest rate trend. Asia Pacific economies explored an investigation to measure the impact of bank rivalry, fixation, guideline and public organizations on individual bank delicacy as estimated by the likelihood of insolvency and the bank's Z-score. The results proposed that more noteworthy fixation encourages monetary delicacy and that lower evaluating power likewise instigates bank risk exposure subsequent to controlling for an assortment of macroeconomic, bank-explicit, administrative and institutional elements. (Fu, 2014). (Beck, 2020) indicated that the impact of the Covid-19 episode would rely upon three elements - the degree of the pandemic's financial impacts around the world, the monetary and money related approach responses to the shocks, and administrative responses tending to conceivable bank delicacy.

3. Research objectives

This paper sums up the degree of information accessible and associates distributed materials in regards to the compatibility of the COVID-19 pandemic in the Banking sector. The primary objective of this report is to present an overview on effects of covid-19 on Banking Industry and to calculate the efficiency level of different kinds of Bank in sudden crisis situation.

4. Methodology:

Sample collection and data development

This research includes 23 listed banks (18 Conventional and 5 Islamic banks) in Dhaka Stock Exchange (DSE), Bangladesh covering data for Three years from 2018 to 2020. This generates a panel sample of 69 bank observations. We have selected this sample on Stratified sampling method. First, we divided the populations into three homogeneous group of SCB, PCB & IB, after that we collected their 50% as sample through simple random sampling method. We consider 2018,2019 as the pre- Covid-19 period and 2020 represents the period of Covid-19. we maintained two data sources, website of Bangladesh Bank and data from annual report of each banks website to collect all our financial, accounting and market data. We have classified data into three categories like State owned commercial bank, private commercial bank and

Islamic bank. We have adopted total cost, total deposits as input variables and total income and total loans and advances as outputs for efficiency analysis.

Method specification and procedure

To develop a hypothetical establishment and situation-based inconvenience of COVID-19 impacts for the Bangladesh banking sector, this paper took on a quantitative methodology. To foster situation-based assessments of the possible effects on banks, this paper utilizes Two Models. One is to measure the technical efficiency in input and output and others is for measure the profitability.

To estimate the technical efficiency, we have used Data Envelopment approach known as DEA model. The Data Envelopment Analysis (DEA) method is a mathematical programming model developed by Charnes, Cooper, and Rhodes in 1978 (Charnes, 1978) and it is known as the CCR model that has been adopted by several studies to measures banks’ efficiency (e.g. (Kamarudin N. &., 2013). The CCR model assumes that there is no significant relationship between the technical efficiency and the scale of operations by assuming constant returns to scale (CRS) and is only applicable when all dynamic units are working at an ideal scale.

To test this model, we have used their DEAP application software. We preferred to test Malmquist DEA test with output-oriented approach. Since our goal was to estimate efficiency, we wanted to measure how much efficient our bank to make the best uses of their input to get best output result. We also used constant return scale method which shows that the changes of output are constant with the changes of input means the scale of changes remain constant in every measure. This model is also known as CCR model.

Inputs	Outputs
Deposit	Loans and advances
Total cost	Total income

Table 01: Inputs and outputs list

We have selected Deposit and total cost as input & Total loans and advances (General investments for IB) and total income as outputs according to (Ariff, 2008)(Banker, 1984) analysis. Since deposit and total cost which represents liability and cash outflow, we selected them as inputs. Again, Loans & advances and total income represent asset and cash inflow we selected them as outputs. Here, according to DEAP analysis if point 1 indicates 100% efficiency in terms of inputs use and greater or less than 1 indicates great efficiency or deficiency respectively. To measure the profitability of Bank performance we used ordinary Least Square method with equation

$$ROE = C(1)*NPL + C(2)*LOAN_TO_DEPOSIT_RATIO + C(3)*COST_INCOME_RATIO + C(4)$$

This equation is estimated to measure the relationship between dependent variable (ROE) and Independent Variables (NPL, CI & LtD)

We have also used Jarque-Bera test, Durbin Watson test to measure the Normality test and Autocorrelation test respectively. According to Hausman test, Fixed effects on period supports the regression analysis, that’s why we used fixed period effect on ordinary lest square method.

Hypothesis constructions:

H0: ROE hasn't affected by NPL,LtD & CI ratio. HA:

ROE has affected by NPL, LtD & CI ratio.

Instruments

To measure all these tests, we used two application software, they are DEAP 2.1 and Eviews.

5. Empirical analysis and results

Here all calculations are based on analytical period from 2018 to 2020, 2018 used as base period for testing the efficiency of 2019 comparatively and all these details are included in appendixes.

Efficiency Test:

Here we have used output-oriented Data Envelopment Approach model to show how much Output can be more efficient with these constant inputs. We have used Deposit and Total cost as input and Loans& Advances and total income as output to measure the level of efficiency of each bank handled within the analytical period.

Output orientated Malmquist DEA: Distances Summary of State-owned commercial Bank

Year	effch	techch	pech	Sech	tfpch
2019	1.006	0.947	1.000	1.006	0.952
2020	0.984	0.932	0.973	1.012	0.918
Mean	0.995	0.940	0.986	1.009	0.935

Table 02: Malmquist index summary of annual means:

From Table 2, here we can see that the total average factor productivity for the entire period is .935 that means it is in the decreasing position of -6.5%, that means decline of productivity. This is due a decrease in technical change of -.6% and pure efficiency -1.4% but Scale efficiency increase by .09%. Here we also see that these efficiencies were better in 2019 than 2020. In 2019 the efficiency was .952 but in 2020 it became worsen at .918 due to Covid-19 impact on Bank activities. Firms failed to handle crisis effect efficiently with their existing resources. Scale efficiency for each year is measured by rationing of technical efficiency on constant return on scale variable method with the Variable return on scale method.

Bank	effch	techch	Pech	sech	tfpch
Sonali Bank	1.030	0.965	1.000	1.030	0.994
Janata Bank	1.000	0.947	1.000	1.000	0.947
Agrani Bank	0.956	0.907	0.959	0.996	0.867
Mean	.995	.940	.986	1.009	.935

Table 03: Malmquist index summary of firm means

From table 3, In the study period Bank 1 means Sonali bank was better in Factor productivity technical efficiency with TFP .994 and Agrani Bank has the lowest efficiency with TFP .867. Scale efficiency and Pure efficiency was efficient enough for Sonali and Janata Bank but inefficient for Agrani Bank. Technical change could be better for all bank, their output could be more with these inputs. In the analytical period if they efficiently handled their technical changes and scale changes then they could earn more output without even increasing the cost.

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Bank	TFP	Rank
Sonali Bank	0.994	1
Janata Bank	0.947	2
Agrani Bank	0.867	3

Table 04: Ranking on SCB

Table 4 indicates among all State-owned commercial bank which are included in sample, Sonali Bank Showed a great performance than other banks, since they are also not in 100% efficient point but they did better than Agrani Bank and Janata Bank, and on basis of total factor productivity change due to technical changes, second and last position have covered by Janata bank and Agrani bank respectively.

Output orientated Malmquist DEA of private Bank:

Year	effch	techch	Pech	sech	tfpch
2019	1.566	0.384	1.292	1.212	0.601
2020	0.898	1.219	0.944	0.952	1.094
Mean	1.186	0.684	1.104	1.074	0.811

Table 05: Malmquist index summary of annual means

According to DEAP analysis, we can see in table 5 that in case of private conventional bank, the overall Factor productivity change due to technical efficiency in three analytical period is 0.811 that means they are still in lack of efficiency of $(1-0.811) * 100 = -18.9\%$. But they have improved their efficiency in year 2020 than the previous year. The total factor productivity changes due to technical changes of private Bank was 0.601 in 2019 and 1.094 in 2020. That means in 2020 they were 100% efficient on their best uses of input to get maximum output. They made huge changes on their technical changes and they improved it.

Malmquist index summary of firm means:

From table 06, we can see that among all of them DBBL, MTB, NBL, Trust bank, UCB, Premier Bank and AB bank has the positive factor productivity change due to technical change so these firms handled COVID-19 effect positively in technical way but other firms showed inefficiency. With 181% efficiency on factor productivity changes, DBBL showed a great performance in over three analytical periods. They also put their efficiency in both pure and scale efficiency measure. With more than 130% efficiency in factor productivity changes premier bank and national bank are second and third position of Ranking. City Bank is in the lowest position with TFP .166 and their technical efficiency is in low condition.

Bank	TFP	Rank
DBBL	1.814	1
National Bank Limited	1.349	3
Premier Bank Limited	1.362	2
Mutual Trust Bank Limited	1.040	4
Trust bank ltd.	1.033	5

Table 06: Top five Ranking on PCB

Output orientated Malmquist DEA of Islamic Bank

According to DEAP analysis, we can see that in case of private Islamic bank the overall Factor productivity change due to technical efficiency in three analytical period is .635 that means they are still in lack of efficiency of $(1-.635) * 100 = -36.5\%$ and they lost their efficiency in year 2020 than the previous year. In 2020 their TFP decreased from 1.582 to .255. They had to use their resources more efficiently for better output. Some of the firms did the better job than any other listed bank like Exim bank Shahjalal Islamic Bank.

Year	Effch	techch	pech	sech	tfpch
2019	0.894	1.769	0.915	0.977	1.582
2020	0.539	0.474	0.786	0.686	0.255
Mean	0.694	0.915	0.848	0.818	0.635

Table 07: Malmquist index summary of annual means

Among all of them, according to table 08 and table from appendices, Exim bank and Shahjalal Islamic Bank have the positive Factor productivity Change due to technical change so these firms handled COVID-19 effect positively in technical way but other firms showed their inefficiency. They could do better performance in case their output same level of input. And among them Shahjalal Islamic bank is in the highest position with TFP 2.976 in terms of, scale efficiency and pure effective efficiency it was 100% efficient too, but IBBL is in the lowest position with TFP .146 and their technical efficiency and effective efficiency is in very low condition.

Bank	TFP	Rank
EXIM Bank Ltd.	1.051	2
Sh. Islamic Bank Ltd.	2.976	1
AL-Arafa Islami Bank ltd.	0.847	3
Union bank ltd.	0.846	4
IBBL	0.146	5

Table 08: Ranking on IB

Descriptive statistics: Descriptive statistics tables from indices show the descriptive statistics for our all samples of SCB, PCB & IB respectively. And it presents the scenario of before and during the outbreak of COVID-19. Financial strength and performance of banking sector appears to suffer from the adverse impact of COVID-19 pandemic. Table 12,13& 14 indicate the before and after situation of the banking sector specially on return on equity, non- performing loan, loan to deposit ratio & cost income ratio, Analysis shows that the average return on equity was 2.31% in 2019 and it decreases to 1.99% in 2020 for a state-owned commercial bank, for private commercial bank return on equity decreases from 10.26 to 9.74 % and in case of Islamic Bank the return on equity decreases from 9.10% to 7.75%. It indicates that the return on equity decreases more in case of Islamic Bank so covid-19 pandemic negatively affected banks profitability in 2020 and Islamic Bank affected more than conventional Bank. For SCB, PCB and IB the CI ratio increased from 79.35% to

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81.92%,66.69% to 70.89% and 66.0% to 79.75% respectively. Since the loan to deposit ratio is in decreasing in position the non-performing loan is also in decreasing position. In 2020, Bank loans and advances was less than its deposit that's why is interest paying cost is higher than its income all of this analysis shows the negative impact of COVID-19.

Overall Analysis and Findings from regression analysis.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL	0.021682	0.029624	0.731911	0.5172
LtD	-0.052382	0.022670	-2.310667	0.1040
CI	-0.102777	0.031042	-3.310921	0.0454
C	13.19402	4.386454	3.007900	0.0573
R-squared	0.816989	Mean dependent var		2.132222
Adjusted R-squared	0.511971	S.D. dependent var		1.522611
F-statistic	2.678495	Durbin-Watson stat		1.383783
Prob(F-statistic)	0.223507			

Table 09: Regression analysis of SCB

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL	-0.528178	0.052327	-10.09373	0.0000
LTD	-0.026398	0.028479	-0.926948	0.3597
CI	-0.022397	0.015956	-1.403697	0.1683
C	17.41889	3.323251	5.241522	0.0000
R-squared	0.372191	Mean dependent var		10.16578
Adjusted R-squared	0.291703	S.D. dependent var		4.834063
F-statistic	4.624167	Durbin-Watson stat		0.833809
Prob(F-statistic)	0.002079			

Table 10: Regression analysis of PCB

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPI	1.448452	0.489520	2.958925	0.0160
LTD	-0.054616	0.246865	-0.221238	0.8298
CI	-0.042483	0.056113	-0.757095	0.4683
C	11.92592	23.94085	0.498141	0.6303
R-squared	0.692680	Mean dependent var	9.084667	
Adjusted R-squared	0.521947	S.D. dependent var	2.898783	
F-statistic	4.057087	Durbin-Watson stat	2.645847	
Prob(F-statistic)	0.033186			

Table 11: Regression analysis of IB

We can see from table 09, that all the explanatory variables are statistically insignificant or the null hypothesis should be accepted for NPL, Loan to deposit ratio and for CI ratio at 5% level of significance because value of individual variables in t- test are in rejection area, so we can reject the alternative hypothesis for individual variables hypothesis with 95% confidence. CI ratio is statistically significant with probability of 4.54% and we can reject null hypothesis for cost income ratio. Here our analytical table indicates that the F value is 2.67 at 5% level of significance and this value is so low and the probability of getting such value is .2235 Or 22%, so that we can reject the alternative hypothesis and accept the null hypothesis with 95% confidence level. Because the probability of getting such value from our analysis is very high, the null hypothesis should be accepted. Sometimes individual t test and combined F- test show the contradictory results because individual hypothesis sometime failed to show the real scenario but since F statistics represents the overall combined effects of all variables it is more suitable for decision making.

For PCB, analytical table 09 shows that t statistics value, in case of NPL, the null hypothesis should be rejected at 5% level of significance, means t value is -10.09, the probability of getting has value is very low, almost zero, so we should accept the alternative hypothesis but in case of loan to deposit ratio and cost income ratio the t value falls accepted region. They individually fail to reject the null hypothesis and the C value for residual that is are not included in equation is 17.42. C value also falls in rejected region. To test the combined effect of the regression equation we used F-statistics that F-value of private commercial bank is 4.62, at 5% level of significance the probability of getting this value is almost 0, so we can we should reject the null hypothesis with 95% confidence level.

For IB, in case of individual significance test non-performing investment, Cost income ratio & Investment to deposit ratio, among all NPI is statistically significant and LTD & CI both are statistically insignificant at 5% level of significance. T-test value of non-performing investment is 2.95 and probability is .0160 so low in two tailed test this value falls in the rejection area. We can say that return on equity is affected by non-performing investment. To test the combined effect of explanatory variables on explained variable, we also measured the f statistics and F- statistics value is 4.05711 and the probability of this value is .0331. Since we made our test at 5% level of significance so that with 3.31% probability it will be great to adopt alternative hypothesis and reject null hypothesis.

After overall regression analysis on our selected sample, we can say that in case of Private conventional and Private Islamic bank, the dependent variable Return on Equity (ROE) was affected by selected independent variables at those analytical periods but for State-owned Commercial Bank this scenario wasn't same.

Conclusions

The COVID-19 pandemic could be the most ticklish challenges of the banking sector in recent memoir. The stability of financial institutions works like a blessing for economy expansion and development of a country. The Financial institutions of Bangladesh already faced different problematic situation like high non-performing loan percentage, less structured market and regulatory deficiency. By adopting several methods for financial performance measurement and risk indicators form data set of 23 banks listed in DSE, we found a relevant consistent result that the pandemic outbreak has a harmful effect on banking sector. It decreased income and increased the cost and bank lost their assets against their liabilities. We also noticed that different effects of COVID-19 outbreak on the stability of conventional bank versus Islamic bank in technical efficiency, private conventional bank handled pandemic more efficiently than Islamic banking sector. But some of the Islamic Banks showed great performance than any other banks. In case of

technical efficiency and profitability, private conventional banks showed better efficiency than state owned commercial banks and Islamic Banks and the return on equity was also in great position for private commercial banks.

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Cryptocurrency Market's Anomaly Impact: A Statistical Method

Jewel Kumar Roy^{1*}, Md. Habibur Rahman²

Abstract

Cryptocurrency is a collective financial mechanism, not a legitimate currency, which controls everything and therefore does not rely on central banks and financial institutions. The aim of the study is to find the day of the week effect for logarithmic return of Bitcoin, Litecoin, XRP, Nxt, Dogecoin, Vertcoin, DigiByte, DASH, Counterparty, and MonaCoin, as well as to understand the trading volume for the day of the week effect of the cryptocurrency market. The findings show that the day of week effect exists in the logarithmic return and trade volume. For logarithmic return Thursday provides the highest return for BTC, LTC and MONA, Friday provides the highest return NXT, Saturday provides the highest return XCP, Sunday provides the highest return for XRP and DASH, Tuesday provides highest return DOGE and DGB and Wednesday provides the highest return VTC. The results will help domestic and international investors for further investments.

Keyword: Bitcoin, Counterparty, Cryptocurrency, Dash, Day-of-the-Week-Effect, DigiByte, Dogecoin, Litecoin, MonaCoin, Nxt, Vertcoin, XRP,

JEL Classification: C5, D53, E44, G1, O14,

1.0 Introduction

The day-of-the-week impact is well-known for its trading of securities, debt, currencies and commodities in capital markets. We are currently researching Bitcoin, Litecoin, XRP, Nxt, Dogecoin, Vertcoin, DigiByte, DASH and MonaCoin. In this study, we are discussing this phenomenon. The demand for cryptocurrencies is now an exciting area for finance academics. The presence of irregularities in the cryptocurrency industry is one topic of research. This investigation investigated the effects of the day-of-the-week and month-of-year impact of the cryptocurrency markets, particularly on Bitcoin and Litecoin. The Bitcoin, as well as Litecoin, have been used as products since it was a high market capitalization cryptocurrency (Robiyanto et al., 2019). The problem of how a recorded market distinction is influenced via any particular day of the week replied Urquhart (2017), who found evidence of market clustering in Bitcoin.

The trade volume has risen dramatically but steadily until the introduction of Bitcoin. Some doubt the rise in the usage of Bitcoin because it is very distinct from conventional currencies but its use spreads throughout the globe (Yutaka et al., 2017). There seems to be a broad paper that investigates moment-specific trends of stock markets like the impact on Monday, the January impact as well as the impact on Halloween. This research focuses on Bitcoin returns as well as trading volume intra-day hours, days of week and months of the year (Baura et al., 2019). The long term growth strengths of many cryptocurrencies were investigated through mean-variance checks from 11 August 2015 to 7 August 2018. Including 8 cryptocurrencies analyzed, they noticed that, in a well-separated comparison portfolio,

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both individual cryptocurrencies in addition to one and a mixture respectively have major long term growth advantages. The change, therefore, is only due to a rise in equity values and not a decrease in uncertainty (Dorflleitner et al., 2018).

Table 01: Capitalisation of the Cryptocurrency market (till date 07.05.2020).

Crypto-currency	Start Date	Market cap (USD \$)	Circulating Supply	Max Supply	Price (Bitcoin)	Price (USD \$)	Website
Bitcoin	28-04-13	170,379,150,961	18,366,300	21,000,000	1.00	9,276.75	bitcoin.org
Litecoin	28-04-13	2,972,748,239	64,674,643	84,000,000	0.00493	45.96	litecoin.org
XRP	04-08-13	9,539,609,515	44,112,853,111	99,990,976,125	0.0000232	0.21625	ripple.com
Nxt	04-12-13	12,119,720	998,999,942	1,000,000,000	0.0000012	0.01213	nxt.org
Dogecoin	15-12-13	315,816,192	124,454,164,575	124,685,906,295	0.0000002	0.00253	dogecoin.com
Vertcoin	20-01-14	16,067,160	54,631,397	84,000,000	0.0000316	0.29410	vertcoin.org
DigiByte	06-02-14	293,778,769	13,110,607,127	21,000,000,000	0.0000025	0.02274	digibyte.io
Dash	14-02-14	738,286,705	9,480,742	18,900,000	0.00839	77.87	dash.org
Counterparty	15-02-14	2,657,779	2,615,338	2,615,391	0.0001101	1.02	counterparty.io
MonaCoin	20-03-14	88,341,735	65,729,675	76,421,850	0.000144	1.34	mona-coin.com

(Source: Author, data collected from the website of respective cryptocurrency)

2.0 Literature Review

The rigorous analysis by Kurihara et al. (2017), whether or not there are weekly value fluctuations by testing Bitcoin's financial performance. The analytical findings demonstrate the productivity of the Bitcoin segment. The statistical findings, therefore, have shown that Bitcoin transfers were growing and becoming more effective. The findings indicated which in potential Bitcoin gains are unpredictable. Cedric L. Mbanga (2018) has discovered evidence which Bitcoin values clustered instead on Fridays while fewer on Mondays by several quantities. The outcome often revealed that Bitcoin prices are mostly Friday trends that concentrate across the best three repeated two digits integers. Caporalea, et al. (2019) investigated week-end results utilizing a number of mathematical and trading modeling tools in the cryptocurrency industry. This phenomenon is not present in other cryptocurrencies. Bitcoin, that also earns Monday returns slightly greater than that of the other days of the week, is the only exception. In this scenario, the study of trade modeling indicates that exhaustible benefit incentives serve a purpose; nevertheless, most of these findings are not distinct from lesser-known as well as thus cannot be viewed as definitive proofs of business performance.

Aharon, et al. (2019) used the standard from 2010 to 2017 information by OLS as well as GARCH models, which offered the empirical evidence of their existence on the day-of-the-week effect phenomenon values, not so much on returns. The results indicate that Bitcoin is strongly independent as well as the conventional betting of the finance market is restricted by Bitcoin's value prediction. By several sub-samples, estimates including test measures, the results remained consistent. Baura et al. (2019) used more than 15 million findings from 7 historical including continuing Bitcoin transactions; they observed period-specific lag abnormalities with no lasting consequences over the period. In comparison, they observed consistent variations in trade throughout local evenings and on weekends throughout all markets to lesser levels of activity. The findings indicate which Bitcoin is being consciously traded by retail as well as institutional investors. Kinatadera et al. (2019) used GARCH dummy method to analyze the impact of calendar impacts on Bitcoin's regular cumulative values as well as uncertainty from 2013 till 2019. The study was done of the Halloween, week-day and year-by-year impacts. Very little Halloween calendar abnormality was noticed in the tests. A traditional DOW impact in Bitcoin return wasn't really found, but throughout the weekend they find a notably lower uncertainty, whereas Bitcoin uncertainty has been more extreme at the starting of the week. In fact, convincing proof of the inverse impact in January also identified. The findings have indicated a significant reduction in the danger of shareholders in September.

Dorfleitner et al. (2018) has noticed that cryptocurrencies have an overall advantageous effect even during the tracking time for optimistic markets periods; however, they fall entirely after the 2018 cryptocurrencies' value crash. In addition, regular gain variations, as well as uncertainty in cryptocurrencies, were modeled using an EGARCH algorithm. The values of all 8 cryptocurrencies during Sundays were considerably smaller during the measurement duration observed than anything on certain days. Yaya et al. (2019) analyzed the everyday impact of some prominent price and share capitalizations cryptocurrencies. They used the dummies form of nominal regression analysis. They consider a day-the-week impact not to be important in exchange, although it is possible to prove that certain Bitcoin variation has Monday as well as Friday impacts. In Bitcoin's as well as some cryptocurrencies' gains, the day-of-the-week impact wasn't really important to somehow encourage the financial performance. Robiyanto et al. (2019) have been used in the analysis of the month-of-the-year effects for the 2014-2018 day-of-the-week impact of periodic cryptocurrency earnings as well as regular gains. The study of GARCH (1,1) has been carried out to identify such cryptocurrency impacts. The findings revealed which the day of the week and month of the year anomalies prevailed throughout the sector for cryptocurrencies. The crypto-monetary sector was thus not an exogenous shock. Stakeholders may subsequently use the trend in Bitcoin as well as Litecoin. As shown at the end of January, shareholders will invest Bitcoin as well as transfer this at the end of February.

Aslana et al. (2019) was explored the link for the most capitalized cryptocurrencies between the weak-form output as well as intraday testing size. They were able to demonstrate significant variations on the consistency of cryptocurrency gains for alternate higher frequency cycles utilizing longer battery standard tests. Performance thus follows a U-shaped trend for alternate testing patterns, which is why there is an optimum intraday level of testing which reduces consumer performance. Such results include major consequences for the study of investments, risk control, the laws and regulatory decisions in cryptocurrency markets. Donglian et al. (2019) researched the day-of-week impact both on 2013-2018 Bitcoin gain as well as the variability that use CoinDesk Bitcoin Price Index regular information. The findings of the calculations indicate that in general, the day-to-week impact differs across sampling times, although on Monday as well as on Thursday considerably strong volatile effects were found. Therefore, the extremely high average gain on Monday in Bitcoin was considered to be the reaction to increased uncertainty. In addition, after adjusting for stock market returns as well as exchange-market returns, the regular as well as the weekly impact on both gain as well as variability continues to rise. Finally, a little variance of discrepancy influence was noticed herein.

3.0 Objective

- i. To find the day of the week effect for logarithmic return of Bitcoin, Litecoin, XRP, Nxt, Dogecoin, Vertcoin, DigiByte, DASH, Counterparty, and MonaCoin, as well as
- ii. To understand the trading volume for the day of the week effect of the cryptocurrency market.

4.0 Methodology

4.1 *The time frame and origins of information*

The analysis is focused primarily upon reference information from the preserved server of Cryptocurrency websites and from finance.yahoo.com. This research assesses regular details on the Logarithmic return of Bitcoin, Litecoin, XRP, Nxt, Dogecoin, Vertcoin, DigiByte, DASH, Counterparty, and MonaCoin for timeframe spanning from October 01, 2014, to April 30, 2020. From 131 cryptocurrencies, we have considered only 10 Cryptocurrencies, because of the availability of data after

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October 2014. Where there was insufficient information, there were average results from the preceding date and the following. The regularly updated ending amounts were used for the period (Roy et al., 2019).

4.2 Calculation of Logarithmic Return

Earning daily Return (R) announced by the Cryptocurrency market indicators have already been calculated by exponential deviation, (Kolte et al., 2022)

$$R = \ln(C_p / (C_{p-1} / t \times 100\%)) \dots \dots \dots (1)$$

Whereas, C_p and C_{p-1} are closing figures at the period of “p” and “p-1” for daily price return.

5.0 Analysis and Findings

5.1 Analysis for Friday

The table discusses for Friday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

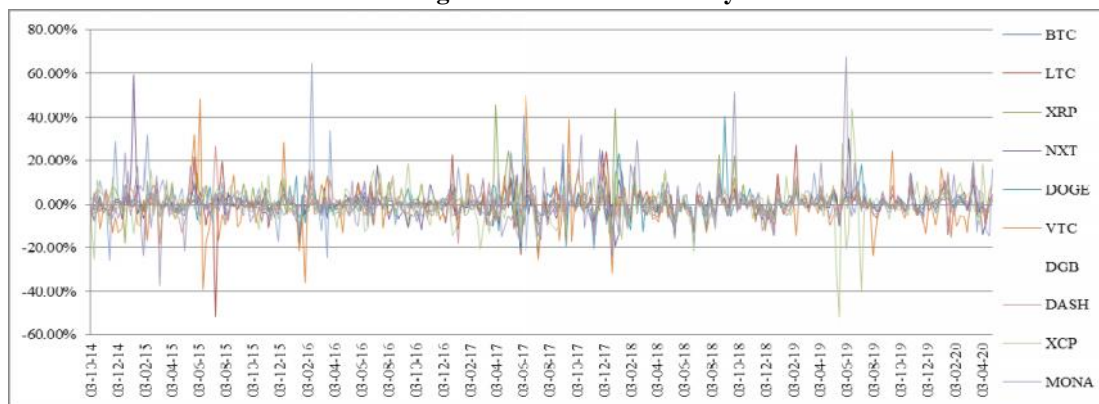
Table 02: Summary statistics of Friday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	291	291	291	291	291	291	291	291	291	291
Mean	0.29%	0.52%	0.91%	-0.07%	0.28%	-0.80%	0.68%	0.53%	-0.24%	0.06%
Median	0.31%	0.37%	-0.02%	-0.66%	0.38%	-0.74%	0.00%	0.26%	-0.03%	-0.46%
Standard Error	0.22%	0.38%	0.37%	0.43%	0.33%	0.58%	0.53%	0.30%	0.53%	0.53%
Standard Deviation	3.70%	6.50%	6.25%	7.26%	5.65%	9.84%	8.97%	5.09%	9.11%	8.97%
Skewness	-0.23	-1.14	2.89	2.15	0.97	0.81	1.82	0.32	-0.44	2.18
Kurtosis	3.70	16.45	16.95	16.58	11.51	6.25	11.03	3.77	6.56	15.83
Minimum	16.64 %	51.46 %	18.00 %	23.71 %	21.12 %	39.26 %	26.10 %	19.64 %	51.74 %	37.41 %
Maximum	14.48 %	26.87 %	45.33 %	59.05 %	40.23 %	49.70 %	64.52 %	26.41 %	43.93 %	67.51 %
Confidence Level (95.0%)	0.43%	0.75%	0.72%	0.84%	0.65%	1.14%	1.04%	0.59%	1.05%	1.03%
Confidence Level (99.0%)	0.56%	0.99%	0.95%	1.10%	0.86%	1.50%	1.36%	0.77%	1.39%	1.36%
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

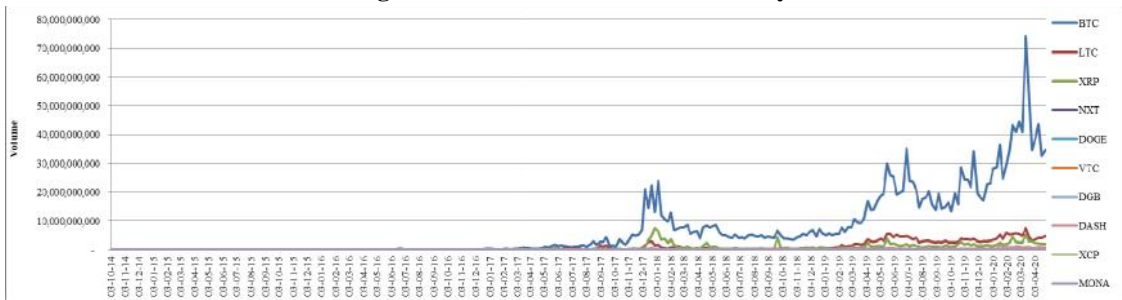
The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

Figure 01: Return on Friday



(Source: Author, calculated at MS Excel with chart format)

Figure 02: Volume of Trade on Friday



(Source: Author, calculated at MS Excel with chart format)

5.2 Analysis for Saturday

The table discusses for the Saturday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

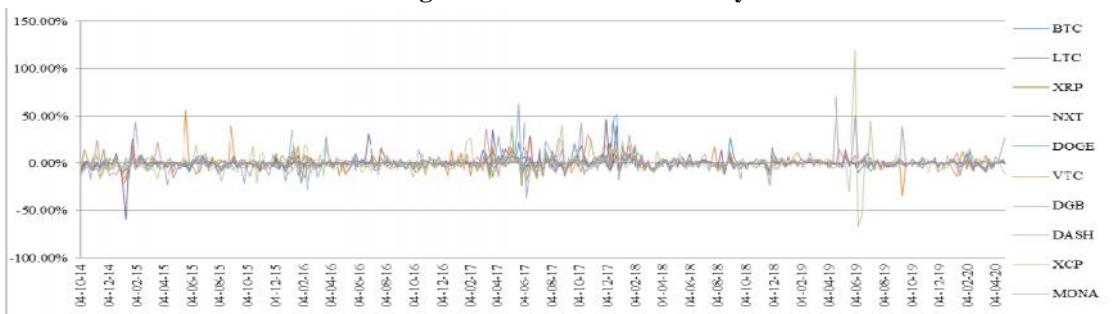
Table 03: Summary statistics of Saturday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	291	291	291	291	291	291	291	291	291	291
Mean	0.18%	0.51%	-0.32%	0.50%	0.49%	0.57%	0.94%	0.44%	0.40%	-0.22%
Median	0.20%	-0.06%	-0.08%	0.00%	0.00%	0.11%	-0.27%	0.08%	-0.36%	-0.52%
Standard Error	0.20%	0.30%	0.24%	0.45%	0.35%	0.49%	0.58%	0.34%	0.73%	0.49%
Standard Deviation	3.42%	5.13%	4.03%	7.65%	5.98%	8.40%	9.90%	5.73%	12.50%	8.30%
Skewness	-0.28	1.16	-0.50	0.13	2.61	1.30	2.29	1.74	2.62	3.78
Kurtosis	3.22	8.01	6.53	21.61	16.30	8.95	11.68	8.72	32.83	27.35
Minimum	12.36 %	22.35 %	24.59 %	60.28 %	20.28 %	34.56 %	35.84 %	13.93 %	67.53 %	23.57 %
Maximum	12.18 %	28.86 %	17.29 %	47.11 %	45.56 %	56.24 %	63.11 %	36.91 %	119.68 %	71.67 %
Confidence Level (95.0%)	0.39%	0.59%	0.47%	0.88%	0.69%	0.97%	1.14%	0.66%	1.44%	0.96%
Confidence Level (99.0%)	0.52%	0.78%	0.61%	1.16%	0.91%	1.28%	1.50%	0.87%	1.90%	1.26%
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

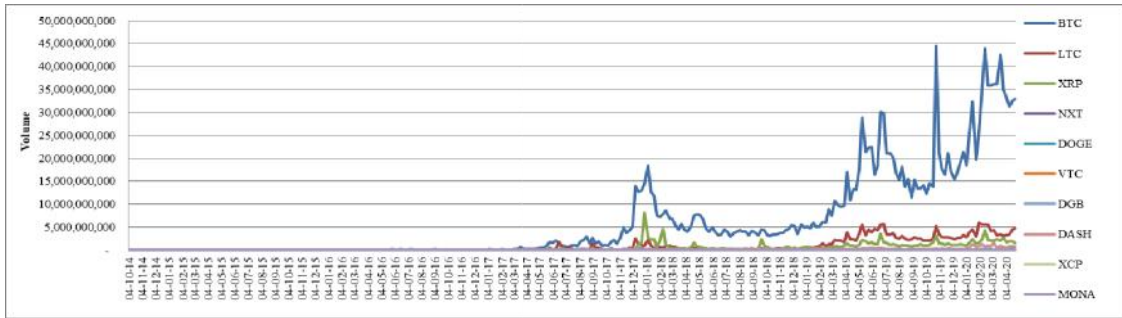
Figure 03: Return on Saturday



(Source: Author, calculated at MS Excel with chart format)

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Figure 04: Volume of Trade on Saturday



(Source: Author, calculated at MS Excel with chart format)

5.3 Analysis for Sunday

The table discusses for the Sunday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

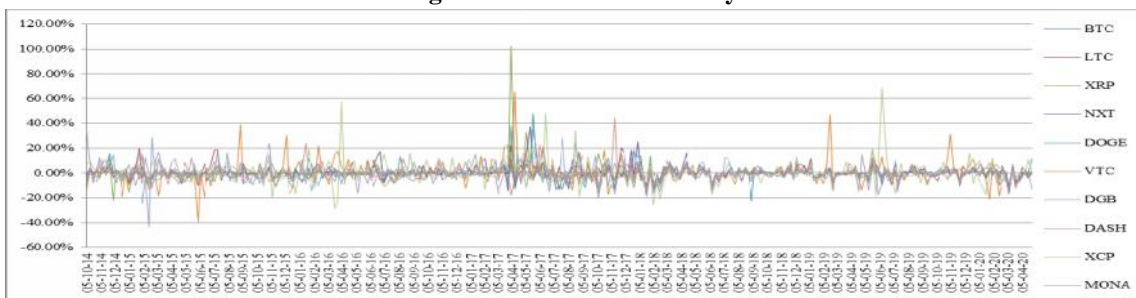
Table 04: Summary statistics of Sunday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	291	291	291	291	291	291	291	291	291	291
Mean	0.01%	0.09%	0.04%	-0.14%	-0.13%	-0.31%	-0.32%	0.14%	0.48%	-0.49%
Median	0.09%	0.02%	-0.32%	0.00%	-0.42%	-0.87%	-0.88%	-0.28%	-0.04%	-0.53%
Standard Error	0.18%	0.26%	0.45%	0.37%	0.35%	0.56%	0.46%	0.33%	0.59%	0.34%
Standard Deviation	3.12%	4.45%	7.61%	6.32%	6.00%	9.55%	7.85%	5.67%	10.03%	5.73%
Skewness	-0.40	0.57	8.65	1.27	2.47	1.79	0.30	1.96	2.02	0.40
Kurtosis	2.76	4.25	115.67	5.86	19.56	11.03	5.39	13.81	12.14	6.39
Minimum	-10.62%	-15.74%	-22.09%	-15.47%	-22.78%	-39.10%	-43.04%	-18.40%	-29.20%	-20.71%
Maximum	11.99%	19.83%	102.74%	37.39%	47.72%	65.31%	35.04%	43.77%	68.69%	34.98%
Confidence Level (95.0%)	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Confidence Level (99.0%)	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

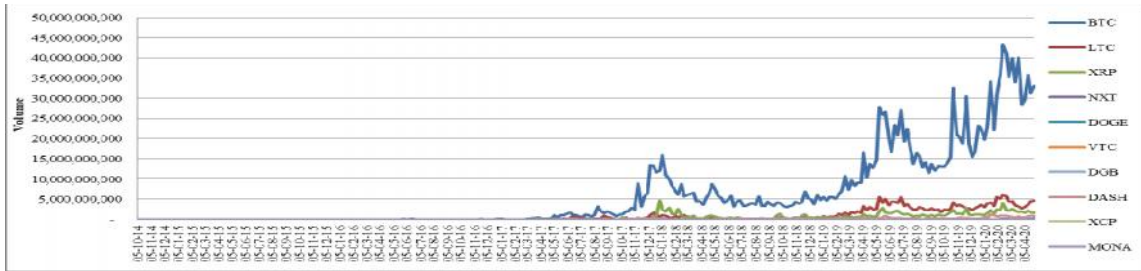
The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

Figure 05: Return on Sunday



(Source: Author, calculated at MS Excel with chart format)

Figure 06: Volume of Trade on Sunday



(Source: Author, calculated at MS Excel with chart format)

5.4 Analysis for Monday

The table discusses for the Monday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

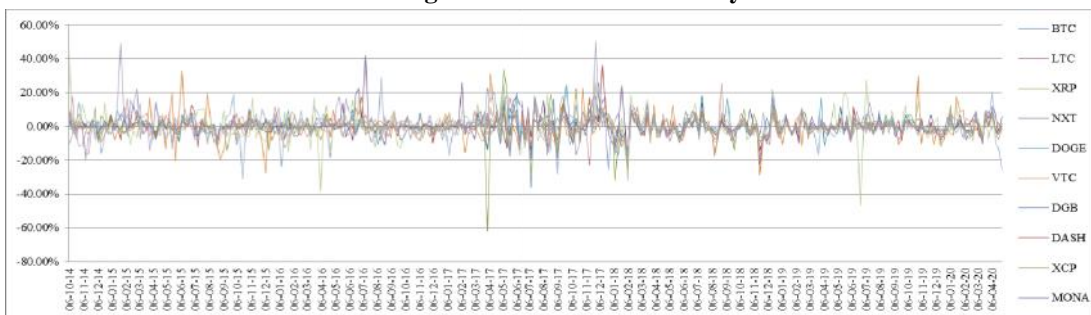
Table 05: Summary statistics of Monday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	291	291	291	291	291	291	291	291	291	291
Mean	0.54%	-0.03%	-0.17%	0.52%	0.13%	-0.44%	-0.14%	-0.29%	0.11%	0.73%
Median	0.28%	-0.14%	-0.33%	-0.26%	-0.31%	-0.75%	0.00%	-0.22%	-0.65%	-0.15%
Standard Error	0.22%	0.30%	0.39%	0.41%	0.32%	0.48%	0.52%	0.34%	0.52%	0.44%
Standard Deviation	3.78%	5.08%	6.58%	7.05%	5.49%	8.15%	8.79%	5.81%	8.95%	7.46%
Skewness	-0.07	1.06	-2.55	1.06	0.40	0.34	-0.43	-0.05	-0.09	2.14
Kurtosis	3.12	9.61	29.81	5.57	4.19	3.24	2.71	2.90	5.99	12.47
Minimum	17.40 %	16.64 %	61.63 %	25.50 %	21.92 %	29.17 %	36.14 %	22.67 %	47.02 %	20.18 %
Maximum	14.39 %	36.53 %	33.52 %	41.85 %	24.62 %	32.85 %	29.02 %	25.59 %	45.08 %	50.33 %
Confidence Level (95.0%)	0.44%	0.59%	0.76%	0.81%	0.63%	0.94%	1.01%	0.67%	1.03%	0.86%
Confidence Level (99.0%)	0.57%	0.77%	1.00%	1.07%	0.83%	1.24%	1.34%	0.88%	1.36%	1.13%
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

Figure 07: Return on Monday



(Source: Author, calculated at MS Excel with chart format)

Figure 08: Volume of Trade on Monday



(Source: Author, calculated at MS Excel with chart format)

5.5 Analysis for Tuesday

The table discusses for the Tuesday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

Table 06: Summary statistics of Tuesday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	291	291	291	291	291	291	291	291	291	291
Mean	0.02%	0.33%	0.11%	-0.41%	-0.20%	-0.12%	0.23%	-0.33%	-0.47%	0.47%
Median	0.11%	-0.04%	-0.41%	-0.71%	-0.45%	-0.56%	0.00%	-0.43%	-0.39%	-0.14%
Standard Error	0.24%	0.35%	0.39%	0.41%	0.39%	0.55%	0.64%	0.34%	0.53%	0.50%
Standard Deviation	4.16%	5.89%	6.65%	6.91%	6.57%	9.45%	10.87%	5.77%	9.12%	8.49%
Skewness	-0.85	1.93	0.70	0.25	1.39	1.66	4.08	0.06	0.47	0.76
Kurtosis	5.21	12.11	8.28	5.84	17.01	13.47	44.87	3.48	4.35	13.88
Minimum	20.06 %	21.19 %	35.20 %	37.84 %	36.80 %	38.06 %	- 33.66%	22.12 %	30.16 %	53.49 %
Maximum	16.00 %	38.93 %	39.48 %	33.24 %	51.83 %	69.31 %	116.56 %	24.28 %	46.36 %	51.17 %
Confidence Level (95.0%)	0.48%	0.68%	0.77%	0.80%	0.76%	1.09%	1.25%	0.67%	1.05%	0.98%
Confidence Level (99.0%)	0.63%	0.90%	1.01%	1.05%	1.00%	1.44%	1.65%	0.88%	1.39%	1.29%
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

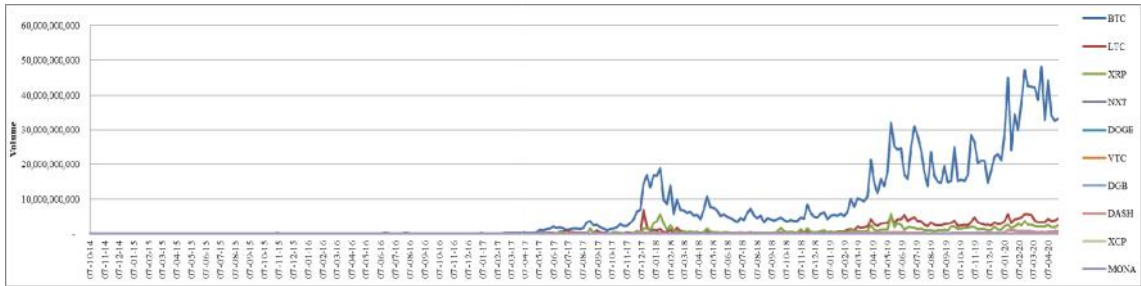
The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

Figure 09: Return on Tuesday



(Source: Author, calculated at MS Excel with chart format)

Figure 10: Volume of Trade on Tuesday



(Source: Author, calculated at MS Excel with chart format)

5.6 Analysis for Wednesday

The table discusses for the Wednesday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

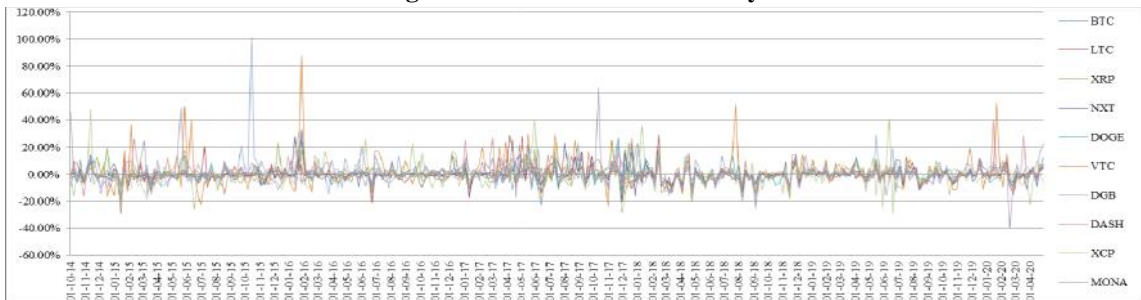
Table 07: Summary statistics of Wednesday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	292	292	292	292	292	292	292	292	292	292
Mean	-0.05%	-0.33%	0.16%	0.03%	0.21%	1.32%	0.32%	0.64%	-0.46%	0.80%
Median	0.03%	-0.38%	-0.07%	0.00%	-0.11%	0.28%	-0.31%	-0.36%	-0.56%	-0.16%
Standard Error	0.24%	0.35%	0.32%	0.39%	0.33%	0.67%	0.56%	0.40%	0.58%	0.51%
Standard Deviation	4.17%	5.98%	5.53%	6.67%	5.56%	11.37%	9.65%	6.80%	9.91%	8.80%
Skewness	-0.43	0.73	0.82	0.59	0.96	2.65	4.16	1.44	0.92	2.11
Kurtosis	5.90	7.73	4.27	4.19	4.11	14.62	41.66	7.16	4.34	15.21
Minimum	23.76%	28.67%	20.76%	24.05%	16.77%	23.42%	25.63%	22.31%	29.55%	39.80%
Maximum	18.17%	29.14%	23.20%	33.31%	27.19%	87.68%	101.86%	39.96%	48.47%	64.17%
Confidence Level (95.0%)	0.48%	0.69%	0.64%	0.77%	0.64%	1.31%	1.11%	0.78%	1.14%	1.01%
Confidence Level (99.0%)	0.63%	0.91%	0.84%	1.01%	0.84%	1.73%	1.46%	1.03%	1.50%	1.34%
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

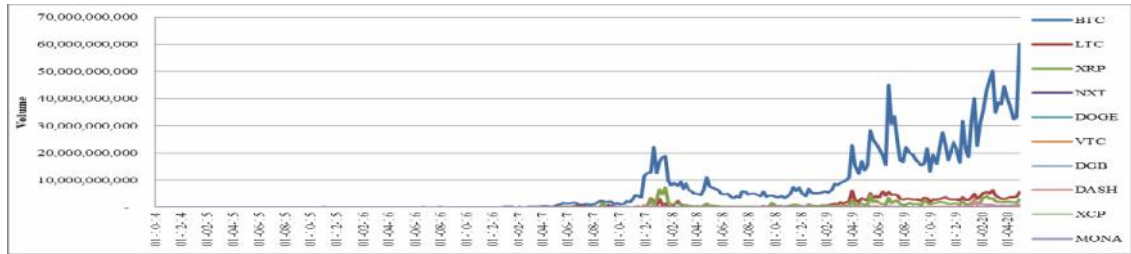
Figure 11: Return on Wednesday



(Source: Author, calculated at MS Excel with chart format)

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Figure 12: Volume of Trade on Wednesday



(Source: Author, calculated at MS Excel with chart format)

5.7 Analysis for Thursday

The table discusses for the Thursday log-returns of BTC, LTC, XRP, NXT, DOGE, VTC, DGB, DASH, XCP, and MONA in percentage from October 01, 2014, to April 30, 2020.

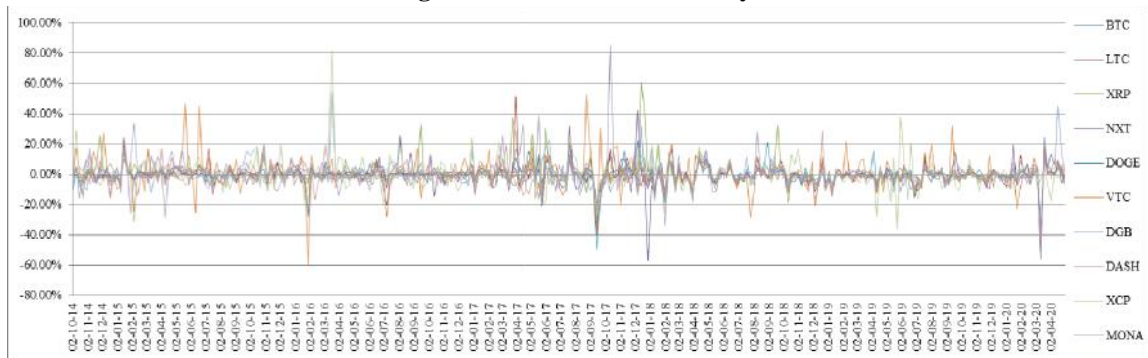
Table 08: Summary statistics of Thursday

Statistics	BTC	LTC	XRP	NXT	DOGE	VTC	DGB	DASH	XCP	MONA
Observations	292	292	292	292	292	292	292	292	292	292
Mean	0.07%	-0.28%	0.57%	-0.76%	-0.15%	0.31%	0.09%	0.02%	-0.07%	-0.11%
Median	0.13%	-0.09%	-0.43%	-0.48%	-0.12%	0.25%	-0.32%	-0.35%	-0.17%	-0.40%
Standard Error	0.30%	0.40%	0.49%	0.51%	0.36%	0.66%	0.54%	0.39%	0.60%	0.53%
Standard Deviation	5.21%	6.81%	8.44%	8.71%	6.23%	11.34%	9.29%	6.66%	10.17%	9.11%
Skewness	-2.08	0.02	2.29	-1.26	-2.28	-0.12	0.76	-0.76	1.75	2.84
Kurtosis	24.42	20.30	15.09	13.93	18.07	6.93	9.52	9.42	15.17	29.72
Minimum	46.47%	44.91%	39.90%	56.94%	49.29%	59.76%	53.55%	45.93%	36.58%	40.75%
Maximum	22.51%	51.14%	60.69%	42.22%	20.72%	52.58%	54.13%	28.77%	81.66%	85.33%
Confidence Level (95.0%)	0.60%	0.78%	0.97%	1.00%	0.72%	1.31%	1.07%	0.77%	1.17%	1.05%
Confidence Level (99.0%)	0.79%	1.03%	1.28%	1.32%	0.94%	1.72%	1.41%	1.01%	1.54%	1.38%
JB p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Source: Author, calculated at MS Excel with data analysis tools)

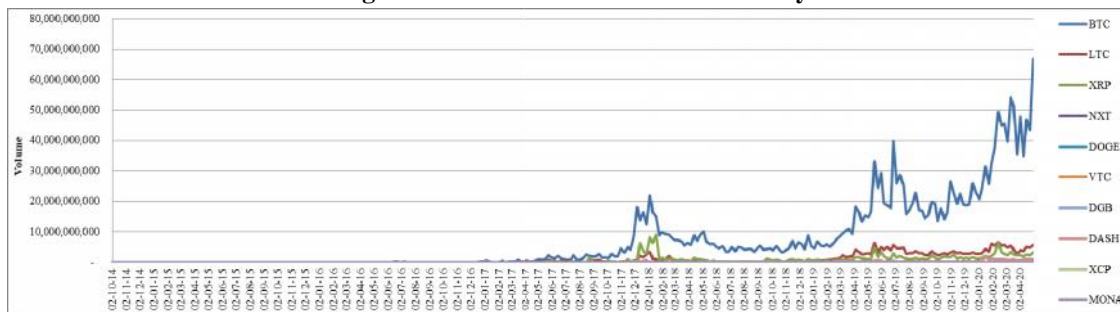
The above table represents total observations, mean, median, standard error, standard deviation, kurtosis, skewness, minimum, maximum, confidence level at 95% and 99% as well as Jarque–Bera Normality test for p-value.

Figure 13: Return on Thursday



(Source: Author, calculated at MS Excel with chart format)

Figure 14: Volume of Trade on Thursday



(Source: Author, calculated at MS Excel with chart format)

5.8 Findings from Analysis

Table 09: Highest, Lowest, Average, Standard Deviation of Logarithmic Return and Trade Volume

Cryptocurrency	Logarithmic Return				Trade Volume		
	Highest	Lowest	Average (Mean)	Risk ()	Highest	Lowest	Average
BTC	Thursday	Thursday	Monday	Thursday	Friday	Sunday	Thursday
LTC	Thursday	Friday	Friday	Thursday	Friday	Sunday	Thursday
XRP	Sunday	Monday	Friday	Thursday	Monday	Saturday	Thursday
NXT	Friday	Saturday	Monday	Thursday	Saturday	Friday	Wednesday
DOGE	Tuesday	Thursday	Saturday	Tuesday	Thursday	Sunday	Thursday
VTC	Wednesday	Thursday	Saturday	Wednesday	Sunday	Sunday	Thursday
DGB	Tuesday	Thursday	Saturday	Tuesday	Saturday	Saturday	Saturday
DASH	Sunday	Thursday	Wednesday	Thursday	Wednesday	Thursday	Wednesday
XCP	Saturday	Saturday	Sunday	Saturday	Thursday	Thursday	Thursday
MONA	Thursday	Tuesday	Wednesday	Thursday	Saturday	Saturday	Saturday

(Source: Author, data taken from the analysis tools of MS Excel)

6.0 Conclusion

This study looks at the future growth in cryptocurrencies from the viewpoint of a global trader. Of the 10 cryptocurrencies reviewed, it was observed that, in comparison to a well globally competitive standard strategy, all but one, as well as a mixture, produces major diversifications. Furthermore, the mean-variance tests, as well as the estimation of effective strategies, suggest that an improvement in investment values is always a function of a rise and not a decrease in uncertainty. The disparities between the positive effects of returns against uncertainty will outcomes in a well-diversified portfolio that differentiates the ideal portfolio weights of cryptocurrencies. The portfolio weights in Cryptocurrencies and the magnitude of portfolio changes rise inside the portfolios with higher target returns. Although the influence of their normal variance, contingent variance, is detected, these effects are less robust than the estimates. One potential explanation for Thursday's negative impact is the average market volume on Thursday, as shown by the mixture of distribution theories, in relation to the presumption of a causal correlation between trade volumes and asset returns as well as volatility. There are many options to allow the use of a consistent pricing schedule on different days of the week. Stakeholders that choose to trade a cryptocurrency will boost their investment efficiency by accurately predicting the trade. As well as gaining from reduced profits, the trade on a Thursday of these commodities is also less volatile, since turnover in most situations is significantly lower. Regular return variations can also be used for the intent of inference. The key conclusion reinforces the favorable potential of cryptocurrencies investments and its drawbacks and represents the findings of several previous researches about this similar topic, that concentrate mostly on foreign investors' viewpoint. Rather, through the years, the positive results seem to become a systematic worldwide trend.

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Disclaimer: The following trend analysis is for informational purposes only and should not be construed as financial advice or a recommendation to buy, sell, or hold any cryptocurrency. The analysis is based on past market data and trends, which may not be indicative of future performance. Furthermore, the analysis may be subject to biases, errors, and inaccuracies that can lead to incorrect conclusions. Real-time investors should exercise caution and independent judgment when using this analysis to make investment decisions in the crypto market. They should also consider their risk tolerance, investment objectives, and financial situation before making any investment decisions. The authors of this analysis and the platform where it is published disclaim any liability for any losses, damages, or other consequences that may result from the use of this analysis by real-time investors.

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Occupational Gender Segregation in Bangladesh Labor Economy: Implications and the Way Forward

Md. Mamin Ullah¹

Abstract

Despite significant improvements in human development, inequality and violence against women remain ongoing problems in Bangladesh. Women still face different forms of discrimination in areas of education and employment. Like many other developing countries, the issue of gender equality is the central point of debate and discussion when adopting development policies. The basic objective of this study is to explore the nature and extent of occupational gender segregation in Bangladesh's labor economy and its subsequent implications at both the individual and national levels. Using document analysis as the methodological basis, the study has revealed greater gender disparities in occupational segregation in Bangladesh. In addition to lower participation in the country's labor force, women tend to confine themselves to traditional female-dominated jobs, mainly characterized as contributing family workers. With notable gender differences in education and skills, female shares of employment in the non-agricultural sector are very insignificant, along with limited positions in higher-status occupations. Several policy options are provided in the paper to address this economic segment of gender inequality, followed by a list of research agendas for further studies. This study is one of the very few focusing on occupational gender segregation in Bangladesh. The study is therefore original, and hence it is expected to contribute to labor market research to a large extent

Keywords: occupation gender segregation, gender segregation at work, gender-based occupational segregation in Bangladesh, women at work, Bangladesh labor economy

1. Introduction

Throughout their lives, women all over the world continue to face discrimination in almost all socio-economic and political aspects. Considering the scope of gender inequality and its subsequent impact at both the individual and national levels, women have occupied significant space in the United Nations 2030 Agenda for Sustainable Development. Like other aspects of inequality, greater gender disparity persists in global labor markets in terms of participation, occupational segregation, and wages (ILO, 2016). Despite significant improvements in women's educational attainment all over the world over the last few decades, it has not exerted the expected influence on women's rights at work. Accordingly, women are still confronted with the obstacles of entry into labor markets, and once they get a chance, they are mostly likely to accept jobs with poor quality and lower occupational status.

Policymakers, researchers, and think tanks have started to recognize that a mere increase in labor force participation is not enough to attain gender equality at work. Instead, it is critically important to justify how both men and women are treated across and within occupations. Being largely criticized as one of the most pernicious aspects of inequality at work, gender differences in occupational segregation adversely affect the quality of employment (Stier & Yaish, 2014).

This sex-based occupational segregation largely results in unequal employment benefits and poor working conditions (Melsom & Mastekaasa, 2018). In addition, occupational gender segregation is perceived as the leading determinant of gender earnings inequality (Gauchat et al., 2012). In spite of severe adverse impacts at both individual and national levels, occupational gender segregation persists at

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all levels of development, irrespective of political systems, and even in diverse religious, social, and cultural settings (Anker et al., 2003). Accordingly, occupational gender segregation has become a major policy concern in many parts of the world, especially in developing countries like Bangladesh.

This study attempts to explore the nature and extent of gender-based occupational segregation in Bangladesh's labor economy and its subsequent implications at both the individual and national levels. The rest of the paper consists of five distinct and interrelated sections. Sections two and three outline the rationale for conducting such a study as well as a brief note on the methodological approach used in this paper. The paper then reviews contemporary studies pertaining to occupational gender segregation. In Section 5, the largest part of the paper, the current state of gender-based occupational segregation in Bangladesh's labor market is explored along with its respective implications for both women and the economy as a whole. Several policy options are recommended in Section 6 to address the existing gender difference in occupational segregation. Finally, the paper is concluded with a list of research agendas for further studies.

2. Justification and Objectives

This study is critically important for several reasons. Out of many, five distinct reasons lay the foundation of the rationale for conducting this study. First, and probably the most important driving factor, are the concurrent debates and discussions concerning gender differences in occupational segregation. Although the gaps between men and women in labor force participation are narrowing globally (ILO, 2016), gender gaps at work persist in multiple forms, including types of economic activity, occupational status, level of earnings, sectoral distribution, and quality of jobs. Accordingly, the quality of employment for women remains a major global concern. It is therefore necessary to explore how men and women in a country are treated across and within occupations.

Second, being the eighth most populous country in the world and one of the most densely populated countries in South Asia, Bangladesh has made significant progress in all indicators of human development in the last three decades. This country's overall HDI (Human Development Index) increased from 0.387 to 0.608 (nearly an increase of 57.1 percent) between 1990 and 2017 (UNDP, 2018). In addition, Bangladesh has shown her caliber in reaching many targets as set in the Millennium Development Goals (MDGs), especially in the areas of poverty alleviation, food security, maternal health, and gender parity in education. Reasonably, it seems logical to justify the level of development in terms of gender equality at work, especially women's comparative positions in occupational segregation.

Third, the outcome of previous studies (e.g., Hossain & Tisdell, 2005; Revenga & Shettythe, 2012) concerning gender inequality in employment in Bangladesh has intensified the importance of conducting a study in order to portray the actual gender-based occupational segregation scenario in Bangladesh's labor market. Fourth, the existing research gap is another important reason for conducting this study. Considering the importance of gender equality at work and the concurrent debates and discussions, very few studies were conducted in this respect. Moreover, studies in the area of occupational gender segregation are scarce. Reasonably, this study attempts to explore the nature and extent of gender-based occupational segregation in Bangladesh and its subsequent implications at both the individual and national levels.

Finally, this paper is one of the very few studies focusing on gender differences in occupational segregation in Bangladesh. The study is therefore expected to contribute to the existing field of labor market research, and accordingly, it opens the doors for future studies.

In response to the above-stated arguments and the underlying importance of the field under investigation, the basic objective of this study has been set to explore the nature and extent of occupational gender segregation in Bangladesh's labor economy. In addition to this objective, the paper also aims to: (i)

review the concurrent studies in the respective field; (ii) provide policy recommendations with a view to minimizing the gender gaps in occupational segregation; and finally (iii) outline the scope for future research.

3. Methodology

This is mainly a policy research paper by nature that addresses the multidimensional aspects of gender-based occupational segregation in Bangladesh. Being a distinctive field of development studies, gender inequality is basically a policy-focused discipline rather than a theoretical phenomenon. With the intent to inform policymakers, this paper integrates the basic elements of policy studies into discussions and policy analysis. Policy research is critically important in areas of development studies, particularly because of its large scope of coverage within a field of study, especially in inter-disciplinary studies (Hettne, 1990). Notably, occupational gender segregation is an interdisciplinary field of study as it focuses on sociology, labor economics, and gender studies simultaneously due to interrelated social, cultural, sexual, and economic settings. Following the basic principles of policy research, 'document analysis' is used as the core methodological approach for this study. Being a qualitative research method, document analysis is essentially helpful for examining and interpreting the existing data, especially in gaining an in-depth understanding of the respective phenomena under investigation (Rapley, 2007). Since this methodological approach requires multiple sources of data, as used in this study, the validity of the study is expected to be higher than that of other methods. This in turn results in 'a confluence of evidence that breeds credibility' (Eisner, 1991).

Accordingly, the required data for this study was collected from multiple secondary sources in different forms. The notable sources of data include strategic papers, background reports, technical notes, discussion papers, and statistical publications of national and international organizations. Since data reliability is a prime concern in document analysis (Bowen, 2009), the statistical data of reputed organizations like the Bangladesh Bureau of Statistics (BBS), the World Bank, the World Economic Forum, the International Labor Organization (ILO), and the Asian Development Bank (ADB) were taken into account. Again, research papers from the world's leading journals were given priority for literature reviews and discussions. The collected data were scrutinized based on two significant principles of document analysis: relevance and timeliness. The latest published data are used in this paper to make the analysis more relevant and time-worthy. Finally, the scrutinized data were analyzed in pursuit of the objectives of the study.

4. Literature Review

In a very recent publication of CEDA entitled *Occupational Gender Segregation (2023)*, Tofts-Len and Barker (2023) defined occupational gender segregation as "the unequal distribution of male and female workers across and within job types". Women's access to the labor market is critical for promoting women's economic empowerment at the micro level and reducing overall gender inequality at the macro level (ILO, 2016). Nonetheless, the current development policies in many countries fail to incorporate women's concerns in their true sense, and in some cases, the issue of gender inequality at work' is overlooked (Heintz, 2006; Song & Zou, 2003). As a result, women's involvement in vulnerable employment is largely observed, along with the persistent gender segregation in labor markets (Kelkar, 2013).

The relationship between occupational gender segregation and gender discrimination has been the focus of numerous studies (such as Ahmed et al., 2021; Erlandsson, 2019), yet the results of these studies are frequently contradictory, raising questions in the field. Intriguingly, Zheng and Weeden's study from

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2023 asked whether there was a connection between gender segregation in higher education and the labor market. These researchers discovered that higher education integration will diminish, but not completely eliminate, gender segregation in the workforce. Whatsoever, Tofts-Len and Barker (2023) were content that the labor market is restricted by occupational segregation, which also limits job mobility.

Since occupational gender segregation remains at the center of labor studies, many measurement tools and techniques are evident in the literature. In a recent study, Khan et al. (2023) attempted to quantify the level of occupational segregation between men and women in Pakistan in a multigroup context and found that human capital-related factors, like higher education, do not help to lessen occupational segregation in the labor market. Further research from this study revealed that, for both men and women, those with higher levels of education are more segregated than those with lower levels of education. Additionally, this study came to the conclusion that devaluation and compensating difference theories can help explain some of Pakistan's gender segregation. The results of the Pearson correlation show a substantial relationship between gender, occupational segregation, and rurality, as well as other demographic variables like age and education. Similar to this study, Yunisvita and Muhyiddin (2020) investigated the degree of segregation in Indonesian rural communities using the D-index of dissimilarity. Anyhow, there are several ways to measure occupational gender segregation in a labor market, including the Gini index, the Karmel MacLachlan (IP) index, the sex-ratio index of occupational segregation, the marginal matching (MM) measure, and the Duncan and Duncan (1955) index of dissimilarity.

Several researchers (e.g., Kelkar & Nathan, 2002; Berniell & Sánchez-Páramo, 2011) identified two notable trends in occupational gender segregation: (i) a continuous increase in women's participation in informal employment; and (ii) unequal gender-based distribution that pushes women to be concentrated in low-skilled, low-paid, and vulnerable employment. Being the victims of domestic power imbalances, women's employment is largely confined to household work and domestic care (Iversen, 2003). This lower involvement in economic work as compared to men results in inadequate earnings from employment and undermines self-esteem on the part of women.

Notably, occupational gender segregation is not a local or regional phenomenon. Being a global phenomenon, although varying in degree, it persists across countries and even at all levels of development. In a study in Germany, Trappe and Rosenfeld (2004) found that occupational gender segregation remains stable over a long period of time and that both men and women tend to participate in traditionally sex-segregated jobs (i.e., typical men's and women's jobs). In addition, German women are underrepresented in managerial positions (Holst & Busch, 2010), and this also differs according to the size of the enterprise, the sector of the economy, and the industry (Kleinert et al., 2007). Like other North American countries, gender-based occupational segregation is also persistent in the U.S. labor market, where women are mostly concentrated in education-based jobs while men dominate technological jobs (Fuchs, 2016). In addition, researchers like Chamberlain (2016) argue that the wage gap between men and women in the United States largely accounts for gender differences in occupational segregation. In Jordan's highly segmented labor market, women are mostly engaged in the informal sector, and their employment opportunities are largely clustered in the civil service, particularly within the health and education sectors (Khasawneh, 2014).

Like many parts of the world, Asian women face discrimination across and within occupations. Ismail et al. (2017), for instance, argued that occupational segregation continues to be prevalent between Malaysian men and women, resulting in severe gender wage differentials. The study by Meng (1998) revealed that most Asian women are involved in domestic and clerical occupations. In addition, women are mostly underrepresented in management in Asian countries (Anker & Hein, 1985). In Central Asian economies, studies found a wider gender-based difference in occupational segregation, which is largely attributed to the existing sectoral structure (Khitarihvili, 2016). In Tajikistan and Kyrgyzstan, women's

employment roles are confined to contributing family workers. However, the case is more severe when the South Asian case is taken into account.

Despite a praiseworthy growth trajectory, the South Asian labor economy is characterized by greater gender inequality at work, especially in occupational gender segregation (Dixon & Qian, 2017). In addition to lower participation in the labor market, especially in Bangladesh, India, and Pakistan (Ali, 2010), women tend to concentrate in unorganized sectors largely featuring low-paid and low-status jobs (Pio & Syed, 2013). Women's participation in the informal sector is higher than that of men in the South Asian labor market, and this representation is largely prevalent among agricultural workers (Basu & Thomas, 2009). In addition, South Asian women face multiple difficulties in management and decision-making positions (Fernando & Cohen, 2011; Singh & Hoge, 2010). Although Bangladesh's constitution prohibits gender-based discrimination, gender disparity persists to a large extent in both the public and private sectors (Ali, 2010; Kabir, 2013).

Disregarding the nature and extent across counties and regions as stated above, occupational gender segregation exerts a significant adverse impact at both the individual and national levels. The most notable consequence of such gender differences in occupational segregation is the gender pay gap (Bishu & Alkadry, 2017; Budria, 2010). In essence, occupational gender segregation is negatively linked with 'quality of employment' on the part of women in terms of poor wages, job discretion, autonomy, job security, and undermined self-esteem (Brown et al., 2012; Stier, 2012). All of these outcomes lead to women's poor economic empowerment (Kabeer, 2012). A substantive number of studies have been conducted so far to explore the factors affecting occupational segregation in an economy. Occupational stereotypes (Catalyst, 2005), gendered division of labor (Bettio & Veraschcagina, 2009), working hours (Watts, 2007), family responsibilities (Vaughan-Whitehead, 2011), women's self-preference (Burchell et al., 2014), educational disparities (Haveman & Beresford, 2012), and geographical proximity (Hanson & Pratt, 1991) are the most common determinants of occupational gender segregation.

5. Discussion

With an ethnically homogeneous population, Bangladesh is the most densely populated country in the world. As per the last official census held in 2011, the country is blessed with 152.52 million people. However, despite being the eighth-largest populated country in the world, this country is in a competitive position, especially for a significant portion of the working-age population. Out of these 152.52 million people, for instance, about 61 percent are working-age people (aged 15–64 years), exerting significant implications for the demographic dividend. As noted in the Human Development Report 2018, Bangladesh has made significant improvements in all indicators of human development, including life expectancy at birth, years of schooling among both girls and boys, and GNI per capita. Again, this is one of seven countries in the world where men exceed women in numbers (CEDAW, 1997). These demographic profiles, along with the above-average 6 percent economic growth in the last few years, are supposed to be contributing factors towards sustainable development. Nonetheless, gender inequality is still persistent in almost all socio-economic aspects of this country.

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Table I: Gender Gap in Different Indicators in Bangladesh

Indicators	2006		2007	
	Rank	Score	Rank	Score
Global Gender Gap Score	91	0.627	47	0.719
Economic Participation and Opportunity	107	0.423	129	0.465
Educational Attainment	95	0.868	111	0.954
Health and Survival	113	0.950	125	0.966
Political Empowerment	17	0.267	7	0.493

Source: World Economic Forum (The Global Gender Gap Report 2017)

As seen in Table I, Bangladesh has closed a 71.9% overall gender gap compared to 62.7 percent in 2006. Despite being a notable success story in human development in South Asia, Bangladesh is still confronted with the challenges of gender inequality, mainly in education and employment. Dropping from 107th to 129th between 2006 and 2007, Bangladesh has closed only 46.5 percent of gender inequality in economic participation and opportunity. This is largely due to the fact that about 70 percent of Bangladeshi women are still outside the labor force. See table II. Although women's participation in the labor force increased from 19.95 percent to 29.14 percent in the lapse of 27 years, the participation rate is still very insignificant compared to the male labor force participation rate.

In South Asia, Bangladesh has made significant progress in increasing women's participation in the labor force compared to its neighboring countries. However, the rate is still lower than those of Nepal, Sri Lanka, the Maldives, and Bhutan. At present, only 29.14 percent of women remain active in Bangladesh's labor economy, compared to 88.56 percent of their male counterparts. This implies a poor gender-based profile of the distribution of the labor force within the country.

Table II: Labor Force Participation Rate (Ages 15-64)

Country	Female		Male		Country	Female		Male	
	1990	2017	1990	2017		1990	2017	1990	2017
Afghanistan	14.12	17.34	88.46	88.56	Maldives	19.82	27.04	78.75	85.09
Bangladesh	19.95	29.14	89.71	81.94	Nepal	48.47	51.78	92.04	87.30
Bhutan	38.32	40.06	77.72	76.54	Pakistan	13.21	22.39	86.92	85.84
India	27.94	24.54	86.61	81.71	Sri Lanka	36.20	34.49	82.91	78.91

Source: World Bank, 2018

The majority of women in Bangladesh are therefore deprived of employment opportunities, and they have very limited access to the country's labor market. Being apparently inactive in the labor market, women exert significant influence on the future supply of labor in Bangladesh's labor market. Notably, labor force participation rates of women are affected by several factors like age, marital status, fertility rates, level of education, rural-urban dynamics, and socio-economic groups (ILO, 2003). In a recent study, Thaddeus et al. (2022) found a long-term causal relationship between female labor force participation and economic growth in sub-Saharan Africa. Therefore, these experts recommended encouraging women's economic empowerment in order to increase female labor force participation and accelerate economic growth.

Disregarding the causes of lower participation, women's participation in the labor force has two distinctive implications for Bangladesh. At the individual level, women's economic empowerment is largely stalled because of their restricted or limited access to economic activities. The economy, on the

other hand, will suffer from a lack of adequate labor supply required for the production of goods and services. This is critically important in order to keep pace with the country's economic growth. Thus, understanding the labor market behavior of the gender-based composition of the labor force remains a major concern for policymakers in Bangladesh.

Table III: Employment Distribution by Occupation, Sex and Area

Occupation	Rural			Urban			Bangladesh		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Managers	1.1	0.3	0.8	5.4	2.1	4.5	2.3	0.7	1.8
Professional	3.8	3.3	3.7	6.9	12.3	8.3	4.7	5.6	4.9
Technicians	1.7	0.6	1.3	4.1	1.8	3.5	2.4	0.9	1.9
Clerical	1.3	0.4	1.0	3.1	1.6	2.7	1.8	0.7	1.5
Workers									
Service Workers	17.4	2.5	12.7	28.6	7.3	22.9	20.6	3.7	15.6
Agriculture	32.5	62.0	41.6	7.4	16.9	9.9	25.2	50.8	32.8
Craft Workers	15.2	10.8	13.8	20.5	27.5	22.3	16.7	14.9	16.2
Plant	8.3	1.9	6.3	11.6	8.2	10.7	9.3	3.5	7.5
Elementary	18.6	18.3	18.5	11.9	22.3	14.7	16.7	19.3	17.4
Others	0.3	0.0	0.2	0.5	0.0	0.4	0.3	0.0	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bangladesh Bureau of Statistics (2017)

As stated in Table III, greater gender disparity persists in Bangladesh's labor economy in terms of occupational distribution. First, women's participation is largely concentrated in agricultural jobs. Nearly 50.8 percent of women participate in agricultural employment, compared to only 25.2 percent of men in Bangladesh. This occupational gender inequality increases in rural areas. Women's participation is also higher in elementary occupations. Men, on the other hand, dominate managerial and technical jobs. The rate of female participation in these prestigious categories of occupation is very insignificant, resulting in wider gender wage differentials. In a study in Chile, Dellacasa (2023) unearthed the impact of occupational gender segregation in that economic, geographical, and gender disparities are exacerbated by segregation. Women are therefore largely employed in low-skilled and low-paid jobs in Bangladesh that ultimately undermine their self-esteem and, more importantly, their economic status.

Table IV: Female Share of Employment in High-Status Occupations (Aged 15+)

Occupations	Agriculture	Industry	Service	Total
Chief Executives, Senior Officials and Legislators	23.3	5.9	18.0	13.6
Administrative and Commercial Managers	36.9	6.4	12.3	10.1
Total	28.0	6.3	14.4	11.4

Source: Bangladesh Bureau of Statistics (2017)

As seen in Table IV, only 18 percent of women occupy chief executive and senior official positions in the service sector, whereas the rate is only 5.9 percent in industrial jobs. On average, only 10.1 percent of women hold administrative and managerial posts across all sectoral occupations, resulting in women's limited participation in the legislative and decision-making processes. Although women hold more than 36.9 percent of managerial posts in the agricultural sector, the rates are not satisfactory compared to men's positions, and again, this is largely due to women's higher participation in the agricultural sector. This wider gender gap in high-status occupations represents a gender difference in skill levels in the labor force. In addition, it indicates the poor advancement of the knowledge economy in Bangladesh.

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Policymakers are therefore required to go through the existing economic structure as well as the possible changes in such a structure. Out of many factors, gender differences in educational attainment and skill levels are perceived to be the two prime factors responsible for this persistent gender inequality in higher-status occupations. See tables V and VI.

Table V: Employment Distribution by Education Level, Sex and Area (Aged 15+) (%)

Education Qualification	Rural			Urban			Bangladesh		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
None	34.4	39.6	36.0	21.0	29.6	23.3	30.5	37.1	32.5
Primary	27.4	25.1	26.7	23.3	25.2	23.9	26.2	25.2	25.9
Secondary	29.1	30.6	29.5	33.0	28.2	31.7	30.2	30.0	30.1
Higher Secondary	5.6	3.2	4.8	9.9	7.3	9.2	6.8	4.2	6.0
Tertiary	3.4	1.4	2.8	12.8	9.6	11.9	6.1	3.5	5.3
Others	0.3	0.1	0.2	0.1	0.0	0.1	0.2	0.0	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bangladesh Bureau of Statistics (2017)

In Bangladesh, women are behind men at levels of education ranging from primary to tertiary. Although the rates of education at primary and secondary levels are closer between men and women in Bangladesh, men are significantly ahead of women in higher secondary and tertiary education. This not only allows them easy access to the labor market but also allows them to hold more administrative and managerial positions compared to women. Rural women are largely deprived of advanced education compared to those in urban areas. Only 3.5 percent of women receive tertiary education, compared to 6.1 percent of their male counterparts. This gender inequality in educational attainment hinders a country's capacity to achieve important social and economic goals. Women also lag behind men in terms of training status. For example, Elsayed and Shirshikova (2023) made the case in a paper published in the Journal of Development Economics that access to universities has a favorable impact on outcomes in terms of marriage, employment, and education, with a stronger effect on women.

Table VI: Employment Distribution by Training Status, Sex and Area (Aged 15+) (%)

Received Training	Rural			Urban			Bangladesh		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Yes	1.9	1.0	1.4	4.7	2.5	3.6	2.7	1.4	2.1
No	98.1	99.0	98.6	95.3	97.5	96.4	97.3	98.6	97.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bangladesh Bureau of Statistics (2017)

Irrespective of sexual identity, only 2.1 percent of total workers in Bangladesh receive training on average, resulting in a poor skill structure in the labor force. Women's status is quite frustrating when training issues are considered. Only 1.4 percent of women workers get training, compared with 2.7 percent of men. This gap in training status also accounts for gender-based occupational segregation to a large extent. Women's employment is therefore largely characterized by poor economic outcomes. Accordingly, women remain an untapped potential in Bangladesh's labor economy. Gender parity in educational attainment and more coverage of both men and women in training programs remain strategic

challenges for Bangladesh, especially in coping with the rapid technological advancement and structural change in macroeconomic policies. This poor educational attainment and skills deficiency lead both Bangladeshi men and women to be engaged in informal employment. See table VII.

Table VII: Employment Distribution between Formal and Informal Sector (Aged 15+) (%)

Sector	Rural			Urban			Bangladesh		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Formal	14.1	3.0	10.7	26.4	9.4	21.9	17.7	4.6	13.8
Informal	85.9	97.0	89.3	73.6	90.6	78.1	82.3	95.4	86.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bangladesh Bureau of Statistics (2017)

In Bangladesh's labor market, nearly 95.4 percent of women are employed in the informal sector. However, the rate is also severe for men, who comprise 82.3 percent of total employment. Both men and women are therefore in danger of the cycle of working poor and a lack of human rights at work. However, the case is more frustrating when women's perspectives are considered. Only 4.6 percent of Bangladeshi women are involved in formal employment compared to 17.7 percent of male workers, exerting substantive adverse individual and social impact. Easy entrance is perceived as one of the important reasons behind women's mass participation in the informal sector.

In addition, regulation, the evolution of technology, a growing body of small-scale enterprises, structural problems in the formal sector, and employers' preference mainly due to lower costs are supposed to be the most influential factors behind the consistent growth of informal employment in Bangladesh. Globalization has also been accused of creating this growing informal sector in developing economies (Bacchetta et al., 2009). Whatever the causes associated with this informality, informal employment is harmful at both the individual and national levels. Employment in the informal sector is characterized by poor income, job insecurity, no voice at work, and limited or no access to basic protections and services (Beneria & Maria, 2006). Accordingly, women are the major victims of this deteriorating informal employment in Bangladesh, more prominently in rural areas. From a national economic perspective, employment in the informal sector is disruptive to the national economy and, thus, a hindrance to the country's development (Williams, 2005).

However, informality is not a standalone phenomenon in Bangladesh's labor economy. Dey (2023), for instance, encouraged India to protect the 150 Million Women Working in the Informal Sector, as it did in the case of Bangladesh. She added that women in India's informal sector are frequently placed outside the purview of government programs, including those pertaining to social security, childcare, and prohibitions against sexual harassment. In a study focusing on the worldwide informal economy, Charmes (2012) found that employment in the informal sector ranges from 50 to 70 percent across countries, and more interestingly, these informal sectors' contribution ranges from 25 percent up to 50 percent to non-agricultural GDP. Being diverse in nature, ranging from self-employment to unpaid family labor, the informal sector has emerged as a significant part of many developing economies like Bangladesh (Meier & Rauch, 2012). In addition, the sector is now the major source of employment, especially for poor and unskilled workers, and has been expanding rapidly across the globe since the 1960s (Carr & Martha, 2011). Thus, creating more employment opportunities in the formal sector along with regulating and controlling informal employment remain strategic challenges for policymakers.

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Table VIII: Employment Status by Gender (Country-Wise) (%)

Country	Employees		Employers		Own-Account Workers		Contributing Family Workers	
	Female	Male	Female	Male	Female	Male	Female	Male
Afghanistan	30.5	33.1	0.3	1.4	11.1	45.6	58.1	19.8
Bangladesh	28.8	44	0.4	3.8	33.3	47.6	37.5	4.6
Bhutan	15.6	36.9	0.1	0.1	36.1	39	48.3	24
India	18.1	21.9	0.5	1.9	54.7	67.4	26.7	8.8
Maldives	62	78.4	1.7	6.6	28.1	12	8.2	3
Nepal	10.1	30.5	0.4	2.2	28.6	45.9	60.9	21.5
Pakistan	24.8	42.8	0.1	1.7	20.4	40.5	54.7	15
Sri Lanka	55.6	58	1	3.7	24	35.7	19.4	2.7

Note: Data for the year 2017

Source: ILOSTAT (ILO Modeled Estimates, May 2018)

As seen in Table VIII, greater gender disparity is persistent in terms of status in employment. Nearly 28.8 percent of women in Bangladesh are wage and salaried workers (employees), compared to 44 percent of male workers. Thus, women's employment opportunities in paid employment are somewhat restricted. Bangladesh is still behind other South Asian countries like the Maldives and Sri Lanka in terms of women's participation in wage-based employment. The case is more deteriorating in the case of vulnerable employment. Although men occupy the larger portion of own-account workers, women are still employed as contributing family workers, which mostly results in unpaid employment. Only 4.6 percent of male workers are contributing family workers, compared to 37.5 percent of female workers. With the combination of both own-account workers and contributing family workers, women are largely employed in vulnerable employment in Bangladesh. As a result, women workers in Bangladesh are less likely to have formal working arrangements and are thus deprived of decent work in terms of adequate earnings, full employment, social security, and a voice at work. In addition, women's large involvement in employment as contributing family workers indicates the country's poor development of the labor market, little quality job growth for women, widespread working poverty, and the dominance of the rural economy.

Despite the fact that about half of the employees are involved in informal employment globally (ILO, 2009), the rate is higher for both men and women in Bangladesh. In a nutshell, both male and female workers in Bangladesh are at greater economic risk due to the vulnerable nature of employment, and thus poor institutional attachment between the person and the job is a common feature of Bangladesh's economy. Quality of employment also remains a dream for Bangladeshi workers, especially women. Finally, as per the statistics presented in Table VIII, only 0.4 percent of women are employers in the Bangladesh labor market, whereas the rate is 3.8 percent from a male perspective. Women in Bangladesh are therefore confronted with the challenges of entrepreneurship in terms of both start-ups and the smooth running of operations.

Table IX: Sectoral Segregation by Gender and Area (Aged 15+) (%)

Sector	Rural			Urban			Bangladesh		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agriculture	43.9	76.7	54.1	9.7	22.1	13.0	34.0	63.1	42.7
Industry	19.9	10.3	17.0	28.1	33.4	29.5	22.3	16.1	20.5
Service	36.2	12.9	29.0	62.2	44.5	57.5	43.7	20.8	36.9
Total	100	100	100	100	100	100	100	100	100

Source: Bangladesh Bureau of Statistics (2017)

The country's consistent economic growth has not translated into sectoral shifts in Bangladesh to the expected extent. And again, women's employment in productive sectors (industry and service) is quite insignificant compared to men's participation. About 76.7 percent of rural women are employed in the agricultural sector, where the overall women's participation in this sector is 63.1 percent. This higher proportion of participation in the agricultural sector characterizes women's employment in non-wage employment. As per the development theories, as development accelerates, employment generally shifts from agriculture to industry, and then from industry to the service sector. Although the trends in sectoral shifts justify these observations, employment is still predominantly agricultural in Bangladesh.

Greater gender disparity also persists in the sectoral distribution of jobs. Despite services being the largest sector in terms of employment in a large majority of countries (ILO, 2016), only 20.8 percent of women are employed in the service sector, compared to 43.7 percent of their male counterparts. This gender difference in sectoral segregation of employment results in income inequality and poor working conditions that largely hinder women's economic empowerment. Traditional patterns of work, cultural attitudes, easy access, the dominance of the agricultural sector in the rural economy, poor skill levels, and work-life balance considerations attract more women to participate in the agricultural sector in Bangladesh. Like sectoral segregation, as seen in Table X, gender disparity at work also persists according to the nature of ownership in job-creating organizations.

Table X: Employment Distribution by Ownership (Aged 15+) (%)

Ownership	Rural			Urban			Bangladesh		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Government	1.7	2.3	5.9	4.5	5.5	3.5	2.4	3.2	3.2
Individual Proprietors	35.7	59.5	61.7	29.1	53.0	67.7	34.1	57.7	57.7
NGO	0.7	0.5	0.7	1.1	0.8	0.5	0.8	0.6	0.6
Household	53.6	27.0	5.2	25.2	10.5	12.2	46.5	22.4	22.4
Private	7.7	9.6	25.2	39.4	29.0	14.7	15.6	15.0	15.0
Others	0.7	1.2	1.3	0.7	1.2	1.4	0.7	1.2	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Government ownership also includes autonomous and local govt. organizations.

Source: Bangladesh Bureau of Statistics (2017)

Although women's participation in the public sector is slightly higher than that of men, they are mostly employed in sole proprietorship firms, resulting in poor legal status of jobs, unstable relationships between employees and employers, inadequate income, and lower bargaining power at work. More than half of Bangladeshi workers (57.7 percent) do jobs in sole proprietorship firms, compared to only 34.7

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percent of male workers. This is largely due to women’s higher participation in informal ready-made garment firms. In contrast, 46.5 percent of men are involved in household economic activities, mainly due to the household-based agricultural economy. The rates of employment between men and women in NGOs and private organizations remain approximately similar. Notwithstanding, women’s large involvement in individual proprietorships and household firms results in working poverty and income disparities. See table XI. Despite several revisions in the country’s wage structures, gender disparity still persists to a large extent in Bangladesh’s labor economy. Both men and women are employed in low-productive sectors that fall into the extremely poor category. About 46.6 percent of female workers earn less than \$1.90 per day, compared to 39.5 percent of male workers. Accordingly, working poverty remains a significant feature of employment in Bangladesh’s economy. And not surprisingly, women hold the larger portion of this working-poor status.

Table XI: Employment by Economic Class 15+ (Age) (%)

Country	Moderately Poor		Near Poor		≥US\$5, PPP		Extremely Poor	
	Female	Male	Female	Male	Female	Male	Female	Male
Afghanistan	12.4	15.2	0.2	0.3	1.1	1.7	86.4	82.9
Bangladesh	24.6	26.3	15.1	16.3	13.7	17.9	46.6	39.5
Bhutan	8.7	8.2	25.5	20.4	64.5	70.2	1.3	1.2
India	32.8	31.5	31	28.1	24	29.7	12.3	10.7
Maldives	7.9	8	25.4	20.4	64.8	70.2	2	1.5
Nepal	25.8	28	36.8	36.2	31.8	30.1	5.7	5.8
Pakistan	29.1	26.6	40	39.7	26.3	29.8	4.7	3.9
Sri Lanka	7.6	9.7	24.1	26.4	67.3	62.8	1	1.1

Note: Moderately poor (≥US\$1.90 & <US\$3.10, PPP), Near poor (≥US\$3.10 & <US\$5, PPP), Extremely poor (<US\$1.90, PPP). Data for the year 2017

Source: ILOSTAT (ILO Modeled Estimates, May 2018)

Except in Afghanistan, women’s employment in Bangladesh results in extremely poor income compared to women in other South Asian countries. Notably, only 13.7 percent of Bangladeshi women earn more than \$5 per day, compared to 67.3 percent, 64.8 percent, and 64.5 percent in Sri Lanka, the Maldives, and Bhutan, respectively. Several studies (e.g., Scheuler et al., 2014; McPhee & Bronstein, 2003; Groh, 2007) documented the adverse consequences of working poor women’s health, social status, and economic empowerment. Accordingly, it raises questions about social welfare policies as they are practiced in the world’s second-fastest economy (i.e., Bangladesh).

6. Key Findings and Policy Responses

Less than one out of every three women participates in Bangladesh’s labor market. Women’s participation in the labor market has decreased between 1990 and 2017, and the current rate is lower than that of other South Asian countries. This lower participation in the labor force widens gender inequality at work in Bangladesh. Although several demographic, social, and economic constraints hinder women’s access to the labor market, gender role conformity and stereotypes play a vital role in this respect. Once women get access to the labor market, they often face discrimination across and within occupations. Women are largely employed in the informal agricultural sector, resulting in working poverty, job insecurity, and undermined self-esteem. Greater gender disparity is observed in terms of educational attainment and training status. Women’s lower participation at higher secondary and tertiary levels of education pushes them to get involved in vulnerable employment. Accordingly, women’s employment status is largely

framed as that of contributing family workers. In addition, women are underrepresented in higher-status occupations, and they largely work in sole proprietorship firms. Women's mass participation in agriculture has widened gender-based sectoral segregation. In essence, women face discrimination in every aspect of occupational segregation. This wider occupational segregation considerably increases income inequality and makes Bangladeshi women bound to work in occupations that yield a wage of less than 1.90 US dollars per day.

Notably, occupational gender segregation is a multidimensional, subjective, and complex phenomenon incorporating different social, labor market, and macroeconomic factors. Accordingly, specific policies are very difficult to suggest for reducing gender-based occupational segregation. Policies addressing the root causes of occupational gender segregation are very diverse within and across economies (Bettio & Verashchagina, 2009). Nonetheless, several policy options seem quite logical and appropriate in response to the existing gender difference in occupational segregation in Bangladesh.

Like many other aspects of gender inequality, social factors exert significant influence on occupational gender segregation. Policymakers are therefore required to address the root causes of societal attitudes towards women's employment and, particularly, their choice of occupations. Several societal policies, like raising public awareness of gender segregation, redesigning educational policies to enroll more girls at every level of education, taking initiatives to counter stereotypes at both school and in the media, encouraging girls to participate in decision-making from the very beginning, and allowing more girls to participate in different leadership programs at school, are more likely to have a positive result in reducing gender inequality in general and occupational gender segregation in particular.

Skill plays a vital role both in accessing the labor market and getting quality jobs. Setting up training institutes at both the rural and urban levels is a good policy option to prepare women for labor market demand. Encouraging women and especially students to participate in training programs and making them aware of the long-term benefits of such programs is supposed to work better. Setting vocational schools at the sub-district level will increase the probability of more women's access to technical education. Women's preference for study areas also widens occupational segregation. Like women in many developing countries, Bangladeshi female students tend to study in general areas like the humanities and social sciences that largely fail to meet the skill and educational requirements of the country's labor market. Female students need to be encouraged to study in scientific and technical fields. Although employment in the agricultural sector is largely criticized for poor income, job insecurity, and poor working conditions, most women are still employed in the agricultural sector. Thus, labor policies ignoring or downgrading the agricultural sector seem veined and inadequate. In addition to encouraging responsible investment in agriculture, land rights for women and access to productive resources must be ensured, along with a special focus on the rural economy. Policy makers should review the 'FAO Policy on Gender Equality' and policies laid down in various policy briefs of international development organizations like IISD, IFAD, the World Bank, the ILO, and the ADB while designing gender-responsive agricultural labor policies.

Sometimes women voluntarily refrain from certain occupations due to excessive working hours and work-life conflict issues. Different time-saving measures like flexible working schedules, child care options, and maternity provisions will encourage women to enter so-called male-dominated occupations. In addition to horizontal segregation, vertical segregation is mostly prevalent in Bangladesh's labor economy. Holding a managerial or administrative post in an organization remains a dream for many Bangladeshi women. Encouraging women to participate in higher education, especially in technical fields, and maintaining female quotas for a while in higher positions are supposed to reduce gender inequality in higher-status occupations. In addition to largely being employed in vulnerable employment and in wage employment to some extent, women are still outnumbered by men in entrepreneurial

activities. Women's investment is largely constrained by social and economic factors like gender role conformity and women's limited access to land, credit, and technology. Fostering a gender-responsive legal framework for business development and setting up incentive measures to facilitate women's access to markets and productive resources are likely to be better policy steps in this respect.

Last but not least, policymakers must address the root causes of women's working-poor status in the Bangladesh labor market. Working poverty and income inequality largely undermine women's social and economic class, resulting in undermined self-esteem. Women's involvement in the informal sector is largely responsible for this working poor. However, the informal sector is the largest source of employment for both men and women in Bangladesh's labor economy. Hence, this is a two-fold problem for policymakers. Several policy interventions, like recognizing the value of informal employment on one side and regulating and monitoring the informal sectors on the other, are deemed appropriate. Introducing minimum wages and an equal pay for work of equal value' policy is more likely to reduce working poverty and income inequality.

7. Concluding Thoughts

Despite consistent economic growth and significant improvements in human development, gender inequality still persists at almost all levels of development, ranging from education to political participation in Bangladesh. The case of inequality is severe in Bangladesh's labor economy in terms of participation, occupational segregation, and wage differentials. Unlike other aspects of gender inequality in the labor market like labor force participation and the gender wage gap, occupational gender segregation remains mostly unstudied in Bangladesh. Gender-based occupational segregation has become a common but neglected feature of Bangladesh's labor economy. Women face inequalities across and within occupations, and these inequalities mostly result in poor working conditions, undermined self-esteem, job insecurity, no or minimum human rights at work, and vulnerable working conditions. These outcomes of gender differences in occupational segregation become serious obstacles to women's economic empowerment. In addition, women's chances of holding managerial and administrative positions are very limited. Hence, occupational gender segregation remains an intrinsic policy interest in Bangladesh.

Being a multidimensional and complex socio-economic phenomenon, occupational gender segregation poses multiple challenges for policymakers. Since multiple societal and labor market factors are interactively involved with this issue, policymakers face extreme difficulties while adopting gender-responsive labor policies. Depending on the degree and nature of problems across occupations and sectors, the most commonly perceived factors behind wider occupational gender segregation in Bangladesh are: stereotypes, social structures, the country's economic policies, existing gender discriminatory laws, women's self-preference for certain occupations, preference for general fields of study, work-life balance considerations, maternity affairs, social security concerns, mobility, proximity to the informal sector, and limited access to land ownership and productive resources.

Several policy options are provided in this paper in response to the existing gender gap in occupational segregation. Tracing the root causes of occupational gender segregation is the most effective policy option in this regard. Like many socio-economic problems, gender inequality in occupational segregation is rooted in social structures and cultural settings. Policy interventions in societal aspects like taking steps to breakdown stereotypes, redesigning educational policies to increase women's enrolment in education, setting state-of-the-art training institutes, promoting women's leadership roles from childhood, and encouraging vocational education are most likely to reduce gender segregation at work. In addition, several labor market issues should be addressed, including setting minimum wages for women, introducing equal pay policies, maintaining quota systems in higher-status positions, flexible work

arrangements, promoting women's entrepreneurship, providing incentives to women for entering non-stereotypical jobs, increasing security at work, regulating informal employment, and giving special attention to the agricultural sector, where most of the Bangladeshi women are employed.

Notably, occupational gender segregation is not a single-focused area of study. A single policy deemed effective for certain occupations may not work for other occupations in different sectors. Accordingly, a bundle of policies is required, as suggested in this paper. Finally, policymakers should jointly work with stakeholders and collaborate with national and international organizations to fight against this segment of inequality in Bangladesh's labor economy.

8. Research Agenda

Gender inequality in employment is one of the most contemporary labor market issues in the world. Moreover, this is critically important for emerging economies like Bangladesh, where women play a dominant role in all economic segments. As stated earlier, occupational gender segregation in Bangladesh's economy remains unstudied to a large extent. This paper has only discussed the nature and extent of this segment of inequality. Lots of areas are open for further study. Research in occupational segregation from Bangladesh's perspective is critically important for at least two reasons: (i) the comparative importance of the field; and (ii) the existing research gap in this respect. Occupational gender segregation thus exerts multiple areas of research here in Bangladesh. Out of many, the most attractive areas are: exploring the root causes of gender segregation across and within occupations; examining the impact of societal factors on gender-based occupational segregation in Bangladesh's economy; reviewing the existing labor policies from a gender perspective; justifying the role of women in both the formal and informal sectors; exploring the gender wage gap; conducting a training needs assessment study; evaluating the role of international organizations like the ILO in this respect; and so on. Indeed, occupational gender segregation is an intrinsic field of study for academics, think tanks, independent researchers, and labor economists.

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Factors Influencing Consumption of Organic Foods: A Study on Organic Food Buyers in Barishal City.

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Abstract

This study aims at identifying the factors influencing consumption behavior of organic food buyers in Barishal city of Bangladesh. Personal interview using a structured questionnaire was utilized for data collection purpose. 200 respondents were chosen for interview using non-probability convenience sampling technique. Factor analysis was employed to analyze the research data. SPSS 26.0 software helped in this purpose. 21 variables related to organic foods consumption behavior were used in the study. Factor analysis results indicate that 7 factors namely high nutrition density, health benefits, environmental concern, safety concern, biodiversity conservation, original food value, and natural quality control positively influence the consumption decision of organic food buyers. The study suggests that organic food marketers can develop effective marketing strategies and tactics to influence the frequency of purchase by organic food buyers. This study provides valuable insights in understanding of the consumer behavior of organic foods.

Keywords: Organic foods, Organic food consumption, Biodiversity conservation, Factor analysis

1. Introduction

1.1 Organic Foods

Organic foods are foods that are not harmful to the environment and are produced using sustainable technology. These foods are free from synthetic chemicals and pesticides, and mostly devoid of genetic medications (Paul & Rana 2012). According to Bryła (2016), organic foods possess superior health benefits, enhanced taste, and a greater sense of authenticity compared to conventional ones. Types of organic foods generally include but not limited to: vegetables, fruits, rice, flour, dairy products, oils, meats, fish, eggs, herbs, teas, juices, wheat, lentils, cereals, and others.

Regarding the features of organic foods, Zakowska-Biemans (2011) stated that organic products are perceived as contaminant-free and highly beneficial to health and the environment. The most distinguishing features of organic foods are that they are free from chemical food additives (Paul & Rana 2012a), contain sufficient nutritive attributes (Bourn & Prescott 2002), harmless, and of superior quality compared to traditional non-organic foods (Dipeolu et al. 2009).

1.2 Organic foods production status in Bangladesh

With the advent of new farming technologies in the 1960s the agricultural production in Bangladesh got momentum. Proshika, a non-government organization (NGO) first began organic farming in the Manikganj district of Bangladesh in 1976. According to Mohiuddin (2020), Proshika's Ecological Agriculture Program has emerged as the dominant force in the organic farming sector, successfully engaging about 800,000 farmers in organic agricultural activities spanning an impressive 220,000 acres of land. Over the years, it has trained more than 250,000 farmers on organic farming (Palma 2017).

Later, a number of firms came forward to produce organic foods in Bangladesh. Notable firms are: (i) *Shashya Prabartana*, launched in 2002, by UBINIG is selling more than hundred food items such as local

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varieties of rice, flour, wheat, lentils, peas, dairy products, pickles, honey, meat, poultry and fish. (ii) *Prakritik Krishi Bipanan Kendra*, an entrepreneurship of Chittagong university ex-graduates, sells fresh vegetables, milk, local variety full-grain rice, various kinds of flour, honey and other items (iii) *Kazi and Kazi Group* produces organic tea, herbs, rice, and vegetables in Panchagarh (Rahman 2019). Currently 47 NGOs are engaged in organic agriculture in Bangladesh mostly producing organic foods on experimental basis (Mohiuddin 2020a).

1.3 Organic foods production status in Barishal Division

The below table shows the present organic food production status in Barishal division.

Name of the districts	Production area (in hectare)	Types of foods produced	Production Amount in a year (in KG)
Barishal	27.35	Cabbage, radish, carrot, beans, pumpkin, tomato, karella, guava, bottle guard, cucumber, dairy.	3,05,980
Patuakhali	8.91	Cucumber, cauliflower, potato, lentils, beans, peas, coconut, mango, watermelon etc.	1,31,420
Jhalakathi	4.05	Brinjal, bottle gourd, okra, string beans, beans, tomato, pumpkin.	66,200
Bhola	48.02	Cabbage, radish, carrot, lentils, beans, peas, watermelon, tomato, dragon fruit, mixed fruit.	2,88,530
Barguna	33.02	Okra, pumpkin, turnip, Snake guard, karella, tomato, brinjal, tomato, cucumber	4,08,350
Pirojpur	0.70	Bottle guard, cucumber, pumpkin.	15,000

Table 1: Organic Foods Production Statistics in Barishal Division in 2020

Source: Bangladesh Safe Food Authority and Department of Agricultural Extension

2. Objectives of the Study

The study aims at examining the key factors that influence the organic food consumption behavior of consumers in Barishal city. The study sets the following specific objectives to achieve the research aim:

- i) To find out the organic food buyers' demographic, psychographic, and behavioral characteristics influencing their consumption decisions.
- ii) To outline the implications of the study, precisely, focusing on the market potential of organic foods in Bangladesh.

3. Literature Review

Over the past decade, there has been a significant increase in consumer awareness regarding the safety of conventionally produced foods. This worry arises from the utilization of chemical fertilizers, pesticides, herbicides, genetically modified materials, growth hormones, antibiotics, and other potentially dangerous substances in the manufacturing process (Basha et al. 2015). The indiscriminate use of chemicals and pesticides can cause health problems such as diabetes, heart disorders and also result in environmental

deterioration (Menrad 2003). Consequently, consumers are now looking for alternatively grown foods that are free for harmful chemicals, pesticides, and other life-threatening substances.

Tsakiridou et al. (2008) found that organically grown foods are healthier, safer and mostly environmental friendly with high nutrition enrichment and could be a good alternative of inorganic foods. Organic agriculture encompasses a range of approaches, such as the utilization of organic fertilizers, the cultivation of locally adapted seeds and breeds, the implementation of biological pest management methods, and the practice of intercropping with nitrogen-fixing trees, legumes, or other crops that exhibit synergistic effects (Adamtey et al. 2016).

Similarly, Dipeolu et al. (2009a) stated that organic foods are chemical free, no pesticides and fungus residues, having natural taste and flavor, enhanced vitamin containments, no negative consequences, and a higher quality than the food items produced using conventional methods. They also found that organic food markets constitute production and selling of food items such as organically grown fruits, vegetables, dairy products, eggs, fishes, herbs, teas, juices, cereals, meat products, oils and fats etc.

Consumer decision of consuming organic foods is influenced by various factors. Briz and Ward (2009) suggest that the consumption decisions of organic foods are influenced by consumers' socio-demographic profiles, food buying behavior, and nutritional knowledge. The concern for health is directly linked to the decision-making process of purchasing organic food products. Chen and Lobo (2012) stated that consumers who have concern for health conservation may want to consume organic foods.

Several other studies have found that consumers' socio-demographic factors can influence their organic food consumption decision. In a study, Gracia and Magistris (2007) found that consumers with higher incomes are more likely to purchase organic foods. Age also influences the decision to buy organic foods by buyers. Van Doorn and Verhoef (2011) found that young people engage in more organic food purchase than others.

In a study, Chegini & Saleh (2016) mentioned that consumer concern for ecology also influences their buying of organic foods. The researchers also found that those with a greater understanding of organic foods and their associated health advantages exhibit a higher propensity to purchase organic food products compared to those with a limited level of knowledge. Furthermore, according to Saleki et al. (2012), consumers are motivated to purchase organic foods due to their perceived attributes of superior quality, local sourcing, and freshness. There is a prevailing belief among consumers that organic foods provide superior taste compared to conventional foods. Wee et al. (2014) found that food quality also influences consumers to buy organic foods. Consumers buy organic foods as they are grown using safe processing techniques.

Though organic foods consumption is highly prevalent in developed countries it is a new trend in Bangladesh (Mehree et al. 2015). Palma (2017a) stated that only a handful of 12,000 farmers cultivate organic crops on approximately 7,000 hectares of land, which represents only 0.19 percent of the country's total farmland.

In a study conducted by Mehree et al. (2015a), it was shown that Bangladeshi consumers exhibit a preference for organic foods due to their perception that such products provide superior quality and health benefits. They also found that higher income group spends more and have high willingness to buy organic foods. Several barriers to the consumption of organic foods were noted, including a lack of awareness about organic foods, limited knowledge on their availability and authenticity, a lack of trust, and the higher price associated with organic foods.

This paper develops the following research hypotheses based on the literature review:

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H_0 : There is no significant difference among the factors influencing the organic foods consumption behavior of organic food buyers in Barishal city.

H_1 : There is significant difference among the factors influencing the organic foods consumption behavior of organic food buyers in Barishal city.

4. Methodology of the Study

4.1 Research Design

This study employs a quantitative approach to better understand organic food customer behavior. This method focuses on objective measures and the statistical, mathematical, or numerical analysis of data gathered through polls and questionnaires (Babbie 2010). Furthermore, this methodology is useful in complex investigations including several variables and treatments, such as factorial designs (Cresswell & Cresswell 2017).

4.2 Sampling Design

This study gathered data from a sample of 200 respondents who engage in the consumption of organic foods. In relation to the process of sample size determination, according to the research conducted by Guilford et al. (1954), it is recommended that a minimum of 200 samples be included while conducting factor analysis. According to Comrey and Lee (1992), it was asserted that a sample size of 200 is considered to be representative and unbiased. This study gathered data from a sample size of 200, in accordance with previous research studies.

4.3 Sampling Technique

The study's sample was chosen using a non-probability convenience sampling method. Malhotra and Dash (2011) stated that using this technique, researchers can quickly reach the desired respondents from large population. No sampling frame was found for this study.

4.4 Data Collection

This study collected primary data from organic food buyers in Barishal city using personal interview method. Ryan et al. (2009) assert that the utilization of personal or individual interviews as a research technique is effective in obtaining comprehensive and valuable insights into individuals' perceptions, understandings, and experiences related to a certain phenomenon. To collect primary data, a structured questionnaire was employed as the survey instrument. Secondary data were gathered from a variety of sources, including books, articles, websites, and journals.

4.5 Data Analysis

The study used SPSS 26.0 software for data analysis. The study involved the analysis of respondents' demographic data by utilizing frequency distribution. In addition, factor analysis was employed to identify the most influential factors on the purchasing behavior of organic consumers. Balasundaram (2009) found that factor analysis is a well-used tool in social science research for analyzing, summarizing and reducing data. Principal Component Analysis (PCA) with Varimax and Kaiser Normalization was used for factor analysis in this study.

5. Analysis and Findings

5.1 Sample demographics

Respondents' Gender	Gender	Number of respondents	Frequency
	Male	148	74%
	Female	52	26%
	Total	200	100%
Respondents' Age	Age	Number of respondents	Frequency
	Below 20 years	10	5%
	21-30 years	70	35%
	31-40 years	79	40%
	41-50 years	28	14%
	Above 50 years	13	6%
	Total	200	100%
Respondents' Education	Education	Number of respondents	Frequency
	School	14	7%
	College	61	31%
	University/Equivalent	101	50%
	Others	14	7%
	No education	10	5%
	Total	200	100%
Respondents' Income	Income (BDT)	Number of respondents	Frequency
	Below 10000	5	3%
	10001-25000	15	7%
	25001-40000	89	45%
	40001-55000	71	35%
	Above 55000	20	10%
	Total	200	100%
Respondents' Occupation	Occupation	Number of respondents	Frequency
	Service	151	75%
	Business	20	10%
	Housewife	11	6%
	Unemployed	9	4.5%
	Others	9	4.5%
	Total	200	100%

Table 2: Frequency Distribution of the Respondents' Demographic data

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Table 2 of the study shows the gender, age, education, income and occupation of the respondents used in this study. Among 200 respondents 74% are male and 26% are female. The study mostly interviewed the 31-40 years old respondents (40%). In case of education university/equivalent level shows the highest frequency with 50%. The income level of BDT 25001-40000 covers 45% which is the highest percentage in this category. Finally, 75% of the respondents participated in this study are in service profession.

5.2 Reliability of Data

Cronbach's Alpha	N of Items
0.618	21

Table 3: Reliability Statistics

Nunnally (1978) argued that an alpha value between 0.50 and 0.60 is appropriate in the preliminary stages of research, suggesting that cronbach's alpha is a good measure of internal consistency of the latent variable. However, previous research conducted by Hair et al. (1998) has indicated that an alpha value of 0.70 or above is often regarded as indicative of internally consistent established factors. However, it should be noted that values close to 0.60 are also deemed acceptable, as suggested by Hair et al. (2006). This study has a cronbach's alpha of 0.618 with internally consistent 21 variables or items (Table 3), exceeding the allowed limit of 0.50 or 0.60. This investigation can proceed with this alpha value based on previous studies.

5.3 KMO and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.640
Bartlett's Test of Sphericity	Approx. Chi-Square	680.405
	df	210
	Sig.	.000

Table 4: KMO and Bartlett's Test of Sphericity

To determine whether the samples are adequate or data used in this study are suitable for factor analysis some tests are essential (Burton & Mazerolle, 2011). Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity are the two tests whose results help the researchers to go with the decision of conducting factor analysis (Netemeyer et al. 2003). These tests must be carried out prior to the extraction of the constructs.

Kaiser (1970) indicated that the sample adequacy of the research can be tested by examining the Kaiser-Meyer-Olkin (KMO). The normal KMO measure ranges from 0 to 1. Hair et al. (1995) validated that a KMO value of 0.50 is acceptable for conducting factor analysis. Netemeyer et al. (2003a) concluded that factor analysis output with a correlation greater than 0.60-0.70 is appropriate.

Kaiser-Meyer-Olkin (KMO) score of 0.640 is significantly higher than the recommended value of 0.50, as seen in table 4 or in the range of 0.60-0.70. This suggests that the KMO measure is sufficient, acceptable, and suitable for doing the factor analysis in this study.

In a 1950 study by Bartlett (1950) on factor analysis tests of significance, Bartlett found that this Test of Sphericity can make chi-square output significant. This test verifies that the correlation matrix is not an identity matrix and is statistically significant when $p < 0.05$ (Hair et al., 1995a). Bartlett's Test of Sphericity is easy to build into principal components computer programs and used best before moving to

conduct of a factor analysis (Maxwell 1959). Moreover, it is less cumbersome to compute (Armstrong & Soelberg 1968).

This study has an approximate Chi-Square statistic of 680.405 with 210 degrees of freedom. This statistic achieves statistical significance at the 0.05 level of significance. Bartlett's Test of Sphericity (Malhotra & Dash, 2011a) draws the conclusion from this finding that the null hypothesis, which states that the population correlation matrix is an identity matrix, cannot be supported. This validates that there is truly significant difference among all the factors influencing the organic foods consumption behavior of organic buyers in Barishal city.

Once the use of factor analysis is justified the next step is to determine the appropriate factor extraction method of extracting factors for this study. Tabachnick and Fidell (2001) found that Principal Components Analysis (PCA) is a commonly used method of factor extraction. Different researchers have tried to justify the use of PCA in factor analysis. According to Netemeyer et al. (2003b), principal component analysis (PCA) is a suitable technique for factor extraction in situations where researchers have developed an instrument comprising multiple items and seek to reduce the items. In addition, Gorsuch (1983) deduced that PCA is most effective when there is no preexisting theoretical foundation or model for the problem at hand. The present study used the Kaiser Normalization (K1) approach, as proposed by Kaiser (1960), with the purpose of selecting constructs based on their eigenvalues. According to the study conducted by Malhotra and Dash (2011b), the Kaiser Normalization method involves the retention of eigenvalues that are larger than 1.00, while excluding values that are less than 1.00.

5.4 Total Variance Explained

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.804	13.354	13.354	2.804	13.354	13.354	2.052	9.771	9.771
2	2.332	11.104	24.458	2.332	11.104	24.458	1.878	8.944	18.714
3	1.829	8.708	33.165	1.829	8.708	33.165	1.814	8.639	27.353
4	1.579	7.520	40.686	1.579	7.520	40.686	1.738	8.274	35.628
5	1.423	6.778	47.463	1.423	6.778	47.463	1.732	8.247	43.875
6	1.061	5.053	52.516	1.061	5.053	52.516	1.483	7.061	50.936
7	1.009	4.807	57.323	1.009	4.807	57.323	1.341	6.388	57.323
8	.967	4.603	61.927						
9	.910	4.336	66.262						
10	.890	4.240	70.502						
11	.795	3.784	74.287						
12	.749	3.564	77.851						
13	.724	3.448	81.299						
14	.621	2.956	84.255						
15	.591	2.813	87.068						
16	.569	2.712	89.779						

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17	.508	2.418	92.198						
18	.475	2.261	94.458						
19	.410	1.955	96.413						
20	.388	1.847	98.260						
21	.365	1.740	100.000						

Extraction Method: Principal Component Analysis.

Table 6: Total Variance Explained in Principal Component Analysis (PCA) of Factor Analysis

According to Malhotra and Dash (2011c), it is recommended to extract factors with eigenvalues equal to or greater than 1.00 for subsequent research purposes. The principal component analysis (PCA) conducted in this study reveals the presence of seven factors with eigenvalues exceeding 1.00. Collectively, these factors account for a cumulative variance of 57.32% of the total variance. The first factor accounts for 13.35%, while the remaining six factors account for 11.10%, 8.71%, 7.52%, 6.78%, 5.05%, and 4.81%, respectively. The cumulative variance percentage of all 21 variables is 100 percent. The study employs Kaiser's criterion and Cattell's scree test to extract the seven factors.

According to the findings of the study, as presented in Table 6, the cumulative variance for the rotated sums of squared loadings is determined to be 57.32%. This value is equivalent to the cumulative variance obtained from the extracted sums of squared loadings when retaining 7 factors. Yong and Pearce (2013) stated that the extraction sums of squared loadings are identical to the initial eigenvalues except factors with eigenvalues less than 1 are not shown. These columns show eigenvalues and variance prior to rotation. Furthermore, Patel (2018) has suggested that the distribution of variance following varimax rotation can be represented by the rotated sums of squared loadings. The purpose of performing Varimax rotation is to optimize the variance of each element, hence redistributing the overall variation among the extracted factors in order to account for the maximum amount of variance.

5.5 Scree Plot

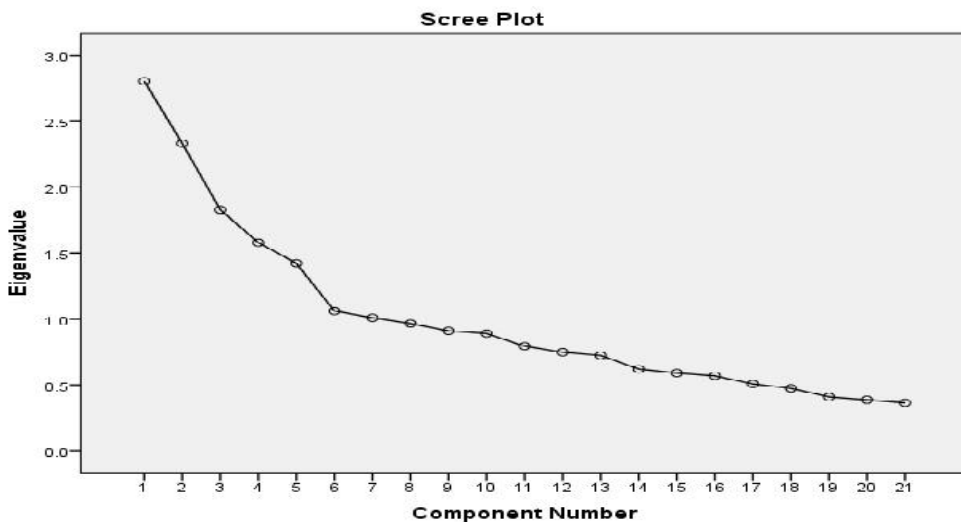


Figure 1: Scree Plot

Cattell (1966) first introduced the concept of scree plot by indicating that a scree plot is the visual exploration of a graphical representation of the eigenvalues. A scree plot displays a pattern of steep

curves followed by a bend and a flat or horizontal line. In a scree plot, the elbow of the graph where the eigenvalues are about to level off is identified, and factors or components to the left of this point are considered significant (Dmitrienko et al. 2007). The scree plot depicted in Figure 1 of this study demonstrates that the majority of the variability can be accounted for by seven factors, as seen by a noticeable discontinuity occurring at the seventh factor. The remaining components have limited significance as they represent just a small proportion of the variability.

Rotated Component Matrix ^a							
	Component						
	1	2	3	4	5	6	7
Richer in nutrients	.765						
No detrimental additives and artificial flavors	.655						
Rich with original tastes and flavors	.502						
Healthier to consume than inorganic foods		.790					
Reliable and trustworthy food quality for health		.599					
No use of antibiotics or growth hormones		.522					
Care for the environment			.783				
Reduce air, water and land pollution			.504				
Decrease the risk of chemically induced chronic diseases				.685			
No use of pesticides or chemical fertilizers				.672			
Use safe processing techniques in production				.611			
Conserve water, soil and power energy					.770		
Conserve biodiversity					.645		
No harmful or life-threatening substances or residues						.777	
Fresh local quality						.640	
No genetic modifications							.753
Use natural production and paste control method							.553

5.6 Rotated Component Matrix

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 8 iterations

Table 7: Rotated Component Matrix

This study employs Principal Component Analysis method of factor analysis and varimax rotation with K1 method. The most popular type of rotational methods for factor analysis, known as Varimax rotation (Taherdoost et al. 2014), produces factors with a low number of large loadings and a high number of minor loadings (Abdi, 2003).

Once the factor rotation method has been determined, it is recommended to establish a predetermined threshold for significant rotated factor loadings (Yong & Pearce, 2013a). To determine the cut-off score, Truong and McColl (2011) suggested that factor loadings should be greater than 0.5 for better results. Furthermore, Hair et al. (2010) recommended that factor loadings estimates higher than 0.5 are good. Other researchers namely Lai et al. (2004); Cheng and Choy (2007); Tsai (2014) conducted factor analysis and found that factor loadings with scores of 0.5 or higher are ideal for proceeding with factor

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analysis. Based on these research precedents this study has retained only those items whose loadings are greater than 0.50 and has deleted the items whose absolute values are less than 0.50.

Seven rotated factors and their loadings were derived from the Rotated Component Matrix (Table 7) of this study. They are as follows:

Factor 1 exhibits a positive correlation with V1, V2, and V3. Therefore, Factor 1 can be referred to as *High Nutrition Density*. This factor indicates that consumers buy organic foods because these are highly nutritious.

Factor 2 shows positive correlation with V4, V5 and V6. Hence, Factor 2 can be indicated as *Health Benefits*. Factor 2 denotes that consumers' decisions to consume organic foods are influenced by their knowledge that these foods offer numerous health benefits.

Factor 3 has a positive correlation with V7 and V8. Hence, Factor 3 can be labeled as *Environmental Concern*. It means consumers' environmental consciousness behavior influence them to buy organic foods.

Factor 4 correlates positively with V9, V10 and V11. Thus, Factor 4 can be called *Safety Concern*. This indicates that consumers choose to buy organic foods because they are highly concerned about food safety.

Factor 5 is positively correlated with V12 and V13. Hence, Factor 5 can be called *Biodiversity Conservation*. Factor 5 denotes that consumers consume organic foods because they believe that organic food production system conserves biodiversity.

Factor 6 exhibits positive correlation with V14 and V15. So, Factor 6 can be named *Original Food Value*. This means original quality of the foods induces consumer to buy.

Factor 7 is positively correlated with V16 and V17. Hence, Factor 7 can be called *Natural Quality Control*. This infers that consumers consume organic foods because they believe that these foods are grown using natural quality control techniques.

Other variables used in the study, including "Contain more fibers; Higher education level; Higher income; Take animal welfare into considerations during production," have no correlation with any other variables in the analysis and had very low loading scores. Consequently, these variables or items have been eliminated from the study.

6. Conclusion

The purpose of the study was to identify the main factors that influence the consumption of organic foods by organic consumers. The factor analysis of the study has extracted seven factors influencing the purchase decision of organic consumers namely, High nutrition density, Health benefits, Environmental concern, Safety concern, Biodiversity conservation, Original food value and Natural quality control. This suggests that consumers' interest in organic food is affected by their perception that such products provide greater nutritional value, are better for the environment, are safer to ingest, help preserve ecosystems, and have a more genuine flavor and quality. These factors are well reflective of the major findings of the literatures this study reviewed such as Tsakiridou et al. (2008a); Dipeolu et al. (2009a); Chen (2012a); Saleki et al. (2012a) and others. However, several studies (Zander & Hamm 2010; Achilleas & Anastasios 2008) found that consumers' willingness to buy organic foods is influenced by their socio-demographic variables such as age, higher education or higher income. But this study has found no significant influence of consumers' socio-demographic variables on their organic foods consumption decision.

7. Implications of the Study

The implications of the study are manifold. First, this study can be helpful for the organic food marketers to gain understanding of what influence target consumers to make organic food purchase decision. Second, the study implies that organic food marketers can gain large market share by investing more in promotional campaigns to increase consumers' awareness and knowledge about organic foods' pressing benefits compared to traditional foods. Third, government can work with NGOs and organic food marketers to eradicate both marketer and non-market barriers that exist in this sector such as establish an enduring linkage between the market and the marketer, providing adequate inputs, training to farmers etc. Moreover, government can ensure consumer trust on organic foods by assigning independent certification agencies and annual inspections based on clear standards for organic farming. Finally, this study will minimize the research gap found in the research field of consumption of organic foods in Barishal city by bringing in a new understanding of organic foods market and consumers' consumption behavior.

8. Limitations and Future Direction of Research

The research had several limitations. First, the convenience sampling method utilized in this study carries the risk of selection bias or nonrepresentational problems. Second, there was no sampling frame discovered. If a sampling frame had been identified, the data collection procedure may have been less difficult. Finally, there were insufficient complete data on organic cultivation in the city of Barishal. This study urges future researchers to investigate the socio-demographic influences on the purchasing decisions of Bangladeshi consumers of organic foods.

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Social Media's Importance and Value to Small and Medium-sized Enterprises

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Abstract: The purpose of the study is to briefly address social media's significance for small and medium-sized businesses. SMEs are hesitant and confused about how to properly integrate social media into their business operations even if social media adoption is a very frequent feature for large corporations. However, it has been demonstrated that social media is the sole way to reach clients more efficiently and affordably in this computerized age, particularly in the wake of the Covid-19 pandemic. Based on the thorough analysis of numerous related publications, the study discovers the use of social media platforms like Facebook, Twitter, Instagram, Pinterest, etc. has substantially influenced SMEs and given them the competitive strength to compete with large and global firms. The current study contributes to our understanding of social media adoption and performance in SMEs and serves as a good foundation for further research for shaping practices in this particular field.

Keywords: Social-Media, SMEs, Performance.

Introduction

Nowadays, in the era of globalization, managing a successful business organization is no longer the same as it was in previous years. Commercial organizations have had the difficulty of keeping up with the accelerating rate of innovation in order to enhance company performance over the previous two decades in a dynamic and unstable business environment. In order to encourage the growth of small and medium-sized businesses, which also contribute to the economic development of any nation, social media (SM) plays a critical role (Fan et al.,2021). In these circumstances, managers must be able to adapt to information technology (IT) and make appropriate planning to avoid such a complex environment so that business organizations can be profitable.

Existing companies already connected to the internet can be adapted various social media tools without any additional resources. Bernoff and Li (2008) claim that businesses can utilize social media platforms to advertise their brands in a variety of settings and contexts, including product sales and marketing, customer support, research, and development planning. Commonly Facebook is the most usable social media site besides Twitter, Instagram, Pinterest, etc. Nowadays every person/organization has a minimum Facebook ID, with which they can easily communicate and purchase the necessary products or services from a variety of store pages that stay anywhere at any time. In addition, they receive updated news or offers from these pages that attract them to this page for future reference. Social media has become quite popular, and many people utilize it to support online learning and information sharing

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with prospective clients (Hur et al., 2017). As a result, the majority of businesses use social media to improve their brand awareness among consumers (Nisar & Whitehead, 2016; Pentina et al., 2013).

The early 2020 COVID-19 Pandemic breakout had an equal impact on people and companies all around the world. Because every country was in lockdown to protect its citizens from Covid 19's clutches, small and medium-sized businesses were the ones who suffered the most (Papadopoulos et al., 2020). The lockdown caused widespread disruption in the supply and demand of goods due to widespread transportation problems, according to an OECD analysis from 2020. Due to various financial and technical bottlenecks, small and medium-sized companies were hit harder than large ones. Due to Covid-19, which included the introduction of social distancing, online shopping platforms are now the only medium for businesses and customers to interact with each other (Effendiet al., 2020). Both large corporations and small businesses have been able to turn back with options to adopt social media in their day-to-day activities.

To keep them in business, each nation's government periodically offers incentives, such as preferential tax treatment and easier access to finance. But the real truth is that government incentives and loans were not enough to run SMEs properly. Because the cost of advertising and other business promotional work over the past few years has been so costly and difficult that only a few large companies and firms can afford it. Small and medium enterprises (SMEs) cannot bear this cost so they could not take advantage of the competitive situation.

Besides this SMEs manager gets many advantages as relatively cheap options for analysis, publishing automatically, conversion tracking, identifying potential customers, and content management (Ahmad et al., 2018). Social media is growing more and more popular as a means of business promotion since it enables communications to move beyond private one-to-one conversations and into conversations between many people (Siamagka et al., 2015). An SME manager must use SM platforms to provide transparent communication and give businesses the chance to comprehend and act properly and proactively in response to consumer requests (Parveen et al., 2016).

We can therefore see from the literature how crucial it is for SMEs to utilize social media. The adoption of social media and how exciting social media may be to SME's performance will be the main topics of this study, which will fill this vacuum in the literature.

Literature review

Social media adoption

Because social media is valued and utilized differently by distinct communities, people can define it in a variety of ways (Kietzmann et al., 2011). Kaplan and Heinlein's (2010) definition was chosen in this investigation because it is widely used and broad. Social media, according to Kaplan and Haenlein (2010), is "a group of internet-based applications that build on the ideological and technological foundation of Web 2.0, and that allow the creation and exchange of user-generated content." As we can see, there are numerous social media technologies available, like Facebook, Instagram, Twitter, Linked In, YouTube, and others. The world's population is currently 7.593 billion, of which 4.021 billion utilize the internet and 3.196 billion actively use social media. Here the most used sites are Facebook, YouTube, Twitter, Instagram, Pinterest, etc (Habes et al., 2019, pp.382-392). And right present, more and more people are using social media regularly. In order to engage with both current and new clients, business groups recently launched and maintained accounts on Facebook, Twitter, and YouTube (Mitic & Kapoulas, 2012). Launching a new product on the market promotes client and shareholder communication, as well as expertise and information about marketing, thanks to social media's use as a cost-effective instrument for SMEs. Nowadays It is common to see small business organizations using

Facebook pages to promote their product and taking huge online orders from customers around different places, which wasn't possible in the last decade for their insufficient resources and manpower. Between sellers and buyers, social media is now the best communication medium for some valuable reasons.

SMEs manager takes some theory of social media for organizational benefit. One of them, Word of mouth (WOM) considers a more powerful way to build communication with customers in recent decades (Herr PM et al,1991). When people want to buy something, they influence by relatives, friends, and known people who give them information about products/services which information is more trustable than any other communication by marketers. (Herr et al., 1991; Schiffman et al.,1995). Social media give consumers to get information about products or services not only for friends or relatives but also the stranger. Consumers share and revealed their feedback on products on social media which is realized to be more reliable than organization initiative advertising (Trusov et al., 2008). Social media look like a social exchange platform that assists in spreading WOM.

Social media is another platform utilized in addition to WOM for the distribution of content. inexpensive services and goods for evaluation, promotion, and listing (Aryanto&Wismantoro, 2020). It is now possible to gather positive comments about a product by uploading videos on social media rather than text or images because of the continued growth of smartphone users and social media users (Dhaoui& Webster, 2020). Social media is crucial to reach customers during the Covid-19 pandemic, as well. According to Obermayer et al. (2021), the value of social media for SMEs as a networking and advertising tool should be emphasized, as its potential use in management, where it could encourage an open flow of information between top management and employees. It is too obvious that there are two sides to social media in the wake of the COVID outbreak. Young people use social media not only to brag about themselves but also to buy or search for goods and services (Subagja et al., 2022).

Small and Medium Enterprises (SMEs)

Small and medium-sized enterprises are significant contributors to the global economy because they provide jobs for a large number of people and foster innovation. SMEs are most relevant in developing countries than in any other developed countries. Statistics show that in developing countries, SMEs form over 90% of businesses and are mainly affected by gross domestic product (GDP) (Ogundana et al., 2017). So as a developing country, Bangladesh is also fully dependent and relevant to the SMEs sector than any other business or commerce. Small and medium-sized businesses (SMEs) constitute the single-largest industrial sector of the Bangladeshi economy, claims (Md. Rahat Hossain, 2016) In Bangladesh, SMEs make up over 90% of the manufacturing and service sectors. SMEs contribute 25% of the nation's GDP and 30% of all employment, with small businesses contributing 27% and medium-sized businesses the remaining 3%. (The daily star, 2020). According to these statistical studies, it's been called the SMEs sector is the most valuable sector than any other business sector in any country. But nowadays the SMEs

sector is affected by various problems also it's difficult to compete with large companies/businesses. According to Karakaya and Shea (2008), it is crucial to convince SMEs to utilize social media as a source of competitive advantages.

In this modern age, small businesses have the most eligible opportunity to access the large market by using IT technology (Dutot et al.,2014). One of the most important IT technology platforms for SMEs is social networking. Customer information sharing and content creation are made easier by social media (Kim & Johnson, 2016). People use a variety of social media platforms, including Facebook, Twitter, Instagram, TripAdvisor, online forum rating, and review forums, to share their experiences and communicate with other customers, according to Chen et al. (2011). Social media attract customers by giving product/service information about which they are going to purchase and increasing their buying

intention of customers (Hajli, 2013). Additionally, social media serves as a conduit of communication for businesses to accomplish a range of SMEs goals, including those related to marketing, public relations, advertising, branding, customer service, human resources, and problem-solving (Kim & Park, 2013; Nisar& Whitehead, 2016). As a result, social media has gained popularity as a medium for companies to engage with a lot of potential clients and grow their brands (Schaupp& Belanger, 2013). Social media is specially and logically suitable for SMEs because of its varieties benefits such as its minimum cost, technical ease of use, and low barriers to participation (Derham et al.,2011). So, SMEs manager adopts social media for their firm profitability and customer satisfaction. Nowadays, a lot of SMEs think they "must" use social media (Durkin, 2013).

SMEs Performance

SME performance refers to the company's noteworthy outcomes in terms of investment effectiveness, strategy effectiveness, customer happiness, market share growth, growth, and returns, which are generated by engaging in a complicated series of actions that assimilate skills and information (Hoque et al., 2017). Utilizing social media has become standard in businesses of all sizes and types (Zhang et al., 2017). When it comes to consumer interactions, inquiries, and the development of customer connections, social media has a significant impact on small businesses in the digital world according to Becker et al. (2012), SMEs can perform better by using social media as an integrated, interdependent resource. Without question, firms are becoming more competitive, regardless of their size or nature. Firms need more reliable and provide the best service to customers. But lack of resources SMEs can't compete with large companies. At that time social media gives the power to SMEs to satisfy customer needs and demands easily without extra manpower or resources. By giving online and social network services SMEs enhance their performance.

SME performance in the digital world relies more on social media than any other business content when it comes to resolving a variety of consumer inquiries and fostering customer relationships (Ali Qalati et al., 2020). Therefore, the authors (Becker et al., 2012) believe that SMEs use social media as a connected collection of strategic resources to perform better. Several studies have identified a favorable correlation between social media adoption and company performance, and others have indicated advantages to corporate social media use (Ainin et al., 2015; Paniagua and Spend, 2014; Parveen et al., 2014; Rodriguez et al., 2012;). According to Kim and Lee (2013), the adoption of Web 2.0 technologies, which include social media, is accelerating in the context of SMEs. SMEs must utilize social media after researching several ideas and data because these platforms are the best ways for businesses to strengthen their ties with customers globally and gain insightful feedback without having to raise additional funds (Vlachvei and Notta, 2014). Table 1 summarizes some important literature containing social media adoption and SME performance.

Table 1: Literature review				
Author	The objective of the study	Social media/industry	Variables used	Findings of the study
Ainin et all,2015	Examine the factors influencing Facebook usage among (SMEs)	Facebook	Compatibility, cost-effectiveness, and interaction	A favorable effect on SMEs' financial and non-financial performance.
Tajvidi, R., &Karami, A. (2021).	To look into how social media affects businesses that act as middlemen for marketing opportunities in the UK hotel sector.	Online forums, rating and review sites, Facebook, YouTube, Wikipedia, Twitter, TripAdvisor	Customer ratings and comments on various social media sites.	The purchasing and decision-making behavior of potential guests can be positively influenced by hotels

				through social media.
Ali Qalati et al,2020	Addressing a number of research problems, including how much the performance of small and medium-sized enterprises is improved by the successful application of SM.	Facebook, WhatsApp, Twitter.	Customer retention, brand awareness and purchase intent, and online word-of-mouth are all factors in consumer purchasing decisions.	The findings imply that SM significantly affects SME performance.
Wu He et al,2015	This study aims to examine how and why small, non-manufacturing businesses use social media for commercial purposes.	Facebook and Twitter	social exchange theory, social capital theory, and word of mouth	SM substantially boosts brand recognition, sales, customer satisfaction, and marketing initiatives.
FossoWamba, S., and Carter, L. 2014.	In order to close this information gap, this study looks at how SMEs are using social networks.	Facebook	Firm size, manager age, industrial sector, and company innovation	The adoption of new technology is significantly impacted by how innovatively a company is.
Stockdale et al, 2012	How the adoption of SM can benefit small enterprises commercially.	Web 2.0	Business worth and social media Using mindfulness to interact with consumers	SMEs see excellent outcomes from implementing and utilizing social media.

Discussions and Implications

People are using social media more frequently every day, and they are growing more and more dependent on it. Social networking sites like Facebook, Instagram, Twitter, and others are the most popular ones that people utilize these days when using the internet for other, more significant objectives. According to the literature, social media use in SMEs has a significant impact on these kinds of firms. A manager who is attempting to embrace new technology in their organization will also have a positive attitude toward adoption. FossoWamba and Carter (2014) claim that SMEs who are open to new concepts and innovation support the use of social media. In addition to being new and youthful, managers have good intentions because they are aware of the scenario at hand as well as the numerous needs and demands of clients for the company. Again, the use of social media is significantly impacted by size. Compared to smaller SMEs, these bigger SMEs are more likely to choose social media adoption. Because small SMEs don't have a large customer chain or great potential, they don't need social media to boost sales instead of traditional business communication. While larger SMEs can invest in some of the most popular social media acquisitions because they have more workers, client chains, and prospects, as well as a greater budget. Because reaching customers using Facebook, Instagram, LinkedIn, and Twitter is easy and budget-friendly. Large or multinational companies can reach and communicate with customers both through social media and directly but SMEs cannot due to a lack of capital. In the literature review, the finding also shows the same as discussed above. This means that the new and innovative SME manager adopts usable social media for his organization to offer the same service as a large organization.

The implications of the research results for SMEs have been shown to add significant value to the organization by preserving social media. Especially after the Covid-19 pandemic, the SME manager understood that Web 2.0 is the future to survive in the existing market. Hence, they take on social media and use it from their perspective, providing the best service to the customer and attracting potential customers. There are many practical implications in literature research. By adopting social media, SME managers can save various costs, e.g., by using digital technological apps or websites, they can create lots of informative content and publish it on their Facebook and other social media page to attract potential

customers. Also, by controlling the site, they can share and communicate with customers without much expense, as is common in other traditional advertising mediums such as newspapers and television. And the most important implication of the finding above is that SMEs can increase their performance by using social media sites or pages in the right way. You only need one or two specialists or part-time moderators to run the entire social media page and enrich it with special and new ideas or content useful to consumers. The process lowers their costs and increases overall performance compared to large and multinational companies that have enormous manpower, capital, and a personal network with consumers.

Conclusion

The study investigates how social media usage affects SME performance. The finding shows how and why adoption is important for SMEs. For how social media will be used and the effects it will have on the organization, the business author or manager needs to have a clear vision and plan. The study demonstrates that the Covid-19 epidemic also adds value to social media adoption for all sorts of corporate organizations, particularly for SMEs that lack the resources (money and labor) to carry out all operations or to materialize new concepts or innovations. Here, the SME manager easily understands the positive impact of social media, which can reduce costs, increase brand equity for consumers, and enable the closing of contracts with consumers after and before purchasing a product. Also, by introducing social media, they can implement marketing camping and also keep a good relationship with the stakeholders. This study has some limitations because it is about the use of social media in SMEs, however not all SMEs necessarily need social media in their organization. The future researcher can follow other steps by choosing different types of SMEs to measure perfectly who needs this more and who needs it less. Finally, compared to smaller and medium-sized businesses, social media has a big impact on them. The management of a small firm must utilize social media as well as communication and marketing tools to increase performance and business growth due to a limited budget and other issues.

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Continuous Online Shopping Intention of Generation Z Using a Structural Equation Modeling Approach

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Abstract

People in Generation Z, compared to adults, prefer to shop online because they perceive that online shopping is more convenient. This study aims to determine key factors that influence the continuous online shopping intention of Generation Z. To do this, we develop a research model with the concept of responsiveness, reliability, pay-on-delivery method, trust, and service quality. We used structural equation modeling (SEM) to evaluate data collected through an online survey of 306 participants who are members of Generation Z. The results of this study show that responsiveness, reliability, and pay-on-delivery method significantly influence trust and service quality, which influence continuous online shopping intention. The findings of this study open new ways aimed at more studies on this topic of online shopping intention. This study also highlights the importance of reliability, responsiveness, pay-on-delivery mode, service quality, and trust in determining the continuous shopping intention in the context of Generation Z.

Keywords: Continuous shopping intention, Generation Z, Structural equation modeling, Trust, Service quality, Bangladesh

1. Introduction

Online shopping is buying goods or services from online shopping platforms as opposed to traditional shops or stores. Online shopping is expanding very fast and influencing traditional businesses. Online retailers are frequently open 24 hours a day, and many customers have access to the internet both at work and at home. Some online vendors include extra product details, such as guidelines, warnings, expressions, or producer descriptions, or they specify links to them. They also provide context information, advice, or how-to guides to help customers make purchasing decisions. In online shopping platforms, we can find sellers of a specific product and make price comparisons online. Another benefit of buying online is the ability to swiftly look for discounts for goods or services offered by a variety of sellers (though some local search engines do exist to help consumers locate products for sale in nearby stores). Although this sector is experiencing exponential development, online shopping platform has a lot of room to grow.

Online shopping has become a popular term in Bangladesh with the invention of the internet and digital transformation. Online e-commerce facilitators crack technology and bring excellent concepts into play for attracting online shoppers. Bangladeshi people are starting to comprehend the benefits of being able to buy and sell products online. El Khatib & Khan (2019) argued that there are some critical factors behind the success of the online business, such as a large selection of options, better prices, no sales pressure, and more diversity. Due to its convenience, online purchasing is currently popular with customers, particularly Generation Z.

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Generation Z, often known as Gen Z, is the group of people that succeeds the Millennial generation. It encompasses individuals who were born between the years 1997 and 2010 (Tirocchi et al., 2022). Future research on online shopping might concentrate on the baby boomer or Generation Z. Generation Z is currently quite accustomed to advancing technologies. Members of Generation Z are expected to be the generation that shapes e-commerce consumer behavior in the near future year. Therefore, analysis and identification of the determinants that influence people's intention to purchase continuously online are crucial. Each individual or group of consumers must make decisions about a product line, service, idea, or activity as a series of decisions about what, why, when, where, how much, and how often they buy (Tandon, 2021). Consumers exhibit behavior when selecting and purchasing products, using available resources to meet their needs and desires. Consumer behavior research aims to explain why, when, and how consumers decide to purchase products and select brands. In this study, our focus is mostly on Generation Z from Bangladesh's perspective. The purpose of this study is to identify the factors that influence people in Gen Z toward continuous online shopping intention. This study focused on the dependent variable, Gen Z's continuous online shopping intention. We perceived that reliability, responsiveness, and pay-on-delivery mode positively influence the service quality and the level of trust, and then Gen Z's level of trust and perception towards service quality influenced the continuous online shopping intention of Gen Z. The higher the level of trust and service quality perception of Gen Z, the higher the continuous online shopping intention of Gen Z. This study will help businesses and retailers on e-commerce platforms improve the quality of their products and services, thereby increasing the efficiency of their business.

2. Literature Review and Hypothesis Development

Numerous studies were conducted to evaluate the factors that influence the adoption of new technologies. These works can be divided into two distinct categories. As a dependent variable, one group of researchers examines the adoption of new information technology by investigating the intention to use it. Another group of researchers evaluates the efficacy of newly implemented systems at the institutional level, as well as the compatibility of the technology with the intended tasks. Numerous researchers, including Compeau & Higgins (1995); Davis (1989); Goodhue & Thompson (1995); Leonard-Barton & Deschamps (1988); Venkatesh et al. (2003) have conducted these investigations. Within the area of technology acceptance, various theories have gained popularity among researchers. These include the theory of planned behavior (TPB), innovation diffusion theory, theory of reasoned action, technology acceptance model (TAM), theory of innovation adoption, motivational model, combined TAM and TBP (C-TAM-TBP), model of pc utilization, and social cognitive theory (Venkatesh et al., 2003). The Unified Theory of Acceptance and Use of Technology (UTAUT) is a contemporary theoretical framework that integrates the key elements from eight preexisting theories as demonstrated in a study conducted by Venkatesh et al. (2003). Almaiah et al. (2016) expanded upon the Technology Adoption Model (TAM) by including the "DeLone and McLean" model in order to get insights into the factors influencing students' adoption of new technology, mobile learning. Also, Alshurideh et al. (2019) integrate two prominent theories, TAM and the Expectation-Confirmation Model (ECM) to identify the key drivers influencing the acceptance of mobile learning systems. In this study, we consider two relevant constructs of the SERQUAL model, reliability, and responsiveness, with the concepts of pay-on-delivery mode. We perceived that reliability, responsiveness, and pay-on-delivery mode positively influence the level of service quality and trust perception, thereby, influencing the continuous shopping intention. The following sections describe the hypotheses used in the proposed research model and empirical findings and results.

2.1 Reliability

Reliability refers to the capacity to accurately and dependably fulfill the service commitment. Reliability has two components: the first is the dependability of website features like the search engine, payment methods, etc. (Ibrahim et al., 2006). The other signifies the validity of the website's promises on services, finances, products, and other pertinent information. The reliability dimension includes the following items: the company can deliver on its promises to customers in a timely manner; the company cares about and assists customers in times of need; the company is dependable; the company can deliver the promised services accurately; and the company can accurately record the pertinent data (Kamel et al., 2021). Users in electronic commerce in Libya argued that the "reliability dimension" has a direct and positive impact on the perception of service quality (Omar et al., 2015). Besides, Ismail et al. (2009) did a study to find out how the reliability dimension affects the level of service quality. They found a strong relationship between the reliability dimension and service quality. The reliability of the services significantly influences trust (Chou & Kohsuwan, 2019). Besides, customer trust may be achieved by surpassing consumer expectations by firms, which can be accomplished through upholding commitments and cultivating robust exchange relationships between customers and organizations. They also argued that responsiveness significantly affects customer trust. Accordingly, we develop the following hypotheses.

H1: Reliability positively influences service quality.

H2: Reliability positively influences trust.

2.2 Responsiveness

Responsiveness means being eager to assist clients and quickly raise the bar for service (Bouzaabia et al., 2013). One of the SERVQUAL dimensions, responsiveness, contains the following components: providing services on time; offering correct service times; having staff members who are always willing to assist clients; and having staff members who can respond quickly to client needs. Customers may turn to online services for assistance when they run into issues or challenges (Rita et al., 2019). As is common knowledge, online customer support interactions can take place before, during, and after transactions. Customers' ability to get the help they need during these processes depends entirely on the company's willingness to help (Choi et al., 2019). Customers' ability to get the help they need during these processes depends entirely on the company's willingness to help. The following are some of the things that make up the responsiveness dimension: the customers have a clear goal when they contact customer care; the customer service can promptly address problems; the customer service staff responds promptly to inquiries (Zaman et al., 2020). The evaluation of service quality will be significantly impacted by how quickly customers receive assistance. Yen & Lu (2008) argued that responsiveness is one of the key constructs in predicting e-service quality. In addition, it was found that responsiveness had a significant role in shaping the overall examination of service quality (Andaleeb & Basu, 1998). Lanin & Hermanto (2019) argued that effective and prompt service establishes a fundamental basis of trust among customers. Gao & Bain (2014) conducted a study where they determined a significant positive relationship between responsiveness and trust. Accordingly, the following hypotheses were formulated.

H3: Responsiveness positively influences service quality.

H4: Responsiveness positively influences trust.

2.3 Pay on delivery mode of payment.

Pay on delivery (POD) is a mode of payment that allows customers to pay for goods or services upon delivery. It is a popular mode of payment for online shopping in developing countries where traditional payment methods like credit and debit cards are not yet widely adopted (Akter, Khatun, & Rahman, 2021). Research has shown that POD is perceived to be more secure than online payments as customers can inspect the goods before making the payment. POD has been found to increase the likelihood of customers making a purchase online, especially for first-time customers who are not familiar with the

seller (Gao & Bai, 2014). The use of a pay-on-delivery system may be advantageous in mitigating the inherent uncertainty associated with online transactions (Xu et al., 2017). They also mentioned that the pay-on-delivery option is very appealing due to its ability to enhance service quality by alleviating concerns related to returns, refunds, and payment security. It has also been found to increase customer satisfaction and trust in the seller, which in turn leads to increased customer loyalty. Accordingly, we develop the following hypotheses.

H5: Pay on delivery positively affects service quality.

H6: Pay on delivery positively affects trust.

2.4 Service quality

Service quality is defined as the degree to which the performance provided by an organization aligns with the customer's expectations (Gurumoorthy & Sasirekha, 2021). This is the level at which provision happens or goes above consumer hopes. Acevedo & Lam (2016) argued that service quality encompasses not only the manner in which the personnel caters to their customers, but also pertains to the facilities and programs that are designed to support the activities in which customers are engaged. Service quality is a key factor in determining customer satisfaction, loyalty, retention, and intention. Service quality is extensively studied in multiple industries such as healthcare, hospitality, education, and banking (Desai, 2018). Service quality influences positively consumers' behavioral intention to use m-banking services (Abu-Taieh et al., 2022). Lee & Chung (2009) also identified the quality of mobile banking services as an external factor influencing customer acceptance. Accordingly, we develop the following hypothesis.

H7: Service quality influences continuous use intention.

2.5 Trust

Trust is an assured dependence in which the trustor and trustee work to satisfy one another and forge a close relationship (Wei et al., 2010). According to internet customers, trust was developed through technology transmission between people and websites rather than between people and people (Wei et al., 2010). According to Lai & Wang (2012), most customers were doubting the vendors' honesty throughout pre- and postal service, merchant authentication, and non-repudiation of defective goods. Moreover, the protection of personal information, declaration accuracy, and unauthorized access all contribute to distrustful behaviour (Luo et al., 2021). Customers' trust can be impacted by the explanation and veracity of the data that the underlying data approaches propose. As a result, increasing customer impression of trust increased their intention to engage in online buying, and they were prepared to bear any potential drawbacks or losses that came with it (Lai & Wang, 2012). Accordingly, we develop the following hypothesis.

H8: Trust influences continuous shopping intention.

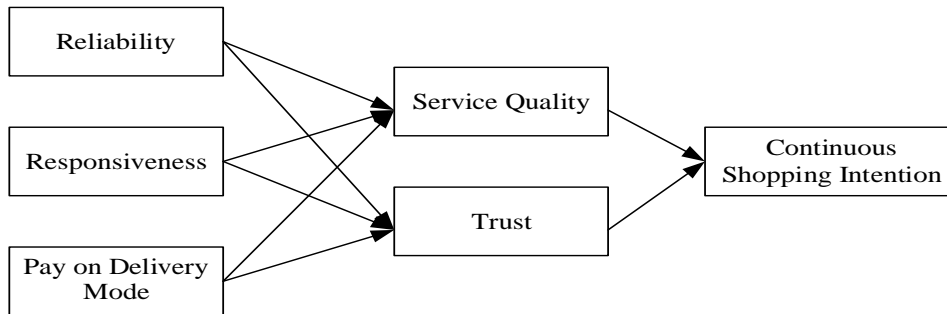


Figure 1: Research Model

3. Research Design and Methods

3.1 Measurement Instruments

The measurement items related to the latent variables included in our research model have been derived from prior studies, as seen in Table 1.

Table 1: Measurement Items

Constructs	Measurement Items	Sources
Reliability	REL1: I think online shopping keeps its promises to deliver a product or service. REL2: I think transactions with online shopping platforms are error-free. REL3: I believe online shopping platforms deliver products and services accurately.	(Mohammed, 2014)
Responsiveness	RES1: I think online sellers give prompt service. RES2: I think the online seller is always willing to help customers. RES3: I think the online seller keeps customers updated on the product's status.	(Tung, 2022)
Service quality	SQ1: I think online shopping platform provides dependable services. SQ2: I think online shopping platform provides services at times it promises. SQ3: I think online shopping platform gives prompt service. SQ4: I think online shopping platform is responsive.	(Rita et al., 2019)
Pay on delivery (POD) mode of payment.	POD1: I think POD is a reliable mode for payment. POD1: I plan to pay through POD mode of payment. POD3: I prefer to buy through POD mode of payment. POD4: I think POD mode of payment facilitates the easy	(Tandon, 2021)

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	return of defected products. POD5: I think POD gives me confidence for the future repurchase of products.	
Trust	TR1: I believe online shopping is reliable. TR2: I believe the features of online shopping meet my needs. TR3: I am clear on what to look ahead from online shopping. TR4: Overall, I believe online shopping is trustworthy.	(Armilawati et al., 2020)
Continuous shopping intention	CSI11: I intend to buy products again using online shopping platforms in the future. CSI2: I predict I will continue using online shopping in the future. CSI3: I plan to continue using online shopping in the future.	(Tung, 2022)

3.2 Samples and Procedure

A self-administrated questionnaire was developed to collect empirical data through an online survey form. The researchers used a convenience sampling method. To collect empirical data, a convenience sampling method was used. Convenience sampling is a method of non-probability sample selection that involves collecting evidence from people in the population who are readily available. And it's most employed in the early stages of a research project (Edrisi et al., 2020). The survey contains 22 measurement items used to measure latent constructs. We used Google Forms as our data collection tool. Data from Google Forms was downloaded and transferred to Smart PLS version 3 for data analysis. The questionnaire had three parts. Part 1 briefly explained the purpose of this survey and assured respondents that researchers would keep their responses confidential and that their responses would only be used for survey purposes. Part 2 asks demographic questions (age, gender, education, marital status, occupation, family income). Part 3 contains measurement questions for latent constructs. The measurement questions used a 5-point scale of (1) Strongly disagree, (2) Strongly disagree, (3) Neutral, (4) Agree, and (5) Strongly agree. We used 306 samples for analysis.

3.3 Analysis

In this study, descriptive statistics were utilized to summarize the demographic factors. We used structural equation modelling for data analysis. We downloaded survey data from Google Forms into Microsoft Excel. For demographic analysis, we used SPSS 16.00 and we also used Smart PLS version 3 for measurement model and structural model.

4. Result

4.1 Demographic Information

The results show that 94.5 percent of the people who answered were between the ages of 20 and 25. The sample consists of 55.60% of men, while 44.40% were women. Furthermore, most of the respondents are unmarried (73.50%). Also, bachelor's degree level dictated the respondents (57.50%), while the master's degree level respondents were only 29.10%.

Table 2 Demographic Information

Items	Variables	Frequency	Percentage
Gender	Male	170	55.6
	Female	136	44.4
Education	SSC	2	.70
	HSC	39	12.7
	Bachelors	176	57.5
	Master's	89	29.1
Marital Status	Single	225	73.5
	Married	81	26.5

Table 2 Demographic Information (Continue)

Items	Variables	Frequency	Percentage
Occupation	Service holder	15	4.9
	Businessman	39	12.7
	Housewife	22	7.2
	Student	230	75.2
Age	Under 20	20	6.5
	20-25	286	93.5
Family Income	5,000-10,000	83	27.1
	10,001-20,000	59	19.3
	20,001-30,000	70	22.9
	30,001-40,000	39	12.7
	40,001-50,000	34	11.1
	Above 50,000	21	6.9

Table 2: Collinearity Statistics (VIF)

Constructs	CSI	POD	REL	RES	SQ	TR
CSI						
POD					2.503	2.668
REL					2.946	3.380
RES					3.240	3.561
SQ	2.673					3.238
TR	2.673					

Note: *Continuous Shopping Intention*; *POD: Pay on delivery mode*; *REL: Reliabilities: Responsiveness*; *SQ: Service Quality*; *TR: Trust*

4.2 Measurement Model

The fact that factor loadings were more than 0.70 indicates that latent variables were reliable (Edrisi et al., 2020). The connection between the factor and the item is assessed by the factor loading; a factor

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loading of excessive than 0.30 usually signifies a moderate connection relating factor and the item. In this study, most of the measurement items are more than 0.70 which indicates that the items and latent variable have adequate reliability. Previous study shows $\alpha > 0.9$ represents very good reliability, $0.70 < \alpha < 0.90$ means high reliability, $0.35 < \alpha < 0.70$ refers to medium reliability and $\alpha < 0.35$ represents low reliability (Nunnally, 1978). A value beyond 0.70 represents the reliability of sample data passing the test. Cronbach's alpha coefficient for individual variables in this analysis is above 0.70, which is in line with the test standard; as a result, the test result shows that each scale is quite reliable. Like Cronbach's alpha, composite reliability measures the internal consistency of scale components. It is referred to as construct reliability (Netemeyer et al., 2003). As a result of these findings, we may draw the conclusion that all research variables satisfy the internal reliability as well as the composite reliability, as indicated by the composite reliability coefficient of > 0.70 . A minimum AVE of 0.50 is strongly advised. The value of all AVEs is above 0.50, which is good, and an AVE smaller than 0.50 indicates that items explain more errors than the variance in the construct. Discriminant validity is examined by the approach of Fornell & Larcker (1981). Table 4 shows that the estimated square roots of AVE were higher than the association values with other factors. So, these results show that the discriminant validity is good.

Table 3: Measurement Model

Constructs	Items	Loadings	Cronbach's alpha	CR	AVE
Continuous shopping intention	CSI1	0.887	0.853	0.911	0.772
	CSI2	0.864			
	CSI3	0.886			
Reliability	REL1	0.889	0.847	0.907	0.766
	REL2	0.872			
	REL3	0.863			
Responsiveness	RES1	0.858	0.791	0.878	0.705
	RES2	0.811			
	RES3	0.850			
Pay on delivery (POD) mode of payment	POD1	0.843	0.898	0.925	0.772
	POD2	0.819			
	POD3	0.872			
	POD4	0.824			
	POD5	0.855			

Table 3: Measurement Model (Continue)

Constructs	Items	Loadings	Cronbach's alpha	CR	AVE
Service Quality	SQ1	0.849	0.780	0.872	0.695
	SQ2	0.834			
	SQ3	0.816			

Trust	TR1	0.849	0.882	0.919	0.739
	TR2	0.854			
	TR3	0.302			
	TR4	0.289			

Note. AVE = average variance extracted; CR = composite reliability

Table4: Correlation matrix and square root of the AVE

	CSI	POD	REL	RES	SQ	TR
CSI	0.879					
POD	0.777	0.843				
REL	0.758	0.717	0.875			
RES	0.760	0.747	0.790	0.840		
SQ	0.767	0.723	0.777	0.773	0.833	
TR	0.851	0.792	0.797	0.808	0.791	0.860

Note: CSI: Continuous Shopping Intention; POD: Pay on delivery mode; REL: Reliability; RES: Responsiveness; SQ: Service Quality; TR: Trust

4.3 Structural Model

The relationships of constructs used in theoretical models can be evaluated by structural models. In this study, we used bootstrapping to assess the hypothesis at the 5% significance level. Additionally, the relationship between dependent and independent variables was examined using path coefficients (β) and t-statistics. Table 5 shows the direct path hypothesis results, including the t-statistics, p-values, and developed hypothesis status, including the path coefficients (β), t-statistics, and developed hypothesis status. POD and SQ, ($\beta=0.226$; t-statistics=3.643; P-value < 0.00. POD and TR; $\beta = 0.290$; t-statistics = 4.789; P-value < 0.00. REL and SQ, ($\beta=0.366$; t-statistics=5.105; P-value < 0.00. REL and TR, ($\beta=0.230$; t-statistics=3.447; P-value < 0.001. RES and SQ, ($\beta=0.315$; t-statistics=4.211; P-value < 0.00. RES and TR, ($\beta=0.245$; t-statistics=5.629; P-value < 0.00. SQ and CSI, ($\beta=0.249$; t-statistics= 4.556; P-value < 0.00. TR and CSI, ($\beta=0.214$; t-statistics= 12.615; P-value < 0.00 were significant. Thus, all the hypotheses are supported.

Table 5: Structural Model

Path	B	t- Statistics	p-Value	Comments
H1: REL -> SQ	0.366	5.105	0.00	Supported
H2: REL -> TR	0.230	3.447	0.001	Supported
H3: RES -> SQ	0.315	4.211	0.00	Supported
H4: RES -> TR	0.245	5.629	0.00	Supported
H5: POD -> SQ	0.226	3.643	0.00	Supported
H6: POD -> TR	0.290	4.789	0.00	Supported
H7: SQ -> CSI	0.249	4.556	0.00	Supported
H8: TR -> CSI	0.214	12.615	0.00	Supported

Note: CSI: Continuous Shopping Intention; POD: Pay on delivery mode; REL: Reliability; RES: Responsiveness; SQ: Service Quality; TR: Trust; Significant at $p < 0.05$

4.3 Predictive relevance

The coefficient of determination, often referred to as R-Square, quantifies the proportion of variability in the dependent variable that can be accounted for by the independent variables included in the model. The result of this study shows that R^2 for CSI, SQ, and Trust were 0.748, 0.691, and 0.780, respectively. These values suggest that the model has a strong ability to explain the observed data.

Table 5: R square

Constructs	R square	R square adjusted
Continuous Shopping Intention	0.748	0.746
Service Quality	0.691	0.688
Trust	0.780	0.777

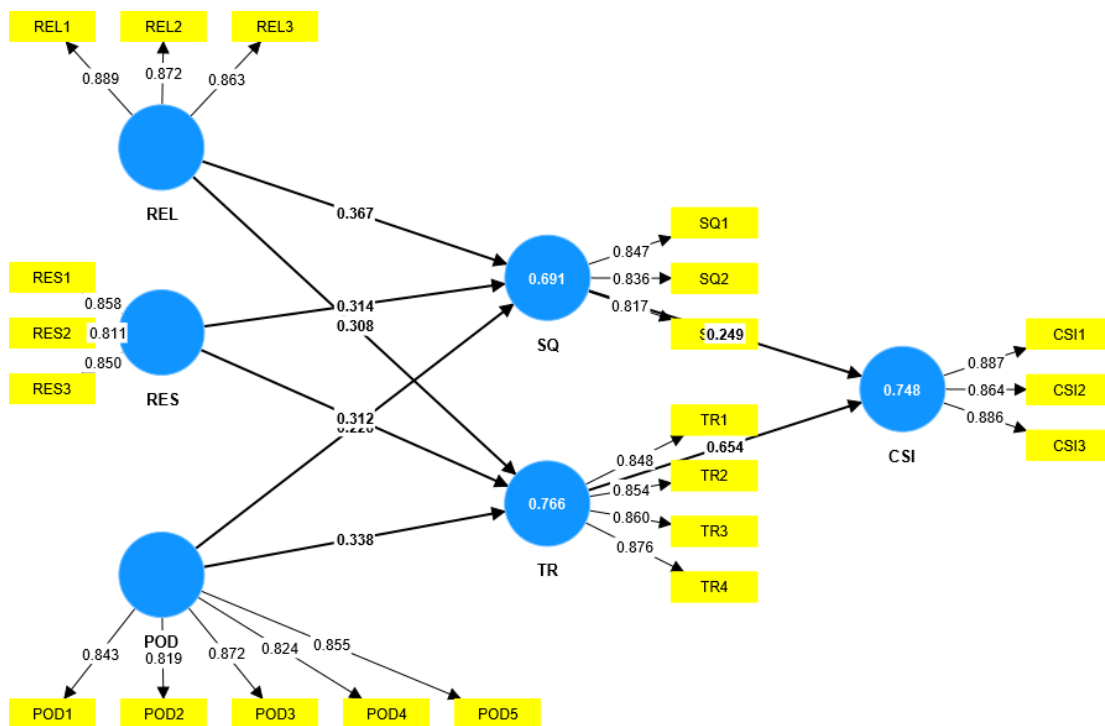


Figure 2: Empirically Validated Model

5. Discussion and Implications

This research initiative developed a conceptual research model in the context of online shopping. The model integrates the concepts of reliability, responsiveness, pay-on-delivery mode of payment, service quality, and trust towards the continuous online shopping intention of Generation Z. The results

show that service quality and trust have favorable impacts on continuous online shopping intention. Moreover, this study confirmed that service quality and trust are significantly influenced by reliability, responsiveness, and pay-on-delivery mode of payment. Therefore, reliability, responsiveness, and pay-on-delivery mode of payment, from an experienced user would influence the service quality and trust factors of the continuous online shopping intention of generation Z. This finding is consistent with Hoffman et al. (1999). Service quality intermediates the correlation relating to reliability then continuous shopping intention. Following that finding revealed that responsiveness has a beneficial impact on service quality. Customers' views regarding online purchases are impacted by their impressions of online sellers. The findings of this study may aid online businesses in better understanding their consumers' expectations and the variables that impact their choices. By being aware of the key aspects that should impact online shoppers' opinions toward shopping online. Online sellers would be able to more efficiently and successfully create and execute their e-business strategy, giving them a competitive advantage. By appreciating the important factors that should influence online shoppers' intentions regarding online purchasing, online sellers would be able to more efficiently and successfully create and execute their e-business strategy, providing them with a strategic advantage. To build, develop, and maintain their competitive position, online retailers, for example, should focus more on service reliability, responsiveness, and simplifying payment on delivery options. Furthermore, the hosting company may use these results to increase the features and capabilities of the online shopping website, assisting online vendors in organizing and managing their activities effectively and efficiently.

6. Theoretical Contribution

The work has made important theoretical contributions to the information systems literature, particularly in the following areas: service quality model and online shopping. The service quality model aims to capture and analyze consumer expectations and perceptions of the service. This elaborate model helps bridge the gap between customer expectations and needs. The research model adds the concept to the existing model, responsiveness, service quality and reliability. We also add a new dimension payment-on-delivery mode. Previous studies show a direct relationship between dimensions of service quality and intention to use or continuous use intention. However, we developed and validated that reliability, responsiveness, and pay-on-delivery model significantly influence the level of trust and overall service quality, which influences the continuous shopping intention of Generation Z. Therefore, this model helps researchers and practitioners to understand the behavioral patterns of people in Generation Z who expect to shop online that can appeal researchers to running further research.

7. Limitations and future direction

First, since most of them were from the academic community, the results might not accurately reflect the complete range of opinions, attitudes, and intentions toward online shopping. The second drawback is that responders cannot communicate with one another because the data is collected online. And as a result, some questions may not be understood correctly, and vice versa. Despite having a worldwide view and growing online purchasing demand, the sample size should be substantial. However, the n in this article (306 respondents) is low because we only have a little amount of data. Large data sets should be used for future study. Future studies might include more age groups with diverse and rich cultures that may differ from one another. Researchers in the future will be able to study not only "Generation Z," but also other generations. Older folks can be studied because they don't regularly utilize the internet. So, they can be samples for future research.

8. Conclusion

This study contributes to the continuous online shopping intention by integrating different variables from SURVQUAL model variables (Reliability, responsiveness, service quality) and other variables, pay on delivery and trust among Generation Z. We have found that all variables significantly affect online

shopping intention which means all hypothesis are accepted. Whenever people get good services in the case of online shopping, they tend to shop online again. Online shopping may accept cash on delivery because most internet shoppers struggle to use online payment methods like credit and debit cards and are unfamiliar with electronic payment systems. Because in Bangladesh most customers prefer cash on delivery over an electronic payment system. Furthermore, the research has identified the importance of trust and reliability in online shopping for Generation Z. Companies that prioritize transparency and security in their online transactions and customer data management are more likely to earn the trust and loyalty of this generation.

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Forecasting of Fish Production in Bangladesh using Autoregressive Integrated Moving Average (ARIMA) Models

Apurba Roy¹, and Sudipa Basu²

Abstract

Fisheries sector plays a significant role in the national economic development of Bangladesh. The objective of the study was to model and forecast inland open water (capture), inland closed water (culture), and marine fish production based on annual time series data reported by the Bangladesh Bureau of Statistics (BBS) from 1984 to 2019. The study has considered the Box–Jenkins method of Autoregressive Integrated Moving Average (ARIMA) approach to forecasting fish production from 2020 to 2029. The best-fitted models were ARIMA (1,1,0) for inland open water (capture), ARIMA (1,1,0) for closed water (culture), and ARIMA (0,1,1) for marine fish production based on AIC and BIC model selection criteria. The forecasted value of inland open water (capture), inland closed water (culture), and marine fish production showed an increasing trend from 2020 to 2029. The study's findings draw policymakers' attention to the necessary steps for utilizing the potential fisheries resources of the country.

Keywords: ARIMA, Fish Production, Time Series, Forecast, Bangladesh.

INTRODUCTION

Fish plays a significant part in the world's food and nutritional security due to its valuable sources of essential nutrients. Bangladesh has many rivers, ponds, canals, and other bodies of water along with the Bay of Bengal. For many people worldwide, fish is a substantial source of animal protein. Fish are an abundant supply of high-quality protein, a variety of minerals, and fatty acids required for proper human brain development. Through the annual consumption of 18.1kg of fish per person in Bangladesh, more than 60% of animal protein is derived from fish (Belton & Thilsted, 2014). Due to its geographical location, plenty of inland waters, river systems, large territory in the Bay of Bengal, and efficient management, Bangladesh's fisheries sector is supported to a great extent, and its fish production rate is progressively rising day by day (Shamsuzzaman et al., 2017). As a large agriculture subsector, fishing has contributed significantly to improvements in the nation's nutritional status, employment rates, and foreign exchange revenues, among other things. The total fish production mainly comes from three primary sources: inland open water (capture), inland closed water (culture), and marine in Bangladesh. Inland open water fishing areas cover rivers & estuaries, Sundarbans, *beels* (wetlands), Kaptai Lake, and floodplain, whereas inland closed-water areas consist of ponds, and seasonal cultured water bodies, *baor*, shrimp/prawn farms, crab farms, pen culture, and cage culture. The marine fisheries include industrial fisheries (Trawl) and artisanal fisheries. In the fiscal year 2018-19, a total of 12,35,709, 24,88,601, and 6,59,911 Metric Tons of fish were produced from inland open water (capture), inland closed water (culture), and marine fisheries, respectively (BBS, 2020).

Fish production is increasing, which is crucial for sustaining Bangladesh's national economy. The fisheries sector contributes around 3.52 percent of the country's GDP and 26.37 percent to agricultural output in the fiscal year 2019-20 (DoF, 2020). In addition, almost 1.3 million women and 17 million men directly depend on farming, harvesting, processing, and managing fish in more than 100 fish processing companies (Bangladesh Foreign Trade Institute, 2016). In the fish processing industry, women comprise almost 85% of the workforce (DoF, 2015). Sound future planning is required to fulfil the growing

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demand for fish in the country's population, boost the national economy, and increase revenue from the fishing industry. This planning is highly beneficial in predicting the future movement of fish output (Haque et al., 2005).

The modeling and forecasting of fishery time series data can be performed using different mathematical and statistical techniques. Box Jenkin's Autoregressive Integrated Moving Average (ARIMA) approach is a powerful and widely used method because of minimum forecasting error. Another advantage of the ARIMA model is that the model possesses the same properties as typical time series models, including autoregressive (AR) and moving-average (MA) models, along with the seasonal and cyclic components (Box et al., 2015). ARIMA model has several stages, including model identification and estimation, diagnostic analysis, and forecasting. Different statistical tools are applied in each stage to check for errors and make forecasting efficient. The application of the ARIMA model for time series forecasting has been growing in fisheries recently. Yadav et al. (2020) used the ARIMA model to forecast fish production in Assam, one of the northeastern states of India. Besides, ARIMA modeling has also been used to forecast marine fish production in Odisha (Raman et al., 2017) and inland fish production in Tamilnadu, India (Sankar & Vijayalakshmi, 2016). Selvaraj et al. (2020) have applied ARIMA modeling to forecast the Seer fish and Mullet landings in the Colombian Pacific Ocean. Haque et al. (2005) have also predicted Bangladesh's total inland and marine fish production from 2000-01 to 2004-05 using the ARIMA model. Tsitsika et al. (2007) also used the ARIMA model to forecast the monthly pelagic fish production in the Mediterranean Sea during 1990-2005

Research Gap

So far, based on the literature review, we are unaware of any research on modeling and forecasting fish production from inland open water, inland closed water, and marine sources in Bangladesh. We found similar research undertaken by Haque et al. (2005) focused on forecasting fish production from total inland and marine sources. The novelty of our study compared with the existing one is that our research has used recent time series data from 1984 to 2019 and predicted the fish production from 2020 to 2029, adding new knowledge to the current literature. In this research, we examine the historical data of fish production in Bangladesh over a period of 35 years using univariate time series analysis. Univariate time series data focuses on a single variable measured at regular intervals. It is used when there is only one variable of interest. Time series analysis investigates how a variable changes over time. Univariate time series analysis explicitly analyzes and predicts a variable based on its previous values and error terms.

Research Objective

The main objective of this study is to develop an ARIMA model for forecasting fish production in Bangladesh. The specific aim of the study is to develop an Autoregressive Integrated Moving Average (ARIMA) model for fish production from inland open water, inland closed water, and marine sources in Bangladesh.

Research Question

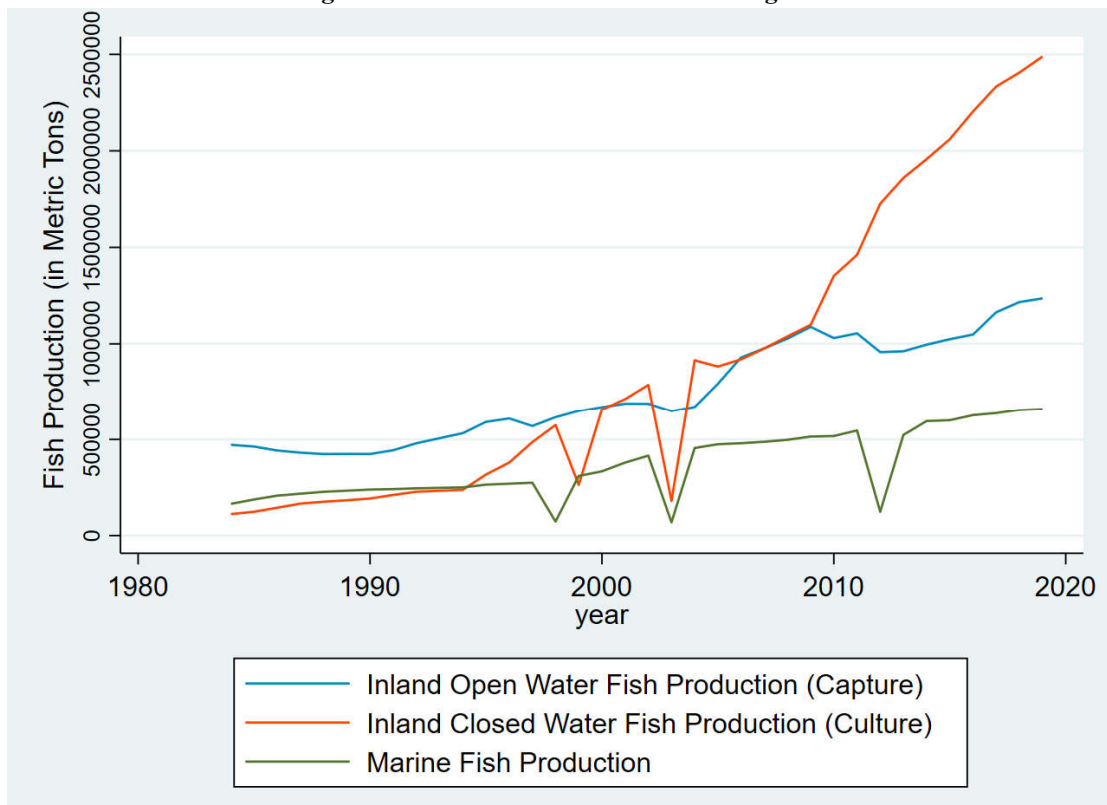
- i. What is the forecasted fish production from 2020 to 2029 from inland open water, inland closed water, and marine sources in Bangladesh?

METHODOLOGY

Data Source

We have used time-series data of fish production from inland open water fish production (capture), inland closed water fish production (culture), and marine fisheries (in metric tons) in Bangladesh from 1984 to 2019. We have collected data from the Statistical Yearbook Bangladesh published by the Bangladesh Bureau of Statistics (BBS) in different years (BBS, 2010, 2011, 2012, 2014, 2016, 2020). The dataset has been divided into two parts: the first covers data from 1984-2016 as a training dataset, and the second covers data from 2017-2019 as a testing dataset. We utilized the ARIMA model to forecast fish production from 2020 to 2019 using the training dataset with the help of the statistical software STATA₁₇.

Figure 1: Annual Fish Production of Bangladesh



The annual trend of fish production from three broad sources, namely, inland open water fish production (capture), inland closed water fish production (culture), and marine fish production, has been presented in Figure 1 from 1984 to 2019. It has been seen that fish production from inland open water fish production (capture) remained top until 2000. After 2000, inland closed water fish production (culture) became higher than the rest of the sectors. There have been ups and downs in fish production from inland open water fish production (capture) and marine fisheries sectors after the year 1998. The significant drops in fish production occurred in 1999 and 2003 from inland closed water fish production (culture), and the marine fisheries sector faced a significant decline in production in 1998, 2003, and 2013. For the rest of the year, there has been an upward increase in fish production from all three sectors. However, fish production from inland closed water fish production (culture) surpassed the other sectors after 2008, with annual fish production up to 1038473 metric tons.

Model Specification

We followed the commonly used Box and Jenkins’s Autoregressive Integrated Moving Average (ARIMA) model. This ARIMA model, also known as the Box-Jenkins Method, was introduced by the statisticians George Box and Gwilym Jenkins in 1976 (Anderson, 2011). The Box-Jenkins approach is suitable for stationary or non-stationary data series with seasonal or without seasonal components (Gujarati et al., 2012). The Box-Jenkins model has five steps: stationary test, identification of the model, estimating the model parameter, diagnostic testing, and forecasting the best-fitted model.

The time series fish production data we use has a non-seasonal structure. So, we applied the seasonal ARIMA (p,d,q) models to forecast fish production. We specified the following ARIMA model shown in Equation 1 (Anderson, 2011; Gujarati et al., 2012):

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \dots + \alpha_p Y_{t-p} + \varepsilon_t + \beta_1 \varepsilon_{t-1} + \beta_2 \varepsilon_{t-2} + \dots + \beta_q \varepsilon_{t-q} \quad (1)$$

Here, Y_t refers to fish production from three sources: Inland Open Water Fish Production (Capture), Inland Closed Water Fish Production (Culture), and Marine Fisheries at the respective time. The equation has three components explained below.

i. Autoregressive (AR) Model

Equation 2 provides a general form of the p^{th} order $AR(p)$ model.

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \dots + \alpha_p Y_{t-p} + \varepsilon_t \quad (2)$$

Here, Y_t is the dependent variable at time t . $Y_{t-1}, Y_{t-2}, \dots, Y_{t-p}$ are the independent variables at time lag $t-1, t-2, \dots, t-p$ respectively. $\alpha_0, \alpha_1, \alpha_2, \dots, \alpha_p$ are the coefficients of each parameter of p to be estimated, and ε_t is the error term at time t .

ii. Order of Integration, d

The order of integration, d is the second component of the ARIMA model. It indicates the number of times a time series data is differenced from the original series. For instance, if the data series is not differenced, the value of d becomes 0. When the original data series is differenced by the lag of one data series, then d is equal to 1. The following equations show the differencing process:

$$\begin{aligned} y_t &= Y_t \text{ if } d = 0 \text{ [No difference]} \\ y_t &= Y_t - Y_{t-1} \text{ if } d = 1 \text{ [First difference]} \\ y_t &= (Y_t - Y_{t-1}) - (Y_{t-1} - Y_{t-2}) \text{ if } d = 2 \text{ [Second difference]} \end{aligned}$$

Where d is the order of difference, Y_t is the original series, and y_t is the differential series.

iii. Moving Average MA(q) Model

The moving average MA(q) has the general form of q^{th} order as given in Equation 3.

$$Y_t = \delta_0 + \varepsilon_t + \beta_1 \varepsilon_{t-1} + \beta_2 \varepsilon_{t-2} + \dots + \beta_q \varepsilon_{t-q} \quad (3)$$

Here, Y_t is the response variable at time t , δ_0 is the constant, $\beta_1, \beta_2, \dots, \beta_q$ are coefficients of each parameter q to be estimated. $\varepsilon_{t-1}, \varepsilon_{t-2}, \dots, \varepsilon_{t-q}$ are errors in lagged time periods associated with Y_t . The five steps of ARIMA(p,d,q) is discussed below:

Step 1: Test of Stationary

The time series production data used in the study has been examined to test the stationarity before the final analysis. The presence of a unit root causes data series to be non-stationary, resulting in erroneous and incorrect estimated results. Generally, if a data series is obtained from random walk processes like a pure random walk, random walk with drift component, or random walk with drift and time trend component, it can be non-stationary. The random walk process has the following equational form in general.

i. Pure Random Walk

$$Y_t = Y_{t-1} + \varepsilon_t \quad (4)$$

ii. Random Walk with Drift

$$Y_t = \gamma_0 + Y_{t-1} + \varepsilon_t \quad (5)$$

iii. Random Walk with Drift and Linear Trend

$$Y_t = \gamma_0 + \gamma_1 t + Y_{t-1} + \varepsilon_t \quad (6)$$

Equation 4 is a model of the pure random walk where there is no drift and time component. Here, Y at a specific time t is explained by Y at one lag time, $t-1$, with a white noise error. If a drift component is added, the model becomes a random walk with drift or constant γ_0 (Equation 5). In Equation 6, time component t is added, which makes the model random walk with drift and linear trend.

The presence or absence of the unit root has been tested using the Augmented Dickey-Fuller (ADF) test, which can handle data series produced by pure random walks, random walks with drift, or random walks with drift and temporal trends (Gujarati et al., 2012; Studenmund, 2017). The null hypothesis that there is a unit root in the data is investigated using the ADF test of unit root (Dickey & Fuller, 1979).

Null hypothesis: $H_0 =$ There is a unit root in data.

Alternative hypothesis: $H_1 =$ There is no unit root in data.

The null hypothesis is rejected if the p-value for the ADF test statistics is less than 0.05, which indicates that either the data have no unit root or the data series is stationary.

Along with the ADF test, a different unit root test known as the Phillips-Perron (PP) test has also been employed to examine the stationarity of the data.

If the variable has a unit root, the PP test shows that the null hypothesis is not rejected. According to the alternative hypothesis, the data in the variable are thought to be produced by a stationary process. The PP test statistic's p-value must be less than 0.05 to reject the null hypothesis, which shows that the data series is stationary (Phillips & Perron, 1988; STATA, 2022).

Step 2: Model Identification

The BOX-Jenkins ARIMA model has been used in the study in order to forecast the fish production value. The p , q , and d values must be accurately specified in order to construct an ARIMA model. By applying the partial autocorrelation function (PACF) and autocorrelation function (ACF) plots, we were able to determine the AR(p) and MA(q) orders. The number of times a data series has been differenced has been used to determine the value of d . Therefore, the equivalent ARIMA model that may be expressed as ARIMA for stationary data is ARIMA(p,q) since the value of d is 0.

Step 3: Model Estimation

The following diagnostic testing is used to determine the best-fitted model:

i. Akaike’s Information Criterion (AIC)

A common information criterion for choosing the top models from a group of competing models is Akaike's Information Criterion (AIC). A model is more closely matched with the smaller AIC value (Akaike, 1974). Equation 7 provides the general form of AIC as follows:

$$AIC = n \log(MSE) + 2h \quad (7)$$

Here, n is the sample size, MSE represents the mean square error, and h denotes all the calculated parameters.

ii. Bayesian Information Criterion (BIC)

The Bayesian Information Criteria (BIC), commonly referred to as the Schwarz Information Criterion, is a well-liked information criterion for choosing the optimal model. The fitted model is shown by the least BIC value (Schwarz, 1978). Equation 8 gives the BIC's general form.

$$BIC = n \log(MSE) + h \log n \quad (8)$$

The sample size is given as n , the mean square error is given as MSE, and the total number of estimated parameters is given as h . The study's best-fitted model has the lowest AIC and BIC values.

Step 4: Diagnostic Testing

The goal of the diagnostic checking is to determine whether there is autocorrelation in the residual. The autocorrelation in the residuals is found using the ACF and PACF plots. The model is appropriate for the forecast if the ACF and PACF are minimal and remain at the 95% confidence boundary level. The Ljung-Box test was also employed to detect autocorrelation in the residuals. The Ljung-Box test is an updated version of the Box-Pierce test (Ljung& Box, 1978). Equation 9 provides the Ljung-Box test equation's general form.

$$Q = n(n + 2) \sum_{k=1}^h \left(\frac{\hat{\rho}^2 k}{n-k} \right) \quad (9)$$

Here, the number of residuals is n , the number of lags is h , the residual autocorrelation at lag k is, and q is the Ljung-Box statistics. If the calculated p-value is less than 0.05, the Ljung-Box test statistics predict that the residuals have substantial autocorrelation. In contrast, the test statistics show that the residuals are independent if the p-value exceeds 0.05; the residuals do not exhibit autocorrelation.

Step 5: Forecasting

After reviewing the diagnostic test, the forecasting can finally be started. The accuracy of the anticipated number has been taken into consideration using the Mean Absolute Percentage Error (MAPE) (Makridakis, 1993). The MAPE is shown in the following Equation 10.

$$MAPE = \frac{100\%}{n} \sum_{t=1}^n \left(\frac{V_A - V_E}{V_A} \right) \quad (10)$$

The actual value is denoted by V_A , whereas the predicted value is denoted by V_E .

RESULTS AND DISCUSSION

A. INLAND OPEN WATER FISH PRODUCTION (CAPTURE)

i. Test of Stationary

The fish production data from inland open water (capture) shows a random walk pattern with no drift component. Augmented Dickey-Fuller (ADF) test and Phillips–Perron (PP) test of a unit root have been employed to detect the stationary of the data, and the test statistics have been shown in Table 1. It has been found that the original time series inland open water fish production data have unit root as the p-values of the ADF, and PP tests are larger than 0.05. Having the unit root in the original series makes the data series non-stationary. However, after taking the first difference of the data series, we found that the p-values of both ADF and PP test statistics are less than 0.05, indicating that the data series has no unit root.

Table 1: ADF and PP Test of Inland Open Water Fish Production (Capture)

Test Specification	Series	Test Statistics	p-value
Augmented Dickey-Fuller test	Original Series	0.064	0.9635
	First Differenced Series	-3.793	0.0030
Phillips-Perron test	Original Series	-0.177	0.9413
	First Differenced Series	-3.807	0.0028

ii. Model Identification

After testing for the data series stationarity, the ARIMA model's second step is to identify the appropriate model among the alternative models. We have used the graphical approaches of the Autocorrelation Function (ACF) and Partial autocorrelation function (PACF) and plotted the ACF and PACF of the original data and first differenced data in Figure 2 and Figure 3, respectively. With the help of ACF and PACF plots, the order of the MA(q) and AR(p) processes has been identified. We have noticed that ACF declines exponentially, having a significant spike at the first lag, whereas the PACF has one larger significant spike at the lag one (Figure 2). Hence, the appropriate model selection depends on the order of difference d . On the other hand, ACF and PACF plots of the first differenced data presented in Figure 3 exhibit no significant spikes at the initial lags. Since both ACF and PACF plots have significant spikes, it indicates AR(1) and MA(1) processes. As a result, our tentative model is either ARIMA (1,1,0) or ARIMA (0,1,1).

Figure 2: Original Series of Inland Open Water Fish Production (Capture)

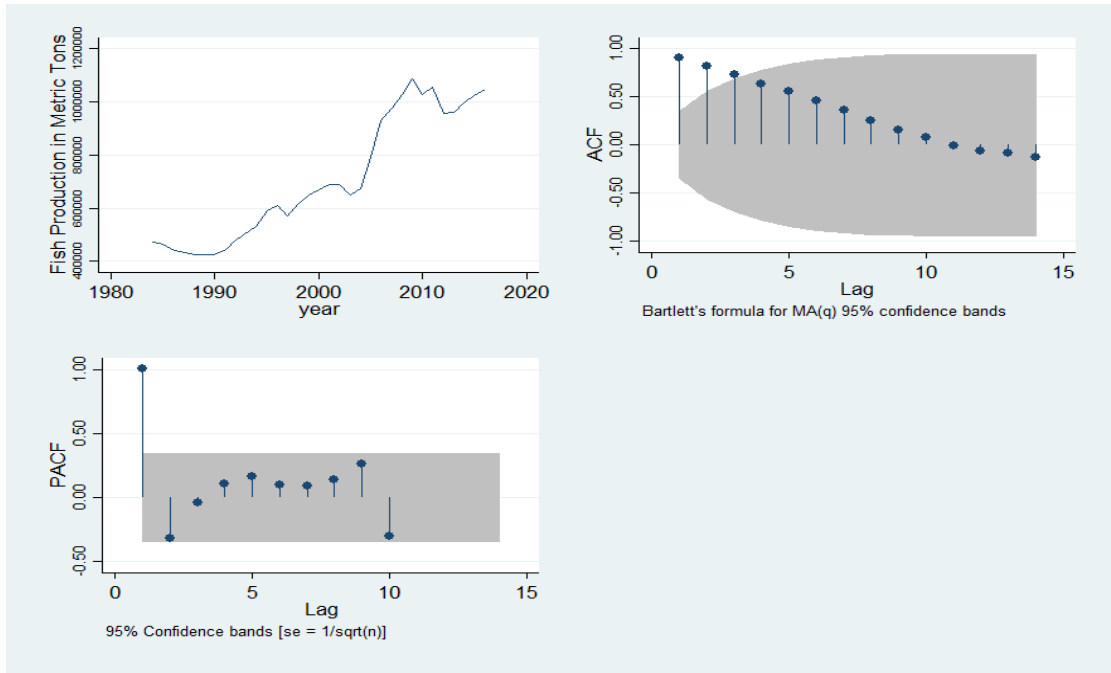
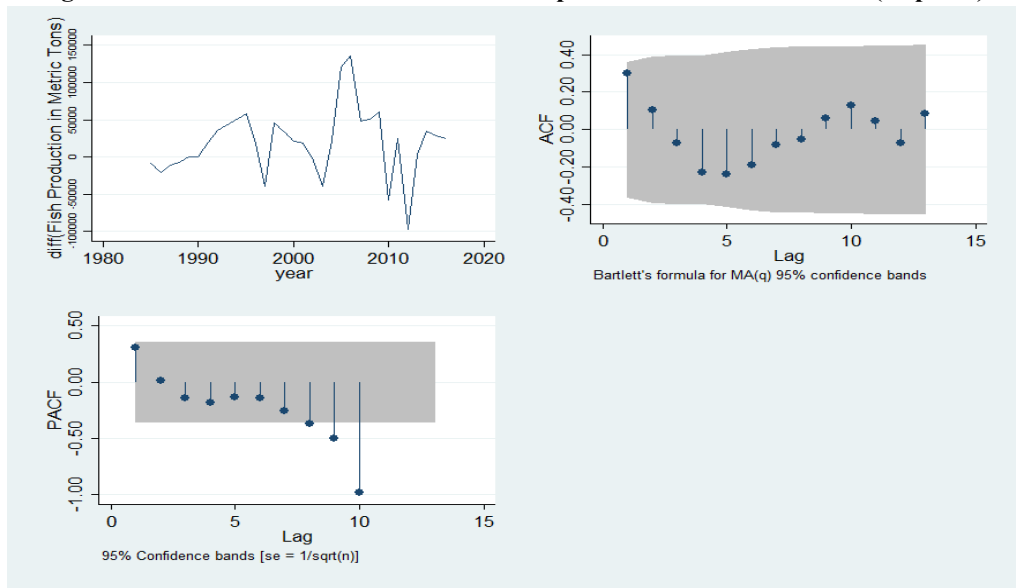


Figure 3: First Differenced Series of Inland Open Water Fish Production (Capture)



iii. Fitting the Appropriate ARIMA model

The next step involves selecting the best-fitted model from several alternative models depending on the lowest AIC and BIC values. We have shown the several ARIMA model along with their AIC and BIC values in Table 2. The table shows that ARIMA (1,1,0) has the lowest AIC and BIC values. Hence, our

best fitted ARIMA model for forecasting fish production from inland open water (capture) is ARIMA (1,1,0).

Table 2: Selected ARIMA Models for Inland Open Water Fish Production (Capture)

Particular	Models	AIC Values	BIC Values
Inland Open Water Fish Production (Capture)	ARIMA (0,1,0)	732.84	735.64
	ARIMA (0,1,1)	732.41	736.61
	ARIMA (1,1,0)	732.00	736.20
	ARIMA (1,1,1)	733.99	739.60
	ARIMA (0,1,2)	733.79	739.39

iv. Residual Analysis

We have attempted to test the autocorrelation among the residuals in the selected ARIMA model. Figure 4 shows the ACF and PACF plots of the residuals of the chosen ARIMA model. From the figure, we observe no significant spikes in the ACF and PACF plots indicating the absence of autocorrelation in the residuals within the 95% confidence limit. Besides, we have also estimated the Ljung-Box autocorrelation test to check for autocorrelation among the residuals. The p-value of the test statistics shown in Table 3 is larger than 0.05, implying no autocorrelation among the residuals. It appears that ARIMA (1,1,0) is the best-fitted model for forecasting fish production from inland open water (capture).

Figure 4: Residual Plot of Inland Open Water Fish Production (Capture) with ACF and PACF

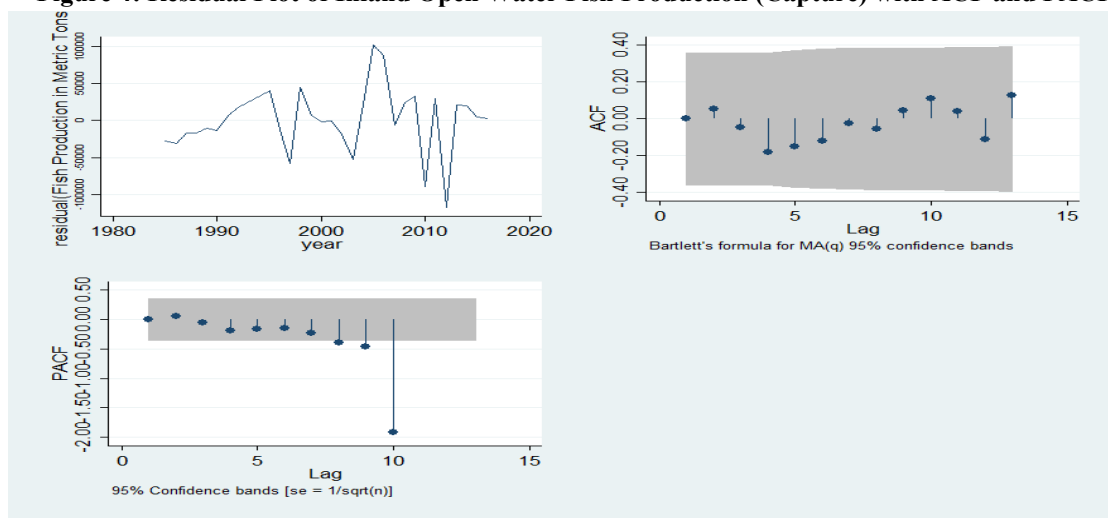


Table 3: Ljung-Box Autocorrelation of Inland Open Water Fish Production (Capture)

Particular	Ljung-Box Autocorrelation LM Test	Value
Inland Open Water Fish Production (Capture)	χ -squared Statistic	0.0001
	p-value	0.9924

v. Forecasting

Finally, we have forecasted the annual fish production from inland open water (capture) by using the best-fitted ARIMA (1,1,0) model from 2020-2029 (Table 5). We have also examined the accuracy of the forecasted values by using the testing dataset from 2017-2019 (Table 4). From Table 4, it has been seen that Mean Absolute Percent Error (MAPE) value is 9.82, implying that the estimated forecasted value of the annual fish production from inland open water (capture) is roughly 90.18 percent accurate. The predicted value of the annual fish production from inland open water (capture) from 2020 to 2029 is presented in Table 5 with a 95% lower and upper confidence limit. Table 5 shows that inland open water fish production (capture) is about to increase from 11,23,105 metric tons in 2020 to 12,85,683 metric tons in 2029.

Table 4: The Accuracy Measurement of Inland Open Water Fish Production (Capture)

Particular	Projected Year	Actual Value	Forecasted Value	Percentage Error (±)	Mean Absolute Percent Error (MAPE)
Inland Open Water Fish Production (Capture)	2017	1163606	1068153	8.20	9.82
	2018	1216539	1086767	10.67	
	2019	1235709	1104994	10.58	

Table 5: Forecasted values of Inland Open Water Fish Production (Capture) in Bangladesh

Forecasted Year	Forecasted Values of Inland Open Water Fish Production (Capture) (in Metric Tons) at 95% Confidence Interval		
	Forecasted Values	Upper Confidence Limit	Lower Confidence Limit
2020	1123105	1212268	1033942
2021	1141182	1230348	1052016
2022	1159248	1248414	1070082
2023	1177311	1266477	1088145
2024	1195374	1284539	1106208
2025	1213436	1302601	1124270
2026	1231497	1320663	1142332
2027	1249559	1338725	1160393
2028	1267621	1356787	1178455
2029	1285683	1374849	1196517

B. INLAND CLOSED WATER FISH PRODUCTION (CULTURE)

i. Test of Stationary

For the test of stationary, the fish production time series data from inland closed water (culture), Augmented Dickey-Fuller (ADF) test, and Phillips–Perron (PP) test have been used. The test statistics are

presented in Table 6. The table shows that the original data series is non-stationary as the p-value of the ADF and PP test is larger than 0.05. It also provides evidence that the data series has a unit root. However, after the first difference, the data series has become stationary as the ADF p-value and the PP test is smaller than 0.05. The data series also becomes free from unit root problems after the first difference and is usable for econometric analysis.

Table 6: ADF and PP Test of Inland Closed Water Fish Production (Culture)

Test Specification	Series	Test Statistics	p-value
Augmented Dickey-Fuller test	Original Series	0.254	0.9751
	First Differenced Series	-8.388	0.0000
Phillips-Perron test	Original Series	1.880	0.9985
	First Differenced Series	-3.736	0.0000

ii. Model Identification

The plots of the Autocorrelation Function (ACF) and Partial autocorrelation function (PACF) of annual fish production from inland closed water (culture) have been used to figure out the appropriate forecasting model. The ACF and PACF plots of the original data series and the first differenced data series are presented in Figure 5 and Figure 6, respectively. The ACF and PACF plots in Figure 5 have one significant spike at lag one and the ACF and PACF values continue to decline. On the other, the ACF and PACF also have one spike in the first differenced data series in Figure 6. The ACF and PACF plots indicate AR(1) and MA(1) processes. Hence, the appropriate model will be decided based on the order of integration one, and the tentative ARIMA model for inland closed water fish production (culture) is either ARIMA (1,1,0) or ARIMA (0,1,1).

Figure 5: Original Series of Inland Closed Water Fish Production (Culture)

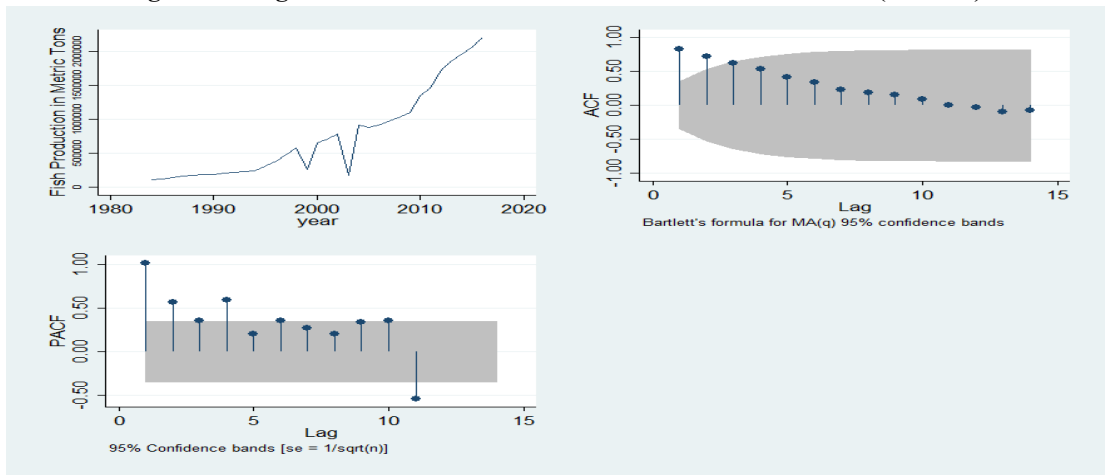
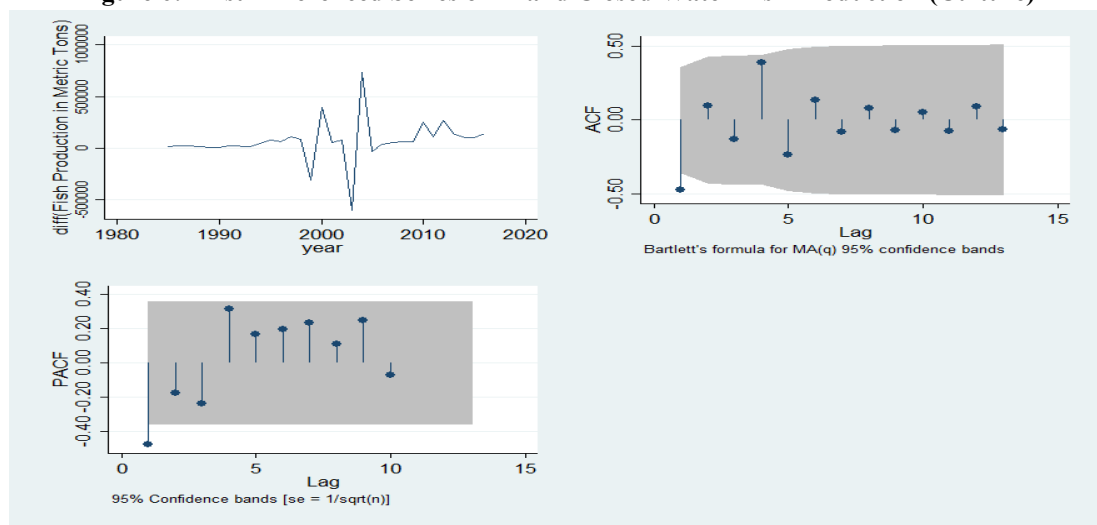


Figure 6: First Differenced Series of Inland Closed Water Fish Production (Culture)



iii. Fitting the Appropriate ARIMA model

The best fitted ARIMA model for forecasting the fish production from inland closed water (culture) has been chosen based on the lower AIC and BIC values among the alternative models. In this process, the AIC and BIC values of a set of ARIMA models with different orders have been estimated and shown in Table 7. From the table, it has been seen that ARIMA (1,1,0) has the lowest AIC and BIC values. So, the ARIMA (1,1,0) has been finally selected to forecast the fish production from closed inland water (culture).

Table 7: Selected ARIMA Models for Inland Closed Water Fish Production (Culture)

Particular	Models	AIC Values	BIC Values
Inland Open Water Fish Production (Culture)	ARIMA (0,1,0)	823.298	826.1004
	ARIMA (0,1,1)	817.5743	821.7779
	ARIMA (1,1,0)	818.075	822.2786
	ARIMA (1,1,1)	819.0435	824.6483
	ARIMA (0,1,2)	818.6528	824.2576

iv. Residual Analysis

After selecting the best fitted ARIMA model, the additional test of correlation among the residuals has also been performed using the ACF and PACF of the residuals (Figure 7). The ACF and PACF plots in Figure 7 indicate no significant spikes at any lag, implying that the residuals are independent and are not correlated to each other. Besides, the Ljung-Box test also needs to be utilized to detect the autocorrelation among the residuals of the selected ARIMA model (Table 8). The p-value of the Ljung-Box test statistics is higher than 0.05, indicating no autocorrelation among the residuals.

Figure 7: Residual Plot of Inland Closed Water Fish Production (Culture) with ACF and PACF

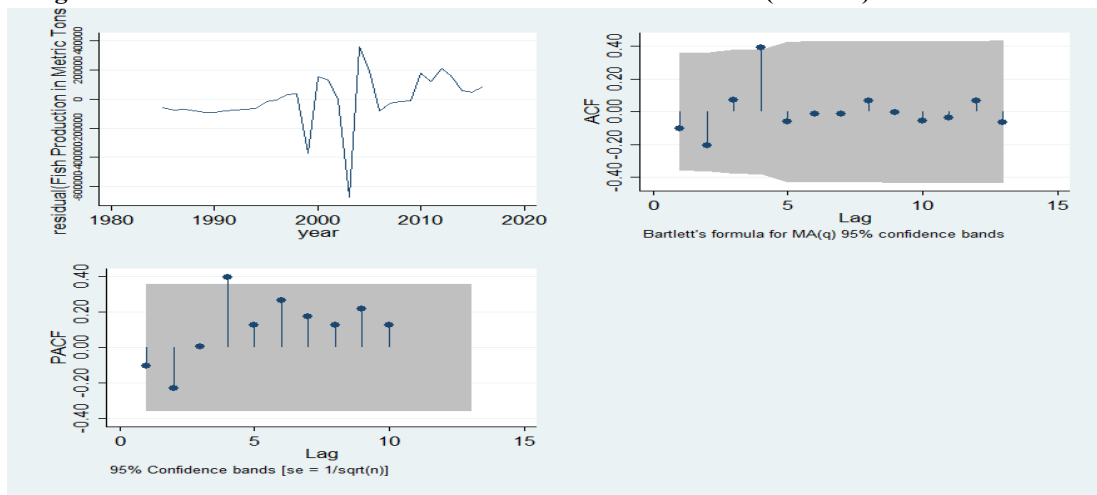


Table 8: Ljung-Box Autocorrelation of Inland Closed Water Fish Production (Culture)

Particular	Ljung-Box Autocorrelation LM Test	Value
Inland Open Water Fish Production (Culture)	χ -squared Statistic	0.3465
	p-value	0.5561

v. Forecasting

After selecting the final best-fitted ARIMA model, the volume of fish production from closed inland water (culture) has been forecasted for 2020-2029. The accuracy of the forecasted fish production has been analyzed using the Mean Absolute Percent Error (MAPE) testing data from 2017-2019 (Table 9). It has been seen from the table that the value of MAPE is 3.77, indicating that the fish production from closed inland water (culture) is forecasted with roughly 96.23 percent accuracy. The forecasted fish production value is presented in Table 10 with a 95 percent upper and lower limit confidence interval. It is observed from the table that the fish production from inland closed water (culture) has a steady increase over the forecasted period from 2020 (24,61,806 metric tons) to 2029 (30,90,912 metric tons)

Table 9: The Accuracy Measurement of Inland Closed Water Fish Production (Culture)

Particular	Projected Year	Actual Value	Forecasted Value	Percentage Error (\pm)	Mean Absolute Percent Error (MAPE)
Inland Open Water Fish Production (Culture)	2017	2333352	2240656	3.97	3.77
	2018	2405415	2325461	3.32	
	2019	2488601	2388807	4.01	

Table 10: Forecasted values of Inland Closed Water Fish Production (Culture) in Bangladesh

Forecasted Year	Forecasted Values of Inland Closed Water Fish Production (Culture) (in Metric Tons) at 95% Confidence Interval		
	Forecasted Values	Upper Confidence Limit	Lower Confidence Limit
2020	2461806	2859710	2063901
2021	2530462	2928633	2132292
2022	2601072	2999297	2202848
2023	2670804	3069039	2272568
2024	2740930	3139168	2342693
2025	2810879	3209117	2412641
2026	2880908	3279146	2482670
2027	2950901	3349139	2552663
2028	3020910	3419148	2622672
2029	3090912	3489150	2692673

C. MARINE FISH PRODUCTION (MARINE FISHERIES)

i. Test of Stationary

The time series data of marine fish production shows random walk with no drift element. The data series' stationery has been tested using the Augmented Dickey-Fuller test and Phillips-Perron test (Table 11). The p-values of the ADF and PP test of the original series show that the data series is not stationary at the 5% significance level. The first differenced series has been used instead of the original series as the p-values of the first differenced series are smaller than 0.05. it also provides statistical evidence that the first differenced series of marine fish production is stationary and free from unit root problems.

Table 11: ADF and PP Test of Marine Fish Production

Test Specification	Series	Test Statistics	p-value
Augmented Dickey-Fuller test	Original Series	-2.771	0.0626
	First Differenced Series	-8.525	0.0000
Phillips-Perron test	Original Series	-2.661	0.0811
	First Differenced Series	-11.209	0.0000

ii. Model Identification

The ACF and PACF plots have been used to identify the potential ARIMA model for marine fish production. Figure 8 and Figure 8 show the ACF and PACF plots of the original data series and the first differenced data series, respectively. Figure 8 shows that ACF has one significant spike at lag one and PACF has three significant spikes at lag 1, 5, and 9. So, it requires identifying the value of the order of integration d for model selection. The ACF and PACF plots of the first differenced data in Figure 9 have similar trends. Hence, the model indicates both AR(1) and MA(1) processes. The potential ARIMA model is either ARIMA (0,1,1) or ARIMA (1,1,0).

Figure 8: Original Series of Marine Fish Production

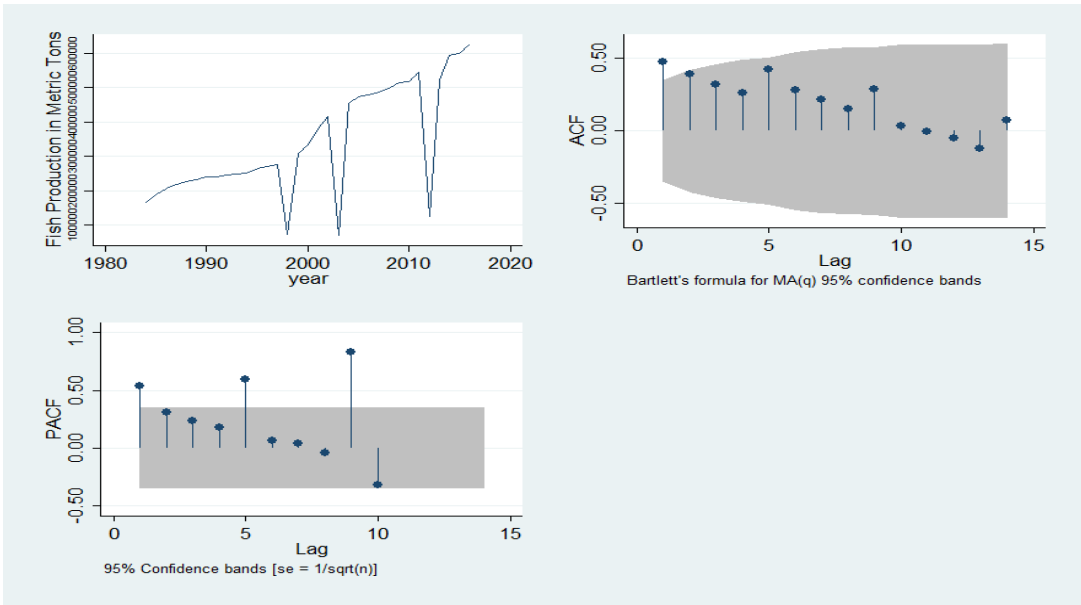
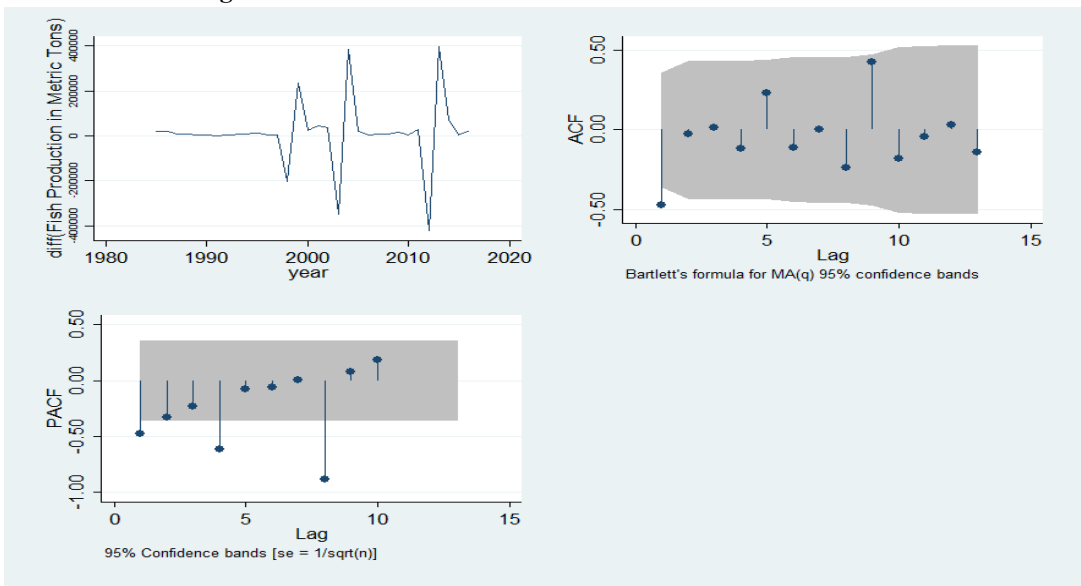


Figure 9: First Differenced Series of Marine Fish Production



iii. Fitting the Appropriate ARIMA model

We have identified the best-fitted ARIMA model to forecast marine fish production based on the AIC and BIC criteria. We selected the model with the lowest AIC and BIC values from various ARIMA models. Table 12 shows ARIMA models with corresponding AIC and BIC values. It has been seen from Table 12 that ARIMA (0,1,1) has the lowest AIC and BIC values. Therefore, ARIMA (0,1,1) has been chosen as the best-fitted model to forecast marine fish production.

Table 12: Selected ARIMA Models for Marine Fish Production

Particular	Models	AIC Values	BIC Values
Marine Fisheries	ARIMA (0,1,0)	805.765	808.5674
	ARIMA (0,1,1)	790.1189	794.3225
	ARIMA (1,1,0)	800.6297	804.8333
	ARIMA (1,1,1)	792.1036	797.7084
	ARIMA (0,1,2)	792.0996	797.7044

iv. Residual Analysis

We have also performed the autocorrelation test among the residuals of the selected ARIMA model using ACF and PACF plots (Figure 10). Figure 10 shows that both ACF and PACF have no significant spikes indicating no autocorrelation among the residuals. Besides, we have also estimated the Ljung-Box test statistics to check the autocorrelation among the residuals. Table 13 shows that the p-value of the Ljung-Box test of autocorrelation is higher than 0.05, implying the absence of autocorrelation in the residuals. So, ARIMA (0,1,1) has finally been used to forecast marine fish production.

Figure 10: Residual Plot of Marine Fish Production with ACF and PACF

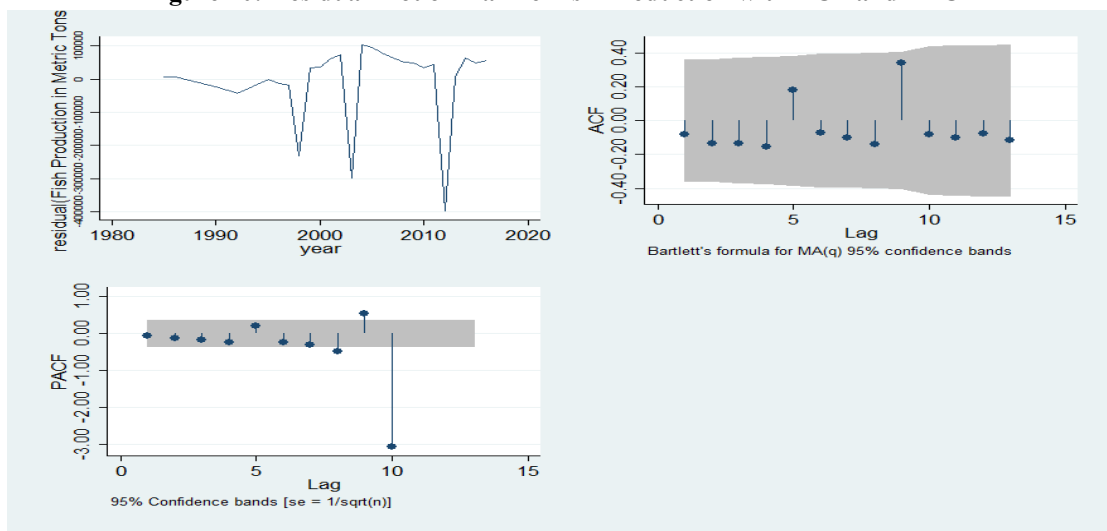


Table 13: Ljung-Box Autocorrelation of Marine Fish Production

Particular	Ljung-Box Autocorrelation LM Test	Value
Inland Open Water Fish	χ -squared Statistic	0.2118
Production (Culture)	p-value	0.6454

v. Forecasting

The selected ARIMA model has forecasted Marine fish production from 2020 to 2029. After estimating the forecasted value, a test of accuracy measurement has been conducted using the Mean Absolute Percent Error (MAPE) approach. We used the testing data set from 2017-2019 to test the accuracy of the forecasted value.

Table 14: The Accuracy Measurement of Marine Fish Production

Particular	Projected Year	Actual Value	Forecasted Value	Percentage Error (\pm)	Mean Absolute Percent Error (MAPE)
Marine Fisheries	2017	637476	588962.9	7.61	7.01
	2018	654687	605139.2	7.57	
	2019	659911	621315.5	5.85	

Table 15: Forecasted values of Marine Fish Production in Bangladesh

Forecasted Year	Forecasted Values of Marine Fish Production (in Metric Tons) at 95% Confidence Interval		
	Forecasted Values	Upper Confidence Limit	Lower Confidence Limit
2020	637491.8	928118.1	346865.5
2021	653668.1	944294.4	363041.7
2022	669844.4	960470.7	379218
2023	686020.7	976647	395394.3
2024	702197	992823.3	411570.7
2025	718373.3	1009000	427746.9
2026	734549.6	1025176	443923.2
2027	750725.9	1041352	460099.5
2028	766902.2	1057529	476275.8
2029	783078.4	1073705	492452.1

Table 14 presents that the Mean Absolute Percent Error (MAPE) value is 92.99, implying that the forecasted value of marine fish production has been estimated with roughly 92.99 percent accuracy. The forecasted marine fish production value with a 95 percent upper and lower limit confidence interval is presented in Table 15. It has been seen that there is an increasing trend in marine fish production during the forecasted year from 2020 to 2029.

PROSPECTS OF FISH PRODUCTION IN BANGLADESH

The future prospects of yearly fish production in Bangladesh from various sources, including inland open water (capture), inland closed water (culture), and marine sources, appear promising. With a vast network of rivers, lakes, and wetlands, Bangladesh has significant potential for increasing inland open water fish production.

Over the past few decades, Bangladesh has witnessed a steady increase in fish production, establishing itself as one of the leading fish-producing countries globally. According to recent statistical data, the country's fish production reached approximately 4.5 million metric tons in 2021, with inland open water accounting for around 30%, inland closed water for 45%, and marine sources for 25% of the total output. Efforts to improve fishery management, implement sustainable fishing practices, and strengthen conservation measures can lead to enhanced yields from these sources. Additionally, the expansion of inland closed water systems, such as fish ponds and reservoirs, offers opportunities for increased fish production through aquaculture. By adopting modern technologies, improved fish breeds, and efficient feed management, Bangladesh can further enhance its closed water aquaculture sector. Furthermore, the marine fisheries sector presents immense prospects for growth, as the country has access to the Bay of Bengal. Effective governance, conservation measures, and the adoption of responsible fishing practices will be crucial in sustaining and maximizing the marine fish production potential. Overall, by focusing on

sustainable practices and leveraging available resources, Bangladesh can anticipate a promising future in yearly fish production from inland open water, inland closed water, and marine sources.

CONCLUDING REMARKS

Fish production as a sub-sector of agriculture has significantly contributed to Bangladesh's annual growth in gross domestic product. In the current study, an attempt has been made to develop a model for forecasting yearly fish production from inland open water (capture), inland closed water (culture), and marine sources using the popular and widely used ARIMA modeling approach. The trend of fish production in the past decades shows a positive and steady increase in fish production from these sources. The selected best-fitted ARIMA models forecast a continuous slow growth in fish production during the following decades with minimum forecasting errors. The estimated forecast values also indicate a possibility of achieving self-sufficiency in fish production if appropriate strategies are implemented. For instance, the concerned policymakers should take necessary steps to utilize the vast unused water bodies, including rivers, canals, wetlands, and coastal aquatic resources, and adopt modern fish production technology. With the utilization of the full potential of the available resources, it will be possible to ensure sustainability and self-sufficiency in fish production in the coming years.

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Impact of Corporate Governance on Firm Performance: Evidence from the Banking Sector of Bangladesh

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ABSTRACT

Corporate Governance (CG) has turned out to be a contemporary issue due to its extensive appeal among many stakeholders such as academics, practitioners, and policymakers. Similar to other emerging countries, Bangladesh's banking industry has evolved into the primary financial institution as a result of underdeveloped capital markets, restricted access to financial instruments, and a lack of trust in the financial system. The study examined the effect of corporate governance attributes (Board size, board independence, size of audit committee, and independence of audit committee, board skills and management skills of board members) on the performance (ROA and ROE) of the banking companies listed on Dhaka Stock Exchange limited (DSE) in Bangladesh. The study used secondary data sources only. Using multiple linear regressions analysis, the study revealed that board size considerably and significantly influences the ROA and ROE while board members' management skill has positive and significant effect on firms' ROE. The study also found that audit committee size, and audit committee member's independence have considerable and favorable impact on the firm's ROE when board independence and board skills have no effect on firm's performance. The study results provide valuable insights for the listed companies in Bangladesh.

Keywords: *Corporate Governance (CG), Audit Committee Size, Board Size, Board Skill and Management Skills, ROA and ROE*

1. Introduction

Corporate Governance (CG) has become a contemporary issue as it is pivotal to ensuring the economic advancement and well-being of a nation through efficient usage of resources, improved admittance of capital, more possibility of creating employment opportunities, and a superior possibility of creating capital markets in a supported manner. A company's operations and how it aligns the priorities of all of its stakeholders are eventually governed by the set of rules and practices that corporate governance generates. Many well-run and established companies became a failure in the absence of good CG. Current literature supports that good CG has a favorable effect on the financial performance of an organization (Claessen et al., 2002, Gompers et al., 2003; ACCA, 2008; OECD, 2009).

CG contains the procedures over which firms' objectives are established and followed in the framework of the social, governing, and market environments. Corporate performance is a crucial idea that refers to the process of using a corporation's economic, personnel, and perhaps other resources in order to attain the organization's overall corporate objective; it maintains the firm in operation and increases the likelihood of better possibilities in the future.

Achieving the company's desired objectives will be made possible by keeping CG at a manageable level. Perhaps this is the factor behind the recent spike in interest in CG. Therefore, this study makes an effort to investigate any established links between governance practices adoption stages and enhancing organizational performance.

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Impact of Corporate Governance on Firm Performance: Evidence from the Banking Sector of Bangladesh..

Owing to the lack of developed financial markets, inadequate accessibility of financial tools, as well as a loss of faith in the banking system, the banking sector, like that of other emerging economies, has to turn into the main financial institution in Bangladesh's financial system. This study intends to the connection between Corporate Governance (CG) variables on firm performances in the banking sector of Bangladesh.

2.1 Literature Review

There is no universally recognized meaning of corporate governance (CG), which is sometimes related to the stark variances in country-specific CG legislation (Solomon, 2010). Different legislators, academics, professionals, or theorists may have multiple perspectives, which can lead to disparities in definition (Solomon, 2010). In the 1980s, the phrase "corporate governance" was first used to refer to "the basic rules through which administration of firms was controlled and directed" (Doret al. 2011). Similarly, O'Donovan (2003) defined Corporate Governance as an arrangement inside the organization comprising rules & regulations, processes, people, and technology involved in managing the activities for serving the interest of shareholders. Inside the context of the current study, corporate governance (CG) refers to the principles that a corporation upholds in order to protect the interests of its stakeholders.

Initiation of transparency and responsibility all over the entity is one of the significant spirits of the CG. This essence of CG can be implemented when the proper allocation of authority is ensured among the shareholders, the entity's management lineup, the members forming the board of directors, and the auditors. Prior studies (Weisbach, 1988; Rosenstein and Wyatt, 1990; Byrd and Hickman, 1992; Brickly et al., 1994; Rajan & Zingale, 1998; Williams, 2000; Drobetz et al., 2003; Hossain et al., 2000; Gemmill and Thomas, 2004) had demonstrated a beneficial connection between sound CG procedures and business results. However, contrary findings have also been found in other investigations (Bathala & Rao, 1995; Hutchinson, 2002;). There is no question about the significance of corporate governance principles in enhancing firm performance, notwithstanding a few unfavorable findings reported in the literature. Researchers, scholars, and governments are increasingly playing a greater role and are more concerned with developing and formulating best CG practices.

The separation of shareholders and management gives birth to the upright CG in an organization (Epps and Cereola, 2008). According to agency theory, people act in pragmatic ways, seeking to further their own benefits as much as possible (McCullers & Schroelder, 1982). By evaluating manager competence and coordinating management's objectives with the interests of the constituents, consequently, agency theory suggests corporate governance as a way to minimize these conflicts. According to Abdullah (2004), top management's predatory actions cause the company's current value to decline. The board should indeed prioritize increasing the firm's financial performance and the prosperity of its shareholders in all of its responsibilities and activities.

Despite drawbacks, good governance creates opportunities for reform when an organization performs poorly as a result of poor administration (Lipton and Lorsch, 1992). Therefore, CG functions as a solution to get over administrative shortcomings and inefficiencies in order to improve the performance of banks. In accordance with the CG ideas, the board of directors along with its committees are already in charge of seeing that certain obligations are met (Levine, 2003; Caprio and Levine, 2002; Macey, 2003).

2.2 Situation of Governance Practices in Bangladesh's Banking Sector

Numerous studies on corporate governance in Bangladesh have shown that the banking sector's CG practices were viewed as subpar. Because of family orientation in ownership structure and intent engagement of the Board of directors in managerial practices, Bangladesh had underperformed in the arena of CG practices in the world economy (Gillibrand, 2004; Haque, Jalil, and Naz, 2007).

Ahmed and Yusuf (2005) found that a maximum of the listed corporations in Bangladesh were highly family connected with respect to ownership composition resulting in domination in control and decision making by the small group of kinder-ship shareholders over the entire community of stockholders. Ahmed and Baree (2000) identified a few anomalies in implementing international CG norms in Bangladesh and recommended some measures such as forming a supreme-power committee with members from the government, regulatory agencies, and companies, to make amendments to the law in force, and to include the principles of CGS in the syllabus of academic and professional institutions.

The banking sector's contribution as a dominant player in financing the business community in Bangladesh is indispensable. Banking and other financial sectors started reforms in ownership structure immediately after the independence of Bangladesh in 1971 with the privatization of two of the six nationalized banking institutions were privatized, and ever since then private commercial banks have been in use. Operational efficiency was in a declining position although expansion was going on (Sayeed 2002; and Raquib, 1999). The country experienced poor frustrating performance in various sectors like low profitability, increased non-performing assets, capital shortage, massive corruption due to undue interference of political leaders, inefficiency in operations and policy-making, deteriorated asset quality, and vulnerable regulatory walk-on. (Hassan 1994; USAID 1995). Insufficient internal and external audits with poor quality of accounting were apparent (World Bank, 1998; Raquib, 1999; CPD, 2001). Such improvised conditions were due to inefficient CG in the banking sectors of Bangladesh. Later, Banking Reform Commission (1999) and BEI (2003) expressed severe alarms on the banking sector in Bangladesh and also blamed the inferior eminence of governance, which in turn stimulated to have a look on the governance aspect in a broader sense.

Banks in Bangladesh are passing risky times because of substantial ownership holding by the government, lack of efficient regulatory measures, weak lawful defense, and the presence of pressure groups (Arun & Turner, 2003). Establishing independent controlling organizations is urgently necessary in order to prevent the ongoing cooperation between the government, corporations, and bankers in order to fulfill special interest groups (Shleifer and Vishny, 1997; Arun and Turner, 2002). Due to the expansion of a wider selection of banking services, the banking industry has recently undergone a transformation. As a result, banks are now more engaged than any in high-risk operations such as dealing with financial markets and various off-balance sheet operations (Greuning and Bratanovic, 2003), which calls for greater attention to the CG character of the Bangladeshi banking sector.

3. Study objectives

The study's main purpose is to observe the connections between CG factors and firms' performance in the banking sector.

The precise goals are:

- To determine how the size of the board of directors affects the firm's performance.
- To determine how board independence affects a firm's performance.
- To determine the impact of board and management competence levels on a firm's performance.
- To determine how the size of the audit committee affects a firm's performance.
- To determine how the audit committee's independence affects a firm's performance.

4. Hypotheses Development

4.1 Board Size and firm performance.

Board Size is the characteristic that has received one of most focus in the literature, and it has been discovered that there is a positive link between the financial performance of an entity and board size. In this regard, Enobakhane (2010) defined the board size as the entire number of members consisting of directors. Scholars and legislators have focused their attention on the board of directors because of its size and makeup, which contribute significantly to better corporate governance. Board of directors play pivotal role in formulating strategies and policies to be implemented by the managers at different level of the organization (Soesetio et al., 2023). According to Amran et al (2010) board of directors also keep positive bearing on shareholders by exercising control over the management of the funds contributed by the shareholders. Several prior studies have evidenced that the size of board of directors positively influence the firm performance. Rashid & Islam (2010) found that larger board enhances the firm's value in emerging economies. Recently, Anas et al. (2023) has shown that the board size positively impacted ROE during Covid-19 pandemic. Besides, Almashhadani & Almashhadani, (2022) and Khan & Mahmood (2023) also found that the larger the board size, the better will be the firm performance. As the bigger board may have more information and skills available, it results in the improved performance. Therefore, we postulate the following hypothesis:

H₁: Performance of the firms is favorably correlated with the size of the board of directors.

4.2 Independent Directors and firm performance.

The board's members who seem to be truly independent aren't in any executive positions with the company and have no financial or other affiliations with it. They are outside directors who have no business interest other than membership in the board. The independent director owns indeed no shareholding or less than just a percentage (1%) of the entire total shareholding (BSEC Guidelines, 2012). Different earlier studies have shown the mixed results about the linkage between independent directors' size and firm performance. Rashid (2018) and Le et al. (2022) found that increasing the number of independent directors on the board is not positively related to the economic performance of the firm. Conversely, Independent directors are more concerned about their social image and reputation which make them more committed to execute firm's strategies, and oversee and control the management of all operations to bring about the effectiveness and efficiency that in turn confirming better equity performance (Awad et al., 2023). Additionally, they have proved the positive association between the number of independent directors and firm performance. Almashhadani & Almashhadani (2022) also confirmed the independent director's favorable bearing on financial performance of the company. Board independence is a sole driver that considerably and positively influences the firm's performance (Hasan et al. 2022). The agency theory also suggests that the independent directors are usually supposed to have the ability to improve a board's oversight powers, offer benefits to businesses by offering specialized expertise and management capabilities and defending interest of the shareholders. Therefore, we postulate the following hypothesis:

H₂: Board independence and firm performance are positively correlated.

4.3 Board and Management Skills Levels

Capacity of board members is one of the key factors that should be considered to enhance the company performance (Kabara et al., 2022). Thus, educational diversity of board members is required in lieu of conventional contracts. In our study context, we measure board member skill level by their educational qualification and relevant professional degrees. Prior studies provide mixed findings of effect of board member's educational qualifications on corporate performance. Board members' educational achievements are significant for both financial and market-based performance to a specific extent

(Darmadi, 2013). In the study of Berger et al. (2014), they demonstrate that executives with PhD. degrees reduce the risks associated with portfolio. Aripin et al. (2016) argued that knowledge and level of skillfulness acquired from the university help a person to be effective leader. Additionally, Kabara et al. (2022) found that the educational background influences positively and significantly the company performance.

Similarly, board member should have experience with strategic planning in finance, financial reporting, brand management, information security, constitutional concerns, and other decision-making-related areas resulting in boosting company's returns. Therefore, consistent with the aforementioned discussion, we believe that the educational level, the experience of board members, management skills will higher up the performance of the banks. Consequently, the following hypothesis can be proposed:

H₃: Board skill levels have a positive correlation with firm performance.

H₄: Management skill levels have a positive correlation with firm performance.

4.4 Audit Committee and firm performance

The board of directors establishes an audit committee, tasked with monitoring financial reporting and disclosure process of a company. The principal obligation of this task force is to look after the financial reporting and disclosure process so as to produce the correct picture of the company's performance (Almaqtari et al., 2021; Safari Gerayli et al., 2021). An audit committee is essential to confirm the righteousness and transparency of the information included in the financial statements and ensures the independence of outside directors (Esan et al. 2022). Earlier studies claimed that the audit committee size and audit committee independence positively explain the firm performance. Alzeban and Sawan, (2015) showed a favorable connection between audit committees with independence and firm performance. Similarly, Naiker and Sharma (2009) also proved the influence of the audit committees with external audit involvement on the firm's performance. According to Hezabr et al (2023) and Lamido et al (2022) stated that the significant determinants factors include the size and independence of the audit affect the insurance companies' performance. Besides, Awad et al. (2023) have argued that the increasing presence of audit committee members and their independence aids in lowering agency costs and raising a company's performance. As a result, we postulate the following hypothesis:

H₅: The size of the audit committee correlates positively with firm performance.

H₆: Audit committee independence correlates positively with firm performance.

5. Methodology of the Study

5.1 Type of data: The study has been grounded on secondary data sources from the year 2017-2021. The secondary has been composed of the disclosed annual reports of listed banks as well as bank's websites.

5.2 Sample Size: The sample of this study covers all the listed banks at DSE. There are 33 listed banks at DSE consisting of commercial banks (state-owned, private, and foreign) and Islamic banks.

5.3 Measurement of Firm Performance

In the published studies on Corporate Governance practices, accounting-based indicators like return on equity (ROE) and return on assets (ROA) are being used as benchmarks for firms performance (Abdullah 2004; Bhagat & Black 2002; Daily & Dalton 1993). Several other research, including Adams and Mehran (2005), Belkhir (2004), Caprio and Levine (2002), and in a wider sense, studies on the usefulness of board diversity for banking companies, employ this measurement or a comparable one as the predictor variables.

Profit after taxes and allowances are split by the total assets to determine the return on assets (ROA). ROE is determined by dividing the profit after deducting expenses and allowances by the total shareholders' capital employed. This or a comparable metric is often used as the variable in research that

looks into how governance practice factors affect firm performance. (For instance, Adams and Mehran, 2005; Belkhir, 2004).

5.4 Model Specification

Multiple linear regression tests are used for conducting the empirical analysis for this study as the basic statistical test. The multiple linear regression tests assess the connotation among the corporate governance (CG) variables used as the descriptive variables (Board size, board independence, size of audit committee, composition of audit committee, board skills, and management skills) with the firm’s performance used as the depended variables in this study (ROA and ROE).

The following is a presentation of the study's conceptual model:

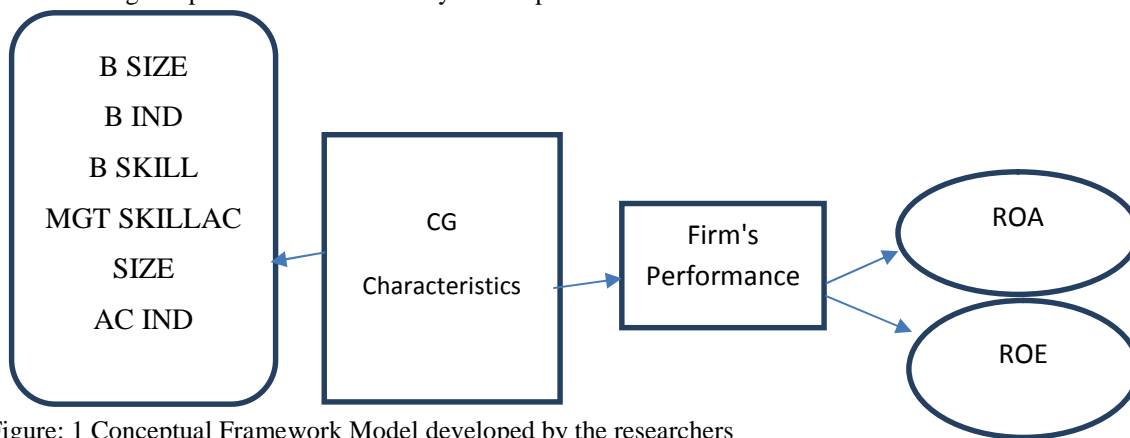


Figure: 1 Conceptual Framework Model developed by the researchers

To scrutinize the connotation between CG variables and firms’ performance, the subsequent regression models have been formed.

$$FP_ROE = BSIZE + 2 BIND + 3 BSKILL + 4 MGT SKILL + 5 ACSIZE + 6 ACIND +$$

$$FP_ROA = BSIZE + 2 BIND + 3 BSKILL + 4 MGT SKILL + 5 ACSIZE + 6 ACIND +$$

5.5 Measures of Performance

Table 1: Firm performance measuring variables and their descriptions

Measures of Performance		
Variables	Explanation	Measurement
ROA	Return on Asset	At the conclusion of every year, the proportion of the calculated net profit after tax with respect to the provision to the total assets.
ROE	Return on Equity	At the conclusion of every year, the proportion of the calculated net profit after tax with respect to the provision to total equity

Table 2: CG variables and their descriptions

Variables	Corporate Governance (CG) Characteristics	Measurement
B SIZE	Board Size	At the close of every year, the entire figure of individuals participating in the board of directors as a board member
BIND	Board Independence	At the end of every year, the proportion of the whole number of independent members acting as the board directors to the total members of directors

BSKILL	Board Skill	The number of persons acting as directors having relevant degrees or qualifications
MGTSKILL	Management Skill	Number of members on the board performing as management executives with relevant degrees or professional credentials
ACSIZE	Audit Committee Size	Total number of members representing in audit committee
ACIND	Audit Committee Independence	The proportion of the number of independent members acting as auditors in the audit committee to the total figure of auditors in the audit committee.

6. Data Analysis

6.1 Correlation analysis

	ROA	ROE	AS	AID	BS	BI	BSK	MSK	VIF
ROA	1								1.010
ROE	.323**	1							1.101
ACSIZE	.012	.384**	1						1.010
ACIND	.111	.312**	.027	1					1.134
BSIZE	.440**	.323**	.006	.027	1				1.054
BIND	.061	.136	.042	.076	.042	1			1.074
BSKILL	.111	.008	.074	.107	.074	.174*	1		1.010
MGTSKILL	.298**	.016	.071	.167*	.071	.202*	.138	1	1.101
**significant at the 0.01 level, * significant at the 0.05 level.									

The table 3 demonstrates the results of correlation analysis and statistics for variance inflation factor (VIF). Correlation analysis provides the strength of relationships between the variables and VIF provides whether the study involves multicollinearity issues. According to Schober et al. (2018), values of correlation coefficients range from +1 to -1; while 0 denotes no linear association, and the relationship becomes stronger when values scaled within ± 1 . Conversely, correlation co-efficient values lower than 0.15 presents weak, those from 0.15 to 0.35 indicates medium and those bigger than 0.35 shows high linkage between the variables (Hemphill, 2003). Our results indicate that correlation coefficients are less than 0.50 which is consistent with Hemphill (2003). On the other hand, a VIF with less than 2.5 indicates no colinearity problem (Johnston, 2018). The results of the study report that all values of VIF are smaller than 2.5 ensuring that the study is free from multicollinearity issue.

6.2 Regression Analysis

The study employs regression analysis as an inferential tool to test relevant hypotheses. As per the research methodology, firm performance is assumed to be a dependent variable along with different governance-related variables as an independent one. Return on Asset (ROA), Return on Equity, and other

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metrics are used to assess a company's performance (ROE). Thus, two different models are run which resulted in different patterns of relationships. These relationships are discussed below followed by the status of hypothesis testing. Return on asset (ROA) and return on equity (ROE) are two metrics used to evaluate a firm's performance. As a result, two distinct models are run, yielding two different patterns of associations. The state of hypothesis testing is reviewed once these relationships are discussed.

6.2.1 Model 1: Impact of Corporate Governance (CG) Variables on Return on Assets

H	Relationship	Beta	t-value	Sig. (P-value)	Accept/Reject	R ²
H1	B SIZE--->ROA	.333	3.783	.000	Yes	18.8%
H2	BIND---> ROA	.022	0.28	0.775	No	
H3	BSKILL---> ROA	.101	1.3	0.184	No	
H4	MGTSKILL --->ROA	.259	3.3	.001	Yes	
H5	ACSIZE---> ROA	.022	0.27	0.783	No	
H6	ACIND---> ROA	.054	0.70	0.483	No	
Source: Researcher's calculation						

To show the effect of CG variables on ROA, we analyzed the hypothetical relationships among the variables through regression model. Table 4 shows the regression analysis's findings with the beta values, adjusted R² value, t-values, and p-values. These values were employed to make accept or reject decision following the acceptable criteria. The R² value indicates how much of the response variable's variability is explained by the explanatory variables. According to Ozili (2023), R² value of 0.10 or 10% can be acceptable if some of explanatory variables show statistically significant results. Besides, Cohen (1992) provided the following criteria for R² value: 0.12 or less presents low; 0.13 to 0.25 means medium; and 0.26 or bigger than 0.26 provides high effect size. In our results, the R square value of 0.188 specifies that the ROA can be described 18.18% by the CG variables. According to the result, only two hypotheses are accepted. Specifically, the return on asset is positively and significantly impacted by the board size with $\beta=0.333$, $t=3.783$, and $P=0.000$ supporting the H1. Similarly, Management skill level of board members also influences the return on assets positively and significantly with $\beta=0.259$, $t=3.300$, and $P=0.001$ confirming H4.

6.2.2 Model 2: Impact of Corporate Governance Variables on Return on Equity (ROE)

H	Relationship	Beta	t-value	Sig. (P-value)	Accept/Reject	R ²
H1	B SIZE--->ROE	0.639	9.1	0.00	Yes	42.8%
H2	BIND--->ROE	0.053	0.8	.042	No	
H3	BSKILL--->ROE	0.80	1.26	0.20	No	
H4	MGTSKILL --->ROE	0.71	1.09	0.27	No	
H5	ACSIZE--->ROE	0.228	3.4	0.00	Yes	
H6	ACIND--->ROE	0.132	2.04	0.04	Yes	

Source: Researcher's calculation

We conducted the second regression model to evaluate the statistical connotation between the CG variables and ROE in order to demonstrate how the CG variables affect ROE. The results of the regression analysis are displayed in Table 5 together with the beta values, adjusted R² value, t- values, and p-values. The R-squared value (coefficient of determination) indicates the proportion of the variance in the dependent variable that is explained by the independent variables in the regression model. As per the findings, the CG variables can account for 42.8% of the ROE, as indicated by the R square value of 0.428. Based on the calculated results, three hypotheses are accepted. Specifically, the return on equity is positively and significantly impacted by the board size with $\beta=0.639$, $t=9.1$, and $P=0.000$ supporting the H1. Likewise, audit committee members also influence the return on equity positively and significantly with $\beta=0.228$, $t=3.4$, and $P=0.00$ confirming H5. Finally, the last supported hypothesis of this model is H6 with $\beta=0.132$, $t=2.04$, and $P=0.04$ signifying the positive impact of the independent members in the audit committee on the return on equity.

7. Discussion of findings:

Our analysis results show that the board size has significant positive influence on the both return on assets and return on equity as hypothesized in H1. This finding is consistent with previous studies of Soesetioet al. (2023); Anas et al. (2023); Almashhadani & Almashhadani (2022); Almashhadani & Almashhadani (2022) and Khan & Mahmood (2023); implying that the bigger the size of board, the higher the profit performance (ROE and ROA) of the business. Besides, the enhanced number of members on the board can result in combination of diversified knowledge, expertise, diverseness in opinion and information, which in turn effective decision making aimed at boosting the organizational performance (Rasheed & Kim, 2013). According to Soesetioet al. (2023), when board size increases it makes the members more functioning and participative in divulging their views on the meeting that ultimately enhances the problem solving capacity and fruitful decision making through reduction of information biasness. In regard to hypothesis two (H2), our results fail to confirm the impact of board independence on the firm's ROA and ROE which is inconsistent with prior studies (Awad et al., 2023; Hasan et al. 2022) and similar with prior research of Rashid (2018) and Le et al. (2022) meaning that independence of board members can't explain firm performance. The possible reason is that the most of the independent board members coming from outside the company may have different biographical backgrounds that can't fit well the organizational setting which may influence the board's decision-making process. Besides, most of the independent directors are appointed by political consideration in public limited companies. Moving on

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the third (H3), our findings show that firm performance is not influenced by the board skill which is inconsistent with Aripin et al. (2016) and Kabara et al. (2022); consistent with prior studies (Pereira & Filipe, 2022; Sidki et al., 2023). It might be the result that the highly qualified board members may apply their skillfulness to fulfill their self-interest as well (Pereira & Filipe, 2022). With regard to H4, the results indicate that the board member's management skill level is positively related to ROA whereas the ROE is not influenced by the board member's management skill level. Moving on the next (H5) and (H6), the analysis results indicate that the size and independence of the audit committee have a favorable and considerable impact on the company's ROE. The prior studies (Hezabr et al., 2023; Lamido et al., 2022; Awad et al., 2023) also confirm and imply that the larger the audit committee size and higher independence of audit committee members, the bigger will be ROE.

8. Conclusion

Corporate Governance (CG) is currently a well-discussed issue as it is pivotal to ensuring economic advancement and well-being of a nation through efficient usage of resources, gaining healthier access to capital, creating more high-quality employment opportunities, and a better chance of up warding capital markets in a sustained way. This study's main goal is to display the connection between Corporate Governance (CG) characteristics and the firms' performance in terms of Return on Assets (ROA) and Return on Equity in Bangladesh's banking industry. Considering sample of listed banks consisting of the commercial banks (the state-owned, private, and foreign commercial banks) as well as the Islamic banks at DSE, and conducting multiple regression analysis the study found that board size significantly influences the ROA and ROE; whereas board members' management skill is significant for enhancing ROA. Conversely, the audit committee size and audit member's independence are important for increasing performance in terms of ROE and other factors don't have any impact on the performance of banking sectors in Bangladesh. Consequently, we suggest the companies in Bangladesh to incorporate more members on the board of directors with heterogeneous knowledge and skills, increase audit committee members and independent audit committee members in audit committee to convert the corporate governance mechanisms into visible outcomes for the shareholders and the society as well.

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Assessing the Impediment of Women Entrepreneurs: Consideration of Family-Social-Financial (FSF) Issues

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Abstract

The ultimate goal of this research is to evaluate the barriers to women's entrepreneurship development at small and medium-sized businesses (SMEs) and provide recommendations for the SME foundation to assist women in successfully managing their businesses. The design of the empirical study was based on primary data that was gathered using a structured questionnaire. The respondents were selected based on a convenient sampling method and the sample size was 50 women entrepreneurs in Dhaka Metropolitan (DM) area. Data analysis was done using SPSS-23. After the analysis, the empirical result suggests that Family-Social-Financial (FSF) barriers have significantly influenced women's entrepreneurial activities in DM, and regression analysis was done to show what factors contributed most. Thus, the limitation of this research is that it focuses only on a very small research sample size. In addition, most of the respondents in this study were involved with similar types of businesses; consequently, generalizability cannot be made. However, this study makes some useful suggestions for enhancing the policy support for rising female entrepreneurs.

Keywords: Impediment, Women, Entrepreneur, Women Entrepreneur, Family-Social-Financial (FSF).

1. Introduction

Entrepreneurship is widely recognized as a medium of growth of economies all over the world. Women own less than 10% of all businesses in Bangladesh, compared to more than 25% of all businesses in industrialized economies where women are enterprise owners. In Bangladesh, especially in the center of the country, there are several obstacles standing in the way of the growth of women's entrepreneurship. Nevertheless, despite several obstacles, a new class of female entrepreneurs in the SME sector has merged in the nation, accepting the challenge of operating in a male-dominated society, cutthroat, and complex economic and business context.

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Besides the impediments, many women are starting to work outside their homes and many of them are trying to become successful entrepreneurs. Therefore, excluding women from economic mainstream involvement won't result in smooth development. Recognizing its significance, the Bangladeshi Government specifically included several recommendations for fostering the growth of women's businesses in the National Action Plan (NAP). It is noteworthy that Goal 3 of the Millennium Development Goals (MDGs) calls for promoting gender equality and giving women more authority in the areas of politics, work, and education. Thus, it is clear that a lot of research has been done on women entrepreneurs in industrialized countries, but relatively little research has been done in developing nations like Bangladesh. This study provides only a sketchy snapshot of the state of women entrepreneurs in Bangladesh. However, it is impossible to understand the true image of the female business in Dhaka through these observations. We were unable to locate any local study on the challenges faced by women entrepreneurs. Additionally, this study is primarily an effort to investigate the impediment to the development of women entrepreneurs at small and medium-sized businesses in the DM area to addressing the issues and challenges that women face in this division and suggest positive policies based on the study's findings to increase women participation in the SME sector.

2. Conceptual Framework Associated with Hypotheses

2.1 Relationship between Family Barrier (FAB) and Women Entrepreneurship Development (WED)

According to the research, families have an impact on the job decision of their members. For women, especially daughters, the family effects their career selection (Matthews & Moser, 1996). When it hampers women's entrepreneurial careers, the marriage family can act as an inhibitor. This effect rises in prior studies on female entrepreneurship (Goffee & Scase, 1985). Managing entrepreneurship with family responsibilities is always a a troublesome position for most women particularly those with children (Brush, 2006). Women entrepreneurs are discouraged from taking chances for lucrative prospects by societal and cultural attitudes and perceptions. The following hypothesis was raised in line with the above discussion:

H₁: *FAB will have a statistically significant influence on WED.*

2.2 Relationship between Social Barrier (SOB) and Women Entrepreneurship Development (WED)

Women business owners frequently compete fiercely with MNCs as well as male-owned businesses. For female entrepreneurs, it is not easy to survive this competition and accomplish the aim of providing high-quality products at reasonable prices (Gupta & Aggarwal, 2015). Women entrepreneurs do not have enough money to invest heavily in the development of advertising and canvassing organizations. As a result, they confront intense rivalry while marketing their products. Matiwane asserts that female entrepreneurs are facing a lack of necessary financial resources and educational background. Budgeting, setting goals, and understanding corporate performance are necessary for training. According to Mordi et al. (2010), women entrepreneurs have difficulty obtaining financing since they lack managerial and business skills. Tanusia, Marthandan, and Subramaniam (2016) identified several factors that

prevent women from becoming entrepreneurs, including a lack of managerial and entrepreneurial abilities and a lack of education (Gayathridevi, 2014; Benard & Victor, 2013). Significant racial and cultural prejudice has been observed, particularly in the policy and legal environments and institutional clench mechanisms (Otunaiya et al., 2013). Separation of men and women is the norm in successive Muslim communities and it has its problems. Female business owners defend their privacy and seek a workplace where they can operate alone or with little interaction from men (Itani et al., 2011). Female business owners are motivated to start and grow their companies because of the security they receive. Recently, they have a realization that their company offers them a secure job, recognition, cash, and flexibility (Maas & Herrington, 2011). The above discussion leads this study to posit the following hypothesis:

H₂: *SOB will have a statistically significant influence on WED.*

2.3 Relationship between Financial Barrier (FIB) and Women Entrepreneurship Development (WED)

The biggest business start-up issues for the "Typical" women entrepreneurs, according to Hisrich and Brush (1984); nationwide in-depth survey of women entrepreneurs, were credit and a lack of funding. The maximum problem found was the lack of financial planning experienced by women. Researchers underline that the largest obstacle facing female entrepreneurs is access to capital (Obi, Okechukwu, & Egbo, 2017). When Women entrepreneurs establish, manage and grow their ventures, face many challenges and the most crucial of these barriers is finance (Mordi et. al., 2010). Lack of credit history, lack of collateral, assets registered in the husband's name, inability to qualify for loans due to strict bank requirements, and lack of business and management experience are specific financial issues that affect women entrepreneurs (Mordi et. al., 2010). Based on the above findings and arguments of prior researchers, this study proposes the hypotheses as follows:

H₃: *FIB will have a statistically significant influence on WED.*

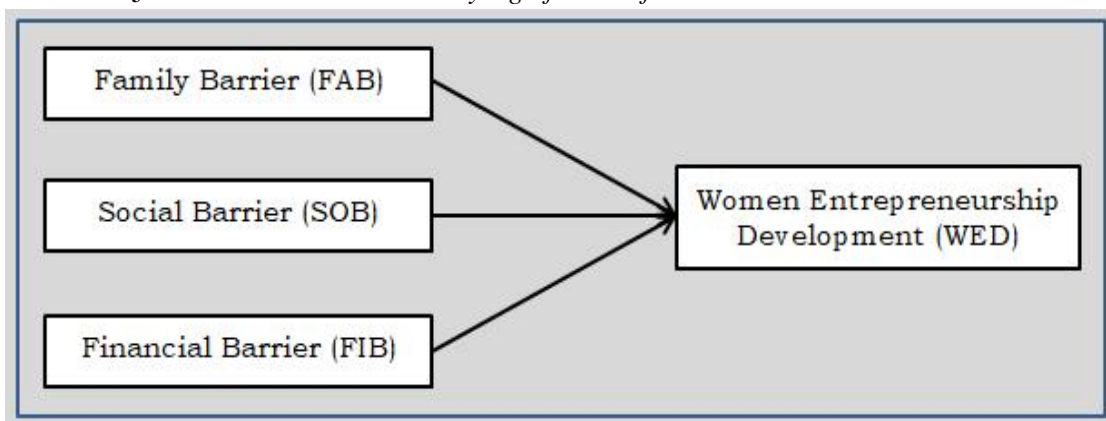


Figure - 1: Conceptual Framework

Women's empowerment as well as entrepreneurship is an essential component of the conversation about economic growth everywhere in the world and in any national development

project (Ratten & Tajeddini, 2018). Since participation in numerous development initiatives is a requirement for women's empowerment, it is evident that women who engage in a variety of entrepreneurial endeavors have gained influence in the social, economic, and cultural spheres (Tajeddini et. al., 2017). Over the years, Bangladesh has excelled in its economic system, educational advancement, social transformations, and living conditions. Through educational and job-training options, the dark ages of confining women inside have been replaced by female empowerment. The biggest improvement is shown in the rising proportion of women business owners in Bangladesh and internationally. (Amaradiwakara & Gunatilake, 2016). However, a complete theoretical framework is still elusive despite the issue's significant academic and commercial interest. *Figure-1* depicts the theoretical framework by following literature review. In this framework, researchers deliberate that FAB is significantly associated with WED (H_1), and also SOB is significantly associated with WED (H_2), and FIB is significantly associated with WED (H_3).

3. Methodology of the Study

This empirical study investigated obstacles faced by female business owners in Dhaka Metropolitan (DM) City. For concluding this research, only quantitative research methodologies were employed. Data for this study was only gathered from primary sources. To fulfilling the ultimate objective of this study, a questionnaire was formed to gather primary data. The responses of the respondents replied their views and perception of the survey ranges from Strongly Agree (5) to Strongly Disagree (5) on a 5-point Likert scale. Face-to-face interviews with individuals were used to gather primary data. In this study, the dependent variable was the development of women entrepreneurs, and the independent variables were the issues that women entrepreneurs experienced in their family-social-financial (FSF) life as a result of particular conditions. The DM city region has functioned as the study's location. The study's target population was all the female business owners in the capital city of Bangladesh and, the sample size was 50 women entrepreneurs. Respondents were interviewed face-to-face conversation. The respondents were selected based on a convenient sampling method. Data analysis was performed using the Statistical Package for Social Sciences (SPSS)-23. In SPSS, descriptive statistics were conducted to determine the current situation as well as the relation between women entrepreneurship development of rural women in the SMEs sector and the economic empowerment of rural women. Several factors were associated with this and regression analysis was done to show what factors contributed most.

4. Discussions and Findings

4.1 Demographic Characteristics of the Respondents

According to the result of this empirical study, 94 percent of the respondents are married, 4% are single, and 2% had experienced a divorce. The age group 36-45 years shows the highest (46%) concentration and the age group 26- 35 years is the 2nd highest (44%) concentration. Only 8% are more than 45 years and 16-25 years women are relatively low and that is only 2%. Most of them are educated. It has been found that 34% of the respondents have completed graduation, 12% have been completed post- graduation, 22% have completed S.S.C. level, 18% have completed H.S.C. level and only 14% are below S.S.C. While they were asked about the

experience, maximum replied more than 7 years and that ratio is 48%. 24% of women have 5-7 years' experience, 4% have less than 1 year and 24% have 2-4 years' experience. Here it is clear that they are not new in this sector because maximum is experienced.

Table – 1: Demographic Characteristics of the Respondents

Variable	Attribute	Frequency	Percent (%)
Marital Status	Married	47	94.0
	Unmarried	2	4.0
	Divorced	1	2.0
	Total	50	100.0
Age	16-25 Years	1	2.0
	26-35 Years	22	44.0
	36-45 Years	23	46.0
	More than 45 Years	4	8.0
	Total	50	100.0
Educational Background	Below S.S.C.	7	14.0
	S.S.C.	11	22.0
	H.S.C.	9	18.0
	Graduation	17	34.0
	Post-Graduation	6	12.0
	Total	50	100.0
Experiences	Less than 1 year	2	4.0
	2-4 years	12	24.0
	5-7 years	12	24.0
	More than 7 years	24	48.0
	Total	50	100.0
Reasons behind Doing Business	For being self-dependent	11	22.0
	Interest in business	2	4.0
	Providing services	1	2.0
	Self interest	7	14.0
	Self-interest and husband's inspiration	1	2.0
	Supporting family	23	46.0
	Time pass	2	4.0
	Time pass as well as self interest	3	6.0
	Total	50	100.0
Current Amount of Investment in Business	Below 100000 Tk.	11	22.0
	100000-200000 Tk.	21	42.0
	200000-300000 Tk.	9	18.0
	300000-400000 Tk.	4	8.0

	Above 400000 Tk.	5	10.0
	Total	50	100.0
Occupational Background of Father's or Husband's	Business	31	62.0
	Govt. Service	9	18.0
	Private service	8	16.0
	Rickshaw puller	1	2.0
	Total	50	100.0

Everyone is different and their reason for doing business is also different. Here, 46% doing business for supporting family, 22% for being self-dependent, 14% for self-interest, 6% for time pass as well as self-interest, 4% for interest in business, 2% for providing services, 4% for time pass and 2% for self-interest and husband's inspiration. So it is a clear maximum of the women in DM city run their businesses for supporting their families as well as themselves. In the case of investment 42% have 100000-200000 Tk., 22% have below 100000 Tk., 18% have 200000-300000 Tk., and 8% have 300000-400000 Tk. And 10% have above 400000 Tk. The result of the table makes it evident that the majority of women in the DM city area have little money to invest in their businesses. As maximum of them are running the business for supporting families and themselves and if the investment becomes higher than the present, it would be quite easier for them to maintain their expenses. Moreover, the women who are doing business, maximum women come from those families where the other members of the family are also related to business. In some cases, both husband and wife are related with the same profession as well as business. When they are asked about their occupational background as father or husband 62% replied business, 18% government services, and 16% private services.

4.2 Descriptive Statistics of the “Problems faced by women entrepreneurs in DM city area”

We have seen in this research, Bangladeshi family tie is a serious problem for entrepreneurship. In maximum family, women are not allowed to do business or go outside. But in the DM city area, we can see the opposite picture. When they are asked about their family support 62% of women strongly agree, and 26% agree. Only 8% disagree and 2% strongly disagree. So it is clear that in the 21st century the situation for women is less challenging and the mentality of the people is changing towards working outside the home. We are really being developed day by day. Family members are supportive nowadays. They can easily get help when they need in every aspect of their life. In the case of getting help from family members for running their business, 62% strongly agree and 26% agree that is very positive. There is no doubt that the women in this area will be very successful one day with the help of their family members. In DM regions, it is found by researchers that family members of maximum women entrepreneurs are not supportive, as well as, do not help in their business. At the same time, the family members are not happy with their profession. But in the DM area, the result is totally surprising. In the case of happiness of her profession, 60% strongly agree, and 26% agree that is a very positive sign for women's entrepreneurship development. This study has also found some women are doing business only for the inspiration of their husbands as well as family members. Social barriers affect every aspect of life. It can be hardly found where there do not exist any

social barriers. Women entrepreneurship development is not out of this sector. Society is a great barrier to going ahead. 92% strongly agree and 6% agree with the statement of social barriers are the main obstacles to being a women entrepreneur. On every walk, they have to hear a bad words from them. Harassment from different age's people is very common for women entrepreneurs. Only 28% strongly agree, 34% agree, 12% are neutral, 20% disagree, and 6% strongly disagree with the notion that society treats my business positively. So in that society, being a successful woman in entrepreneurship is quite tough. We are still living in male-dominated society. So it is impossible to get equal opportunity in the male dominated society. 64% women said that they didn't get equal opportunity in the male-dominated society. Only 14% of women said that they get equal opportunities like men in this society. Doing business in male-dominated society is very challenging. 78% of women strongly agree and 18% agree with the statement that there are barriers to doing business in male-dominated society.

Table-2: Descriptive Statistics of the "Problems faced by women entrepreneurs DM city area"

Barriers	Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Total
FAB (X₁)	I have family support for being an entrepreneur. (X ₁ -i)	2.0	8.0	2.0	26.0	62.0	100.0
	My family members always help me to run my business. (X ₁ -ii)	4.0	8.00	0.0	26.0	62.0	100.0
	My family members are happy with my profession. (X ₁ -iii)	4.0	10.0	0.0	26.0	60.0	100.0
SOB (X₂)	Social barriers are the main obstacles to being a women entrepreneur. (X ₂ -i)	2.0	0.0	0.0	6.0	92.0	100.0
	Society people treat my profession positively. (X ₂ -ii)	6.0	20.0	12.0	34.0	28.0	100.0
	I get equal opportunity as a male in the male dominated society. (X ₂ -iii)	8.0	64.0	6.0	14.0	8.0	100.0
	There are barriers to doing business in male-dominated society. (X ₂ -iv)	2.0	0.0	2.0	18.0	78.0	100.0
FIB (X₃)	I have a lack of finance. (X ₃ -i)	2.0	0.0	0.0	4.0	94.0	100.0
	I get loans easily from any financial institution. (X ₃ -ii)	68.0	30.0	0.0	0.0	2.0	100.0
	My family provides me with finance when I need it. (X ₃ -iii)	2.0	4.0	2.0	74.0	18.0	100.0
	I need more capital for my present enterprise. (X ₃ -iv)	2.0	8.0	0.0	0.0	90.0	100.0

[Note: SD = Strongly Disagree, D = Disagree, N = Neutral, SA = Strongly Agree, A = Agree]

For women, the accumulation of capital is very tough. So it is found in this research that 94% of women lack finance. Only 2% of women are found who don't have a lack of finance. A loan facility for women is very rare. Some NGOs give them a little amount of loan but they charge high interest. For this reason in maximum cases, it is not possible to afford it. They also mentioned that they don't get a loan from any government bank or financial institutions. So government should come forward in this sector. With the statement, I get loans easily from any financial institutions, 68% strongly disagree, and 30% disagree. Only 2% of women are found who agreed. In Maximum cases when they need finance they get it from their family. 74% of women agree and 18% of women strongly agree that their family provides them with finance when they need it. With the statement, I need more capital for my present enterprise, 90% strongly agree, 8 % agree and 2% strongly disagree. So it is clear that women in city are facing financial problems extremely.

4.3 Result of Model Summary, ANOVA, and Coefficient

4.3.1 Model Summary

The R Square score is 0.603 according to the regression analysis model summary table. This shows that the independent variable may account for 60.3% of the dependent variable which has an opportunity for business expansion DM city area. The remaining 39.7% of the dependent variable is explained by other variables that aren't considered in this study.

Table - 3: Model Summary

Model Summary				
	R	R Square	Adjusted R Square	Std. Error of the Estimate
Model-1	.776a	.603	.525	.300

4.3.2 ANOVA

We can see from the result of table-4 that the independent variable's P value is.000, which is less than the alpha value of 0.05. So, the alternative hypothesis is accepted and the significance value indicates these factors have a significant influence on the SME businesses which had been run by women entrepreneurs.

Table - 4: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Model-1	Regression	5.592	8	.699	7.772	.000a
	Residual	3.688	41	.090		
	Total	9.280	49			

4.3.3 Coefficient

In addition to the significance and beta values for FAB (= 0.794, $p = 0.000^{**}$), SOB (= 0.109, $p = 0.000^{**}$), and FIB (= 0.021, $p = 0.007^{**}$) have a statistically significant relationship with WED. At a 5% level of significance, the entire alternative hypothesis for this study was accepted, confirming that these three barriers have a statistical impact on women's entrepreneurship development. According to the results of multiple regression analysis,

obstacles related to family-society-financial (FSF) have a statistically significant impact on WED.

Table - 5: Coefficient

Hypothesis	Path		Significance	Result
H ₁	X ₁ -----> Y	0.794	0.000**	Accepted
H ₂	X ₂ -----> Y	0.109	0.002**	Accepted
H ₃	X ₃ -----> Y	0.021	0.007**	Accepted
H ₄	X ₄ -----> Y	0.092	0.009**	Accepted

5.0 Conclusion, Recommendations, and Limitations of the Study

5.1 Conclusion

In Bangladesh, women's entrepreneurship is currently a rapidly growing phenomenon. However, businesswomen actively participate in economic activities and strive to increase the success of their country. Furthermore, women are mentally geared to slip into an entrepreneurial activity because of their family support, restricted mobility, financial problem, negative attitude toward authority, lack of model, the problem of the market, and limited resources. They will be capable of overcoming these limitations by following the direction and proper guidelines. The current study shows that the majorities of entrepreneurs are 36-45 and they were from different areas migrating. This empirical survey's finding is that women are interested in a wide range of businesses. In addition, most of the cases indicate that they were previously employed by others as a worker from whom they obtained their ability to work and then only started their businesses in those regions. This study makes it abundantly clear that the main obstacle to the development of entrepreneurship in the DM area is still a lack of capital. The future of small and medium-sized businesses for urban women is promising, which is important for the emerging economy of Bangladesh. This sector can be absorbed by trained and educated women from the DM region. They will progressively enter the field of entrepreneurship, establish their value via operational effectiveness, expand outside of the home market, and considerably boost Bangladesh's economy.

5.2 Recommendations and Limitations of the Study

The findings of the study offer the following recommendations for further enhancing the accurate growth of women entrepreneurs in Bangladesh, notably in the DM area - (i) To overcome the obstacles facing women entrepreneurs, the government should put measures into place and raise awareness. (ii) To create specialized, affordable training programs to assist female entrepreneurs in obtaining education and training to overcome obstacles. (iii) To expand the research program on the development of women's businesses and to give the government financial support to these initiatives. The primary drawback of this study is that it primarily examines the difficulties faced by female entrepreneurs who operate their businesses in the DM area, indicating a very tiny research sample size. In addition, most of the respondents in this study were involved with similar types of businesses consequently generalizability cannot be made.

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Financial Diagnosis Using CAMELS Approach: A Comparative Analysis of Public and Private Sector Banks in Bangladesh

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Abstract

The study aims to reveal the comparative performance evaluation of public and private sector banks of Bangladesh using the CAMELS rating system over a period of 5 years ranging from 2015 to 2019. The sample consisted of 20 banks (15 private and 5 public), and the entire analysis is conducted using secondary data. Various financial ratios and statistical tools are used to analyze the acquired data. In this study, an effort has been made to rank the selected banks. Independent sample t-test has been used to analyze the significant differences in individual CAMELS parameter between both sectors. The findings highlighted that in the parameters of C, A, M, and E, private sector bank is found to be better than the public sector, whereas the parameter of L and S of public sector is found to be better. The empirical result highlighted that there is a statistically significant difference between private and public sector banks in Bangladesh in all the parameters of the CAMELS model. Since the study is constrained to the sample banks and shorter time period further study in this field with a longer time period, more banks and also on other financial institutions are recommended.

Keywords: *CAMELS Approach, Public Sector Banks, Private Sector Banks, Comparative Performance Evaluation, Bangladesh.*

1. Introduction

The banking industry is one of the most important measures of a country's development. Bangladesh is not an exception. Bangladesh's banking industry is basically divided into two categories. The first one is Specialized Banks (SBs) and the second one is Commercial Banks (CBs). The banking industry in Bangladesh is now experiencing a slow-motion banking crisis, primarily affecting government-owned banks along with some private sector banks (Mahmood, 2019). Banking sector in Bangladesh is going to face a difficult period and this sector has been struggling to survive in the last couple of years. Most of the banks are in trouble regarding loan default, high non-performing loans, and other issues (Ahmed, 2021). If the banks are stable and managed efficiently, people's needs can be met, and the bank's profit will rise (Panboli and Birda, 2019). To measure their assets quality, management quality and efficiency, and achievement of their objectives and to ascertain their earning quality, liquidity, capital adequacy, and level of bank services, banks need to evaluate their performance (Rengasamy, 2012). The fundamental goal of this performance measurement is to keep banks on track and to effectively manage all of the banks' risk concerns (Babar, 2011). There are numerous studies on banking performance evaluation. CAMELS framework, which is one of the most important analyses for performance evaluation of banking sector, compares the important parameters that reflect the results of banking sector performance (Zagherd and Barghi, 2017). For these reasons, the study tried to reveal the comparative performance evaluation of public and private sector banks. This evaluation has been expressed based on some selected public and private banks in our country using the CAMELS rating system. Although many journals and articles have been published based on the CAMELS model, most of them have used only the CAMEL model set

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aside the “S” portion. This paper tried to use the CAMELS components in the most effective way that will clearly dissociate this paper from others and also make the paper more sophisticated and significant.

2 Literature Review

2.1 Theoretical Framework

CAMELS is a rating system through which banking companies are categorized based on 6 different aspects and assess the overall strength, safety, and soundness of each individual banking company. To make the CAMEL rating system more risk-focused, a sixth component relating to Sensitivity to Market Risk has been included (Veena, 2017). The CAMELS acronym stands for "**Capital adequacy, Asset quality, Management efficiency, Earnings quality, Liquidity management, and Sensitivity to market risk.**" Banking companies are assigned two sets of ratings under CAMELS model: an individual rating and an overall composite rating.

Table 1: Description of *CAMELS Parameter*

Parameter	Description
Capital Adequacy	Capital adequacy is a measure of a bank's ability to absorb a reasonable amount of losses or cushion against an acceptable level of losses before going bankrupt (Abba, Okwa, Soje, & Aikpitanyi, 2018).
Asset Quality	The quality of an asset is of paramount importance since it has a direct impact on income, cash flow, solvency, and liquidity (Kumar & Alam, 2018).
Management Efficiency	When a bank's management controls costs and boosts productivity, resulting in increased profits, it is referred to as excellent management or skilled management (Ahsan, 2016).
Earnings Quality	It assesses a bank's ability to generate regular earnings in order to maintain operations, expand, and remain competitive (Iheanyi & Hyginus, 2017).
Liquidity Management	The ability of a bank to meet financial obligations as they become due without suffering intolerable losses is referred to as liquidity (Venkatesh & Suresh, 2014).
Sensitivity to Market Risk	Sensitivity to market risk refers to how resistant a bank's assets, liabilities, and net worth are to changes in market circumstances such as interest rates, exchange rates, and inflation risk (Yuksel, Dincer, & Hacıoglu, 2015).

Source: Compiled by authors

2.2 Empirical Review

Hossain, Islam, Mahmud, & Islam (2017) used secondary data, the CAMEL model, and other pertinent statistical tools to analyze and compare the financial performance of Islamic and conventional commercial banks operating in Bangladesh from 2011 to 2015. According to the study, Islamic banks outperform conventional banks in terms of capital sufficiency, asset quality, management competence, and earning capacity. However, compared to conventional banks, Islamic banks had a weaker liquidity position. The study also discovered that, aside from liquidity position, there are no real differences between the two banking categories. Rahman and Islam (2018) used the CAMEL rating framework to look at the performance of 17 private commercial banks in Bangladesh from 2010 to 2016 in terms of CAMEL ratios. The average Capital Adequacy Ratio of all banks was determined to be substantially higher than the Bangladesh Bank-mandated norm. According to the study, Bangladesh Bank should pay special attention to the banks with the highest NPL ratio. Rahman and Nitu (2018) analyzed the

performance between state owned and private commercial banks in Bangladesh through CAMEL approach based on six state-owned banks and six private commercial banks over the years 2010 to 2014. Private commercial banks were clearly seen as being more financially sound than state-owned banks. The study's findings also revealed that there was no substantial difference in terms of A, M, and E parameter. In the study of Islam & Sufian (2019), a CAMEL approach evaluation of the commercial bank's performance and financial soundness has been made. The study was carried out to evaluate the financial status of the five commercial banks operating in Bangladesh, and data for five years, from 2014 to 2018, was collected. Based on the CAMEL approach, Haq and Nasrin (2020) revealed benchmarking and rating of private commercial banks in Bangladesh through CAMELS components. According to the study, the majority of private commercial banks have adequate capital. These banks' earnings performance was more or less worthy. Their P/E ratio was also sensible. The banks, on the other hand, were having difficulties with their categorized loan. Those banks' managerial efficiency was very modest, and their liquidity performance was not satisfactory. The article of Mahmud & Rahman (2020) assesses the financial soundness of Islamic and conventional PCBs operating in Bangladesh from 2015 to 2019. The authors choose a sample of 6 Islamic PCBs and 17 Conventional PCBs that are traded on the Dhaka Stock Exchange. None of the banks are found to have strong or satisfactory financial soundness in 2019 according to the composite CAMEL ratings. The performance of Islamic banks and conventional private commercial banks in Bangladesh over the period of 2015 to 2019 is analyzed and evaluated in the paper of Akber & Dey (2020). The CAMEL test served as the foundation for the analysis in this paper. The study's findings indicate that, aside from management quality, there is no discernible difference in performance between traditional private commercial banks and Islamic banks in Bangladesh using the CAMEL test. Traditional private commercial banks perform better in terms of asset quality and management quality, but for capital adequacy and liquidity position Islamic banks perform better in Bangladesh. Islam, Hossain, and Roy (2021) provided a performance evaluation of private 13 commercial banks in Bangladesh with CAMELS rating approach from 2016 to 2018. In terms of consolidated result the study showed all banks' capital adequacy ratios were found to be much higher than the benchmark. Because Uttara Bank's NPLs were substantially larger than those of the other banks, Bangladesh Bank should recommend corrective actions to mitigate the bank's possible losses as a result of the increased NPLs. Employing the CAMEL approach this study examines the financial health of Bangladeshi banks and the variables influencing it from 2010 to 2015 for 35 banks (Afroj, 2022).

Srinivasan and Saminathan (2016) conducted a complete analysis of the major commercial banks operating in India using the CAMEL technique. The empirical findings revealed that the CAMEL ratios of the selected Public Sector Banks, Private Sector Banks, and Foreign Banks in India differ statistically significantly. Purohit & and Bothra (2018) used the CAMEL model to assess the comparative performance of total two public and private sector banks in India. It was ultimately determined that ICICI has to increase its capital sufficiency and asset quality, while SBI needs to improve its management efficiency, earnings quality, and liquidity. Khan (2018) attempted to uncover the relative financial status, performance, and comparative analysis of public and private sector banks in India, over a five-year period from 2013 to 2017. Under the five headings of this model, eighteen ratios have been calculated. The differences in the computed ratios of the banks were then analyzed using an independent sample t-test. The performance of private sector banks has been proven to be superior to that of public sector banks in every way. Samuel (2018) has investigated the comparative performance evaluation of selected commercial banks in India using the CAMELS rating model. The researcher attempted to compare the performance of these three banks: Syndicate Bank came in first, Canara Bank came in second, and Indian Overseas Bank came in third. Beevi (2018) has evaluated the performance of public and private sector

banks in India adopting CAMEL model. This study covered the period of three years 2010-2012 where conclusion was made based on the mean value of used ratios represented each parameter of this model. The study opined that, public sector banks perform better financially when compared to private sector banks. Panboli & Birda (2019) investigated the performance of a number of public and private sector banks in India. For this study, five private sector banks and five public sectors were considered for 2012-13 to 2016-17 (5 years). It stated that the private sector outperformed the public sector across the board in all CAMEL model parameters and sub-parameters. Mayakkannan and Jayasankar (2020) attempted to highlight the relative financial status and position of chosen public and private banking sectors, as well as the results from 2015 to 2020. The study focused on India's top 10 public and private sector banks. According to the findings, Public sector banks were ranked first in the overall performance chart followed by private sector banks. Zagherd and Barghi (2017) used CAMELS framework to evaluate performance of Iranian Banking Industry. A total of 17 banks operated in Iranian banking industry were selected for the time domain of 2007-2014. According to the test, C, A, M, L and S have a significant impact on the return on asset of the Iranian banking industry. On the other hand, earnings quality (E) had no significant impact on return on asset of Iranian banking industry.

Rahman and Islam (2018), Islam & Sufian (2019), Haq & Nasrin (2020), Islam, Hossain, and Roy (2021), only have centered on the overall performance of private sector banks in exceptional countries where Rahman and Nitu (2018) in the perspective of Bangladesh, Purohit and Bothra (2018), Khan (2018), Beevi (2018), Panboli & Birda (2019) in the perspective of India have been made comparative assessment for public and private sectors banks. It can be observed that there are only a few comparative analyses of private and public zone banks in Bangladesh, in which in most instances the “S” parameter is absent. It could be due to the unavailability of facts representing the “S” parameter. In Bangladesh, most of the research have nearly targeted at the private zone’s monetary function evaluation. That is why this paper has been originated to expose the comparative evaluation of public and private sector banks in Bangladesh through the use of the CAMELS approach.

3. Methodology and Data Collection

3.1 Data Collection:

The research is based on Analytical Research Design that is quantitative in nature. The research spans five years, from 2015 to 2019. The data used for this paper is mainly secondary data collected from published annual reports of selected banks. More data is also gathered from Bangladesh Bank's annual reports, banking bulletins, associated websites, journals, newspapers, and numerous periodicals. In this study, 15 private sector banks and 5 public sector banks were selected based on the availability of the data needed for the CAMELS Model.

3.2 Variables and Research Methods:

A very simplified and well known method CAMELS rating approach has been employed here. In this paper, first of all the required and relevant ratios representing each parameter of CAMELS model has been calculated. Then bank’s individual ranking system has been employed based on each sub-parameter/ratio (like, Capital Adequacy Ratio, Debt/Equity Ratio). A composite ranking for each parameter of selected banks has been created combining all the sub parameters of the major parameter. Eventually, a Composite CAMELS ranking system was created by averaging the ranks of all CAMELS parameters for each bank which is in line with the research report by Srinivasan and Saminathan (2016), Rahman and Islam (2018) and Islam, Hossain, and Roy (2021). Microsoft Excel and Statistical Package for Social Science (SPSS) 26 software have been used for independent sample t-test required for stated

hypothesis testing. Chronological steps of analysis are: Ratio Analysis, Arithmetic Mean, Standard Deviation, Average, Rank, Composite Ranking and Independent sample t-test for hypothesis testing. Test result can be drawn on the basis of two criteria. If the $t_{\text{critical}} < |t_{\text{calculated}}|$ in case of two tail- test at 5% significance level, then null hypothesis is rejected otherwise accepted. The second criterion is P-value. If $P\text{-value} < 0.05$ then hypothesis testing is significant (McLeod, 2023).

Table 2: Studies Related to CAMELS Sub-parameters

Parameter	Sub-parameter	Evaluation Criteria	Author
Capital Adequacy	Capital Adequacy Ratio (CAR): Tier I + Tier II Capital/ Aggregate of Risk Weighted Asset (RWA)	Higher The Better	(Purohit and Bothra, 2018), (Khan, 2018), (Samuel, 2018), (Beevi, 2018)
	Equity-to-Asset ratio (TE/TA)	Higher The Better	(Panboli and Birda, 2019)
	Advance to Asset Ratio (Adv./TA)	Higher The Better	(Purohit and Bothra, 2018), (Khan, 2018), (Beevi, 2018)
	Govt. Securities/Investment Ratio (GS/II)	Higher The Safer	(Purohit and Bothra, 2018), (Khan, 2018), (Rahman and Islam, 2018)
Asset Quality	Non-performing Loans to Total Loan (NPL)	Lower The Better	(Haq and Nasrin, 2020)
	Total Investment to Total Assets (TI/TA)	Lower The Better (Depends on bank's needs and circumstances)	(Purohit and Bothra, 2018), (Beevi, 2018)
	Fixed Assets to Total Assets (FA/TA)	Lower The Higher Solvent	(Yuksel, Dincer, and Hacıoglu, 2015)
Management Efficiency	Total Advance to Total Deposit (ADR)	Higher The Better (Depend on bank's circumstances)	(Purohit and Bothra, 2018), (Khan, 2018), (BEEVI, 2018)
	Business Per Employee (BPE)	Higher The Better	(Purohit and Bothra, 2018), (Khan, 2018), (Samuel, 2018), (Beevi, 2018)
	Profit Per Employee (PPE)	Higher The Greater Productivity	(Purohit and Bothra, 2018), (Khan, 2018), (Samuel, 2018), (BEEVI, 2018)
Earnings Quality	Return on Asset (ROA)	Higher The Better	(Purohit and Bothra, 2018), (Khan, 2018)
	Net Interest Income to Total Asset Ratio (NII/TA)	Higher The Better	(Rahman and Nitu, 2018)
	Cost Income Ratio (OE/OI)	Lower The Better	(Srinivasan and Saminathan, 2016)
Liquidity Management	Cash to Total Asset Ratio (Cash/TA)	Higher The Better	(Srinivasan and Saminathan, 2016)
	Liquid Assets to Total Assets (LA/TA)	Higher The Better	(Purohit and Bothra, 2018), (Khan, 2018), (Samuel, 2018)
	Liquid Assets to Total Deposit (LA/TD)	Higher The Better	(Purohit and Bothra, 2018), (Khan, 2018), (Samuel, 2018), (Beevi, 2018)
	Total Asset to Total Sector Asset (TA/TSA)	Higher The Better	(Yuksel, Dincer and Hacıoglu, 2015)

Sensitivity to Market Risk	Total Deposit to Total Sector Deposit (TD/TSD)	Higher The Better	(Yuksel, Dincer and Hacıoglu, 2015)
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Source: Compiled by authors

4. Empirical Results and Interpretations

Table 3: Capital Adequacy

Ratio	Bank	Mean	S.D	t-value	p-value	Hypothesis Result	Significance of Test
CAR(%)	Pvtsbs	12.8780	0.8780	2.572	.033	Ho: Rejected	Significant
	Psbs	10.3040	2.0588				
TE/TA(%)	Pvtsbs	7.7620	0.4886	-5.913	.000	Ho: Rejected	Significant
	Psbs	11.5340	1.3402				
Adv/TA(%)	Pvtsbs	69.9740	2.3087	11.183	.000	Ho: Rejected	Significant
	Psbs	48.8600	3.5345				
GS/TI(%)	Pvtsbs	86.5600	1.4790	6.616	.000	Ho: Rejected	Significant
	Psbs	69.0160	5.7422				

Source: Output of IMB SPSS_26

It is evident here that all banks have not maintained the required level 12.5% of CAR according to BB guidelines. Where private sector banks on average maintained the prescribed level but the public sector retained only average of 10.30%. In terms of TE/TA ratio public sector bank is the top position with highest average of 11.53% followed by private sector 7.76%. In terms of Advance/Asset ratio private sector is the highest position with highest average of 69.97% followed by public sector 48.86% only. And finally in terms of Govt. Securities/Investment ratio private sector is in the safest position with average of 86.56% followed by public sector 69.02%. Public sector banks have higher risk for maintaining adequate capital to absorb reasonable amount of losses. All the hypothesis testing are significant.

Table 4: Asset Quality

Ratio	Bank	Mean	S.D	t-value	p-value	Hypothesis Result	Significance of Test
NPL(%)	Pvtsbs	5.9600	0.83642	-22.491	.000	Ho: Rejected	Significant
	Psbs	33.1040	2.56581				
TI/TA(%)	Pvtsbs	13.7340	1.77835	-5.211	.001	Ho: Rejected	Significant
	Psbs	25.5420	4.74496				
FA/TA(%)	Pvtsbs	1.4360	0.16149	-13.060	.000	Ho: Rejected	Significant
	Psbs	4.1500	0.43572				

Source: Output of IMB SPSS_26

It is found that, private sector banks secured top position with lowest average in NPL, TI/TA and FA/TA ratio. Public sector has higher risk for not maintaining qualitative asset quality because of high NPL as also a higher portion of total asset employed into fixed asset.

Table 5: Management Efficiency

Ratio	Bank	Mean	S.D	t-value	p-value	Hypothesis Result	Significance of Test
ADR(%)	Pvtsbs	83.7200	1.46712	6.909	.000	Ho: Rejected	Significant
	Psbs	68.0520	4.85428				
BPE(mln. Tk.)	Pvtsbs	134.8860	18.1711	5.107	.001	Ho: Rejected	Significant
	Psbs	86.0960	11.2291				
PPE(mln. Tk.)	Pvtsbs	2.0220	0.23059	10.380	.000	Ho: Rejected	Significant
	Psbs	0.5740	0.21007				

Source: Output of IMB SPSS_26

Public sector's productivity and efficiency in management is not satisfactory because of poor performance in all of these three sub parameters. Public sector banks have higher risk for ADR ratio compared to private sector. But for BPE and PPE both private sector have higher risk than public sector.

Table 6: Earnings Quality

Ratio	Bank	Mean	S.D	t-value	p-value	Hypothesis Result	Significance of Test
ROA(%)	Pvtsbs	1.0260	0.1282	4.811	.001	Ho: Rejected	Significant
	Psbs	(0.3680)	0.6350				
NII/TA(%)	Pvtsbs	2.2400	0.2171	10.417	.000	Ho: Rejected	Significant
	Psbs	0.0240	0.4232				
OE/OI(%)	Pvtsbs	49.8380	1.1990	-21.974	.000	Ho: Rejected	Significant
	Psbs	88.2320	3.7185				

Source: Output of IMB SPSS_26

It implies that private-sector banks are better able to cover operational costs with the operating income they generates. This is the sign of better earnings quality, ability and reliability of private sector banks. Public sector banks have higher risk to produce earnings consistently and remain competitive, expanding its activities. On an average, public sector's sustainability and growth in earnings is very pathetic. The lower earning capacity is a sign of hopeless growth and productivity of public sector banks.

Table 7: Liquidity Management

Ratio	Bank	Mean	S.D	t-value	p-value	Hypothesis Result	Significance of Test
Cash/TA(%)	Pvtsbs	6.7040	0.4813	4.118	.003	Ho: Rejected	Significant
	Psbs	5.5080	0.4358				
LA/TA(%)	Pvtsbs	10.4460	1.0019	-3.687	.006	Ho: Rejected	Significant
	Psbs	14.5120	2.2535				
LA/TD(%)	Pvtsbs	13.7320	1.1956	-5.426	.001	Ho: Rejected	Significant
	Psbs	22.6580	3.4788				

Source: Output of IMB SPSS_26

The public sector banks are ranked top in liquidity management criteria because of the highest average in LA/TA and LA/TD ratio but a trade-off between liquidity and profitability exists here as risk. Public sector banks face higher risk holding higher standard deviation.

Table 8: *Sensitivity to Market Risk*

Ratio	Bank	Mean	S.D	t-value	p-value	Hypothesis Result	Significance of Test
TA/TSA(%)	Pvtsbs	2.0100	0.0235	-20.030	.000	Ho: Rejected	Significant
	Psbs	4.6160	0.2901				
TD/TSD(%)	Pvtsbs	2.0260	0.0261	-19.62	.000	Ho: Rejected	Significant
	Psbs	4.9020	0.3268				

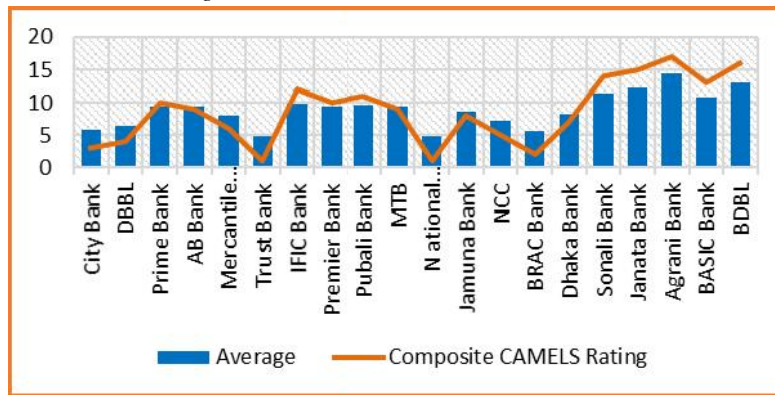
Source: *Output of IMB SPSS_26*

With average TA/TSA and TD/TSD ratios of 4.62 and 4.90 respectively, public sector banks were rated first, followed by private sector banks. There is an inverse relationship between a bank's size and its sensitivity to market risk (the risk of failure as a result of poor market circumstances) (Dincer, Gencer, Orhan, & Sahinbas, 2011). It indicates that public sector banks are less vulnerable to market risk and have greater ability to cope with the danger of failure as a result of poor market conditions.

Table 9: *Composite CAMELS Rating*

Bank	Rank						Average	Composite CAMELS Ranking
	C	A	M	E	L	S		
City Bank	4	5	11	4	2	9	5.83	3
DBBL	5	3	16	8	1	6	6.5	4
Prime Bank	1	13	12	14	10	7	9.5	10
AB Bank	11	9	2	13	16	5	9.33	9
Mercantile Bank	6	4	4	9	17	8	8	6
Trust Bank	6	1	1	5	6	10	4.83	1
IFIC Bank	10	10	7	14	9	9	9.83	12
PremierbBank	9	8	3	7	15	15	9.5	10
Pubali Bank	12	6	14	11	11	4	9.67	11
MTB	8	4	8	10	11	15	9.33	9
National Bank	2	11	5	2	15	4	6.5	4
Jamuna	3	8	10	6	12	13	8.67	8
NCC Bank	2	6	6	3	14	12	7.17	5
BRAC Bank	6	2	13	1	4	8	5.67	2
Dhaka Bank	11	7	3	12	5	11	8.17	7
Sonali Bank	14	17	17	17	3	1	11.5	13
Janata Bank	13	14	15	16	13	2	12.17	14
Agrani Bank	15	15	18	17	8	3	12.67	16
BASIC Bank	7	12	9	18	15	14	12.5	15
BDBL	8	16	16	15	7	16	13	17

Source: Compiled by authors

Figure 1: Composite CAMELS Ranking

Source: Compiled by authors

When looking at the consolidated results, it can be observed that Trust Bank Ltd. is in the first place due to its stronger asset quality and management efficiency, as well as improved capital adequacy, earnings quality, and liquidity position. BRAC bank Ltd. occupies the second position with its accomplishment concentrated towards earnings quality, asset quality and high liquidity. All the private sector banks are in the first phases position and in the middle status whereas all the public sector banks dwelled in the last phases ranking. One of the last phases position occupied by Sonali bank Ltd. because of its ineffective capital adequacy, asset quality, management efficiency and earnings quality but effectively maintained high liquidity as also less sensitive to changes in market condition. Janata and Agrani bank's C, A, M, E parameters are not satisfactory. BDBL bank performed last position among all banks because of its poor and unsatisfactory performance. The overall result suggests that all of the ratios reflecting C, A, M, E, L and S parameters differ significantly between the two banking sectors. As a result, it may be argued that there is a statistically significant difference between private and public sector banks in terms of each CAMELS parameter.

5. Conclusion

The banking sector acts as the spine of an economy and serves as the financial hub. Thus it plays a crucial role in economic growth. The CAMELS rating model is a frequently used method for assessing the performance of banking units. To ensure that Bangladesh has a sound financial system and an efficient economy, the banking sector must be carefully evaluated and analyzed as its efficiency is of vital importance. Banks must evaluate their performance to determine banks' operational results and overall financial condition. To look at the comparative performance of public and private sector banks in Bangladesh, this research incorporated secondary data ranging from 2015 to 2019.

This study concluded that different banks have obtained varying performances with respect to CAMELS ratios during the process of financial diagnosis of selected public and private sector banks using the CAMELS model. The empirical result highlighted that there is a statistically significant difference between private and public sector banks in Bangladesh in all the parameters of CAMELS model. It has also been revealed that the performance of private sector banks is better when compared to public sector banks in the field of capital adequacy, asset quality, management efficiency, and earnings quality. The result of this analysis is consistent with the findings of the previous research like Khan (2018), Panboli and Birda (2019), but inconsistent with the result of Mayakkannan and Jayasankar (2020). Public sector banks must enhance their positions in terms of capital adequacy, asset quality, management efficiency, and earnings quality, while private sector banks must improve with regard to liquidity and market risk

sensitivity. The findings from the study can assist the public and private sector banks' management in improving their financial performance and formulating policies that will promote their overall performance. This study will assist the central bank in nurturing all banks as per their present condition. Further research may be possible focusing on the reasons behind the current ratings.

In light of the findings, all public sector banks must enhance their earnings quality, management and Capital Adequacy Ratio in order to support the stability and efficiency of their financial system. On the contrary, private sector banks have to give utmost importance to its liquidity position and sensitivity to changes in market condition as its asset size is much lower than the public sector banks. The study is fully based on the secondary sources of information. It's not improbable that the data presented in the bank's annual report is window dressed, and that the bank's true position and publicized data are inconsistent. Other financial institutions, such as insurance firms, investment banks, mutual funds, etc. may be suggested for further research connected to the CAMELS rating system. To extend the research's geographical scope to other countries, where CAMELS is the supervisory rating system, is also recommended.

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Determining the impact of reliability, responsiveness, ease of use, security & privacy on customers satisfaction and behavioral intentions of ATM users in Bangladesh: An empirical analysis

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Abstract

Self-service technology (SST) is a recent innovation in service quality research with far-reaching implications for how consumers interact with businesses to influence the quality of the services they receive. The study's primary goal is to find out how the different factors have been found to significantly affect consumer satisfaction and behavior intention among ATM users in Bangladesh. The respondents of our study are primarily Bangladeshi mobile phone users who live in the Barishal Division. The SPSS 16 has been used to analyze the raw data by using Google Forms of 260 participants aged between below 20 and above 40. The result shows that each construct, such as reliability, responsiveness, ease of use, security, and privacy, positively affects customer satisfaction and is positively associated with behavioral intentions. This study will help the management and marketing managers improve customer satisfaction and customers' intentions to use the services through ATM service provider banks. The paper establishes a theoretical foundation for evaluating ATM service quality. The derived dimensions address the need for more solid research in conceptualizing and testing ATM service quality factors. Apart from improving theoretical understanding, the factors discovered also give bank managers a greater understanding and tools for better-managing consumers' ATM experiences.

Keywords: Technology Acceptance Model (TAM), ATM service Quality, self-service technology (SST), Behavioral Intentions, Customer Satisfaction

Introduction

1.1: Overview

Rising employment expenses and technical advancements have prompted service providers to investigate technology-based services that enable clients to supply self-government services over the last 20 years (Davalakar,1996). Technology is significant essential variables in acquiring more customers, improving services, and improving transaction performance. Customers want service providers to adopt consumer technology because it boosts operations, efficiency, customer service, and alternative delivery alternatives. Self-service technology is the "cutting edge of high technology that assists in creating self-regulating services with continuous employee participation in customer service." It is a viable alternative to banks for cash deposits, withdrawals, and counter-transactions (Ibrahim et al., 2016). SSTs were created to advance quality to suit consumers' needs.

ATMs are commonplace in convenience stores, gas stations, and neighborhood bars. These ATMs are crucial because they allow residents to get cash without driving long distances. Automated service quality has become a feasible instrument because of its ability to quickly replicate a bank commodity, but not

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because of its service level. Payments are offered to banks to improve service quality, acquire competitive advantages, increase market share, raise innovation potential, and Improve bank performance by confronting the effects of automated service quality (Al-Hawari, 2011).

Customers who use self-service technology (SST) prefer services with more flexible time frames and additional networks. Service providers can improve both quality and efficacy over SSTs. "The customer's overall appreciation and judgment on the quality of services supplied via the ATM channel," according to the ATM service quality definition (Narteh, 2013). The success of ATMs in retail banking is due to lower personnel costs, increased productivity, enhanced consumer involvement, service standardization, customer happiness, and loyalty. In a traditional banking setting, service quality is essential for developing and sustaining a positive customer relationship. Automated service efficiency and customer happiness are inextricably linked. Quality of service has been described as a significant factor of customer loyalty and satisfaction. (Olorunniwo et al., 2006; Wong & Zhou, 2006; Aslam & Frooghi, 2018). According to Oliver (1997), The effectiveness of the recommended service is determined by the gap between the consumer's expectations and the service provider's actual performance. and their evaluation of the services they received. To calculate service quality, the SERVQUAL model by modifying its metrics (Shachaf et al., 2008). Customer satisfaction with automated teller machines has been studied in a few research (ATMs). For example, it evaluated banking services, ATM services, and client loyalty and determined the importance of ATMs in conditioning expectations of the bank's services. Chan (1993) investigated Hong Kong college students' attitudes and behaviors toward ATMs and credit cards. Curran and Meuter (2005) investigated the characteristics influencing customers' attitudes toward three SSTs: ATMs, telephone banking, and online banking. Chen et al. (2008) established an integrated model to combine the nature of the Technology Readiness Index (TRI), the Technology Acceptance Model (TAM), and the Expected Behavior Theory (TBP) in order to understand better why customers, continue to utilize Self-Service Technology (SST). Meng and Elliott (2009) used TRI to analyze Chinese customers' attitudes and actions around using new technologies. They were, however, unable to estimate the likelihood of emerging technologies being adopted by consumers. They have integrated TRI and TAM to examine customer behavior concerning e-stock trading (Lin et al., 2007).

This study uses SERVQUAL and TAM model to understand better how customers react to Bangladeshi ATM services. The study also examines the role of consumers in shaping their behavior intentions (BIs). According to the past literature study, most studies on SSTs have focused on Internet banking and e-services in nations such as the United States, the United Kingdom, and Malaysia (Wang et al., 2003). Insufficient research endeavors have been conducted about the determinants of customers' inclination to utilize automated teller machine (ATM) services in emerging economies, specifically focusing on the context of Bangladesh, have thus been the motivation for conducting the current study. The current research examines customers' behavioral intentions for ATM services in economically developing cities (such as Barishal), In contexts where self-service is relatively new, its implementation is considered innovative. The primary objective of this study is to ascertain the multitude of elements that influence customer satisfaction and customers' intentions to utilize automated teller machine (ATM) services. The aim is also to construct an integrated model that can effectively assess and analyze the interconnections between these factors.

Customers who believe using the system will improve their performance and productivity will benefit from this research. ATM operators, researchers, and the government will all gain from this research (Wang et al., 2003). Financial institutions can use cutting-edge technology to add innovative features that will result in higher security, increased ATM use, and a better customer experience, eventually raising income.

1.2: Objectives

The study's overall goal is to discover the most vibrant aspects impacting respondents' behavioral intentions and customer satisfaction among ATM users in Bangladesh. The following are the study's particular objectives:

1. Determine the respondents' behavioral intentions as ATM users in Bangladesh.
2. To ascertain the connection between customer satisfaction and behavioral intentions among Bangladeshi ATM users.

Literature Review and Hypothesis Development

2.1: Behavioral Intentions

According to Bitner (2001), behavioral intentions are considered critical trouble in understanding the strikes of clients with the aid of which the firm intention of a persona to function a satisfactory behavior is in all likelihood to give up quit result in its performance. The definition of behavioral intentions is based on the TBP delivered by Ajzen (1991), who claimed that attitude, subjective norms, and perceived manipulation determine the intentions. According to Ajzen and Fishbein (1980), human actions are predictably primarily based on their intentions. In this regard, the formation of behavioral intentions has been investigated by using the ability of quantity researchers in unique settings to recognize clients' purchasing behavior. According to Han et al. (2010), although the meanings of behavioral intentions range from previous literature, scholars frequently argue that behavioral intentions are the willingness/likelihood of one to characteristic a particular motion. Oliver (1997) mentioned behavioral intentions as "a referred to threat of behavior involvement." Han and Ryu (2006) described behavioral intentions as an asserted probability of shopping for recreation being carried out. One's intention indicates one's willingness to increase such moves, and a man's or woman's intention can also be beneficial or unfavorable. These factors have additionally been used to seize attitudinal loyalty, seeing that they replicate a positive emotional dedication to a product or a manufacturer. Economic behavioral intentions are customers' behavior that influences the monetary component of the firm. The intentions of repurchasing satisfied customers are notably more than those of sad customers. Halstead and Page (1992) state that increased everyday pleasure contributes to higher repurchase intentions and actual repurchase behavior. One standard discovery of more than a few lookups on adopting science is a proof-aiding mindset as an antecedent to behavioral intention and excellent beliefs as salient antecedents to these attitudes. According to Curran et al. (2003), researchers have validated that the way of thinking toward a particular SST affects the intent to use. However, more than one hierarchical attitude strengthens the intention to use the self-service technology (SST) option.

2.7: Technology Acceptance Model

The Technology Acceptance Model (TAM) was initially introduced by Davis in 1989 as a framework for conceptualizing and elucidating human behavior concerning technologies. The Technology Acceptance Model (TAM) has been widely acknowledged for its reliability, robustness, and cost-effectiveness in predicting the adoption of information technology (IT) (Venkatesh & Davis, 2000; Davis, 1989; Davis et al., 1989). The primary objective behind its inception was to provide a comprehensive understanding and anticipatory insights into how users employ computers, with a special focus. The Technology Acceptance Model (TAM) differentiates itself from other multi-attribute models, such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB), through its adoption of a more context-focused approach. The Technology Acceptance Model (TAM) aims to comprehensively understand the elements that influence persons' adoption behaviors, specifically in the context of information technology (IT). It also puts forth a framework that identifies the specific components of attitudes associated with IT usage. Without a doubt, the Technology Acceptance Model (TAM) is more effective than other multi-attribute models, such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB), in

explaining individuals' attitudes toward the use of information technology. According to the Technology Acceptance Model (TAM), an individual's attitude toward using a system is determined by their underlying beliefs regarding the technology's ease of use and usefulness. This mindset subsequently impacts their inclination to utilize the system, resulting in their active participation in practical usage endeavors. Thieson et al. (2001) conducted a study. The Technology Acceptance Model (TAM), originally introduced by Davis in 1989, is utilized to assess the adoption of Automated Teller Machines (ATMs) by incorporating two key constructs: perceived ease of use (PEU) and perceived usefulness (PU). Multiple cases of innovation uptake have been analyzed using different theoretical frameworks (Lucas et al., 2007). According to Davis (1989), the Technology Acceptance Model (TAM) defines Perceived Usefulness (PU) as the subjective perception of individuals regarding the degree to which the utilization of a certain technology will improve their work performance. Many research papers have provided evidence supporting the efficacy of PU as a dependable indicator of user behavior. The existing body of academic literature indicates a significant impact of Perceived Usefulness (PU) on the utilization of systems, as demonstrated by the empirical investigation done by Robey in 1979. In contrast, Perceived Ease of Use (PEU) refers to an individual's perception of the simplicity of using a particular technology. Users demonstrate a greater propensity to approve an application that exhibits a higher level of user-friendliness than another application. The Technology Acceptance Model (TAM) is a practical framework that provides utility to all stakeholders engaged in developing services. The Technology Acceptance Model (TAM) differentiates itself from other adoption models by providing support for developing activities related to service creation. On the other hand, the elements of user-friendliness and utility fall under the jurisdiction of a system designer, affording them a certain degree of influence (Taylor & Todd, 1995). The incorporation of contextual elements of belief or the supplementation of additional components to the model has led to a heightened utilization of the Technology Acceptance Model (TAM) in many research studies (Eriksson et al., 2005; Guriting & Ndubisi, 2006; Pikkarainen et al., 2004; Wang et al., 2003). The complete establishment of the mediating effects of perceived usefulness (PU) and perceived ease of use (PEU) on technology readiness (TR) and consumer usage intentions has been achieved. Individuals with a strong inherent predisposition towards technology demonstrate a higher level of comfort and proficiency in utilizing technical equipment or systems and perceiving them as user-friendly. The current study conducted by Walczuch et al. (2007) aimed to investigate the relationship between personality qualities connected with Technology Readiness (TR), such as optimism, inventiveness, anxiety, and insecurity, and cognitive components linked to the Technology Acceptance Model (TAM). The conceptual connection between the Technology Acceptance Model (TAM) and the Theory of Reasoned Action (TRA) emerges from TAM's evaluation of perceived usefulness and perceived ease of use, which are customized to a particular system, rendering it system-specific. In contrast, the concept of technological readiness (TR) primarily emphasizes the development of general technological ideas, tailoring them to individuals' specific needs and characteristics. When confronted with a decision, most persons tend to do internal searches, whereby they carefully scrutinize their memories to recover relevant information (Bettman, 1979). Therefore, in addition to system attributes, individuals' overarching perspectives about technology, which are influenced by previous experiences, may serve as a basis for assessing the effectiveness and ease of use of that particular technology. Experience-based assessment is notably observed among consumers with less experience, as they tend to analyze alternative choices using general and abstract criteria rather than specific ones (Bettman & Sujjan, 1987).

2.2: Reliability

Reliability refers to the ability to consistently and accurately perform the essential service, as defined in the conventional framework of service research (Parasuraman et al., 1988). According to the findings of

Wolfenbarger and Gilly (2003), there is a strong relationship between dependability and consumer satisfaction in the context of electronic channels. The reliability dimension is essential because it embeds the energetic competence to efficaciously and accurately habits the provider has undertaken. Reliability in the ATM placing predicts the machine's capacity to function constantly and furnish error-free and reliable services. Stiakakis and Georgiadis (2009) considered reliability in online transactions as the fundamental benchmark for more considerable best of electronic service. Within ATMs, reliability was found by Khan (2010) and Katono (2011) to be an essential dimension of ATM that influences customer satisfaction. Accordingly, we can develop the following hypothesis-

H1: There is a positive relationship between reliability and customer satisfaction.

2.3: Responsiveness

The term "responsiveness" refers to an organization's capacity to meet the needs of its customers in a timely and flexible manner. According to Friedlander (2012), responsiveness refers to the capacity to comprehend and adapt to the evolving requirements of a supervisee in terms of knowledge, abilities, and interpersonal awareness related to the demands of the clients they are serving. It includes how business organizations respond to their customers in a fast manner and in a way that is appropriate for the situation (Bornstein et al., 2008). Responsiveness assessments evaluate the utilization of strategies employed by financial institutions to enhance service quality in instances where ATM services are suboptimal (Narteh, 2013). In several digital service satisfactory scales, responsiveness or restoration is a sizeable determinant (Parasuraman et al., 2005; Narteh, 2013). With ATMs, the super of response or recovery offers the willingness of the banks to deal with consumer grievances taking vicinity as a result of transactional mistakes and compensation of purchasers in contradiction to losses suffered, such as money unlawfully withdrawn from their accounts. Ibrahim et al. (2016) performed a study to determine if there was any association between responsiveness of ATM services and customer satisfaction and found that responsiveness positively influences customer satisfaction. Thus, we can propose the following hypothesis-

H2: There is a positive relationship between responsiveness and customer satisfaction.

2.4: Ease of use

Technology can endanger customers, so ATMs are intended to shorten the transactional system for customers. The ease of use is the degree to which the doable purchaser expects the target device to be stress-free (Davis et al., 1989). If users consider electronic banking effortless and free of pressure, they would have a greater chance of using the machine (Chong et al., 2010). This research uses the term to explain the degree to which ATMs provide the consumer with a problem-free transaction. The ease of use is critical in investigating the acceptance and usage of advanced organizational data technology, such as online banking (Gounaris & Koritos, 2008). Several studies have acknowledged the significance of simplicity of use concerning customer satisfaction when using automated teller machines (Al-Hawari et al., 2005; Khan, 2010). So, we can develop the following hypothesis-

H3: There is a positive relationship between ease of use and customer satisfaction.

2.5: Security and privacy

ATMs possess the capacity to provide both safety and privacy to their consumers. Protection includes safeguarding clients against fraudulent activities and financial losses, while the confidentiality of personal data is reinforced by privacy measures (Zenithol et al., 2002). *Security* was defined by Casaló et al. (2007) as a technical guarantee that criminal prosecution and privacy measures will be effectively upheld. The significance of privacy and safety in online transactions was found to be of great importance and a crucial facilitator for customers in Bangladesh and Brazil (Hernandez & Mazzon, 2007; Jahangir & Begum, 2008). Each customer anticipates that their banking institutions will safeguard their financial resources and personal information. Research, safety, and privacy dimensions have been widely

recognized as essential aspects of high-quality ATM services in the United States, Australia, and Pakistan (Al-Hawari et al., 2005; Joseph & Stone, 2003; Khan, 2010). As a result, contemporary research posits a positive correlation between safety, privacy, and consumer happiness. Resolving security and privacy issues led to a notable enhancement in consumer satisfaction, as demonstrated by the studies conducted by Hammoud et al. (2018). Accordingly, we can propose the following hypothesis-

H4: There is a positive relationship between security and customer satisfaction.

2.6: Customer satisfaction

Customer satisfaction can be defined as the degree to which a customer expresses favorable feelings about a service interaction" (Lin & Hsieh, 2006). Consumers report higher satisfaction levels when they feel they receive value for the money they spend (Jeong et al., 2016). Previous research has shown that happy customers are more likely to take action (Burton et al., 2003). According to Meng et al., (2008), customers create expectations about a product or service prior to use. It is an emotion or opinion regarding the goods or services that customers have used (Jamal & Naser, 2003). In the service sectors, there have been two approaches to client satisfaction: satisfaction as a result of dissatisfaction and satisfaction as a function of perception (Davis & Heineke, 1998). Prior research found a positive correlation between satisfaction and behavioral intentions (Lin & Hsieh, 2006). Other findings also revealed a robust association between consumer satisfaction and behavioral intentions (Burton et al., 2003). Hence, we can develop the following hypothesis-

H5: There is a positive relationship between customer satisfaction and behavioral intentions.

2.8: Conceptual framework

The following research framework is created based on the literature review and the hypotheses Examined for the study

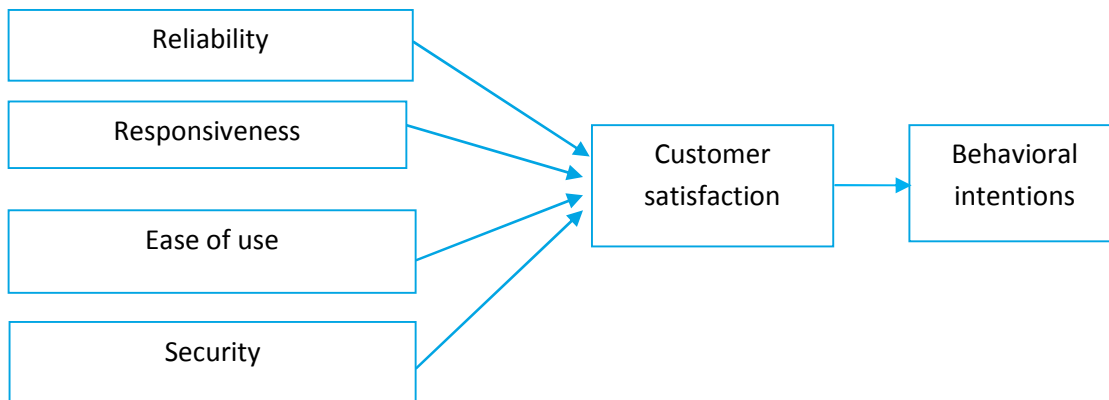


Figure1: Conceptual model

Research design & Methods

3.1: Measurement instruments

The measurement items for each construct in our proposed study were gathered from previous research. The measuring elements for each latent construct are listed in detail in Table 1.

Table 1: Measurement items

Constructs	Items	Sources
Reliability	R1: ATM functions 24/7 basis R2: ATM offer a reliable and unwavering provision of services.	(Sohail & Nabaz , 2019)

Responsiveness	R1: The ATM system reimburses for incorrect deductions. R2: Problems with ATMs are resolved to my satisfaction. R3: A designated individual is accessible to address any problems with the ATM. R4: ATM breakdowns are swiftly rectified. R5: ATM cards are swiftly replaced. R6: The ATM banking system effectively resolves customer concerns within a fair timeframe.	(Narteh, 2013)
Ease of Use	EOU1: ATM offers explicit guidelines on its operation. EOU2: ATMs are user-friendly and facilitate flawless transactional processes. EOU3: ATM instructions is easy to understand. EOU4: ATM offers visual representations and promotional materials pertaining to banking services. EOU5: The ATM offers educational resources and guidance on its usage	(Akpan et al., 2016)
Security & privacy	SP1: I feel a sense of security when engaging in ATM transactions. SP2: I possess confidence in the ATM. SP3: I worry about the safety of my personal information	(Sohail & Nabaz, 2019)
Customer Satisfaction	CS1: I am satisfied to the overall service.	(Cockrill et al., 2009)
Behavioral Intentions	BI1: I intend to return to the ATM service in the future. BI2: I suggest the ATM services to both my friends and other people. BI3: I would increase the frequency of my transactions to the ATM.	Cronin et al., 2000)

3.2: Questionnaire design & Data collection

All the information was gathered via a Google form and distributed over the social media platform Messenger. Data was collected from March 12th to May 21st, 2022. The data was collected from respondents by using the convenience sample technique. Convenience sampling is a non-probability sampling strategy that involves gathering data from individuals within a community who are easily accessible. This method is predominantly observed at the preliminary stage of a research endeavor (Sekaran & Bougie, 2010). The survey has a total of 20 measurement items. The questionnaire has been partitioned into two distinct sections. The initial part provides an overview of the demographic characteristics of the respondents, encompassing variables such as gender, age, educational attainment, occupation, and monthly income. The survey employed a Likert scale with five points, ranging from "strongly disagree" (1) to "strongly agree" (5), to assess the constructs of dependability, responsiveness, ease of use, security, customer satisfaction, and behavioral intents. Sample size has been determined the following guideline of Malhotra (2004) recommendation that there should be at least four/five times as many sample sizes as variables.

Additionally, other researchers also depicted that According to the guidelines established for research in the social sciences (Stevens, 2009; Tabachnick & Fidell, 2013), the sample size of the current study, which was n = 260, is sufficient. So through the guideline, this study collected 260 responds from the Barishal division of those who have access to ATMs in our country. The younger generation in the Barishal Division makes up the majority of our sample.

3.3: Analysis

Because the quantitative method was used to generate our report, all of the data acquired was primary data. A variety of statistical approaches are used to quantify customer happiness and loyalty. The trustworthiness of construction claims is checked using factor loading analysis. Linear regression and Chronbach’s Alpha are also looked at. SPSS 16 is used to examine the data.

Result & Discussion

4.1: Demographic profile of respondents

The first element of our structured questionnaire is a demographic profile. There are five items in the demographic profile. The first is the gender's name, age, education level, career, and monthly income. 260 respondents have been chosen for this study, with 165 men (63.5%) and 95 women (36.5%). The survey was primarily performed in the Barishal Division, and most respondents were young students at Barishal University. Regarding education, the population is divided into five categories: S.S.C., H.S.C., graduate, postgraduate, and Ph.D The most common responses are graduate (68.5%) and postgraduate (20%) degrees among the five categories. Some respondents have a Ph.D (2%). Monthly income has been divided into four categories, with the highest monthly income below 10,000 (67.6%). A small number of people exceeded 30000(7.7%). Students, private employees, government employees, business owners, cobblers, masons, farmers, and other professions are accessible in our country. Students, private service employees, government employees, and business owners were among those who participated in our research. The number of students (83.3%) is higher in this table than in the others.

Table 2: Demographic profile of respondents

Items	Description	Frequency	Percentage
Gender	Male	165	63.6
	Female	95	36.4
Age	Below 20	15	5.8
	21-30	231	89.2
	31-40	90	3.5
	Above 40	4	1.5
Education Level	SSC	00	00
	HSC	28	10.7
	Graduate	178	68.5
	Postgraduate	52	20
	Ph.D	2	0.8
Profession	Student	214	83.3
	Govt. Service Holder	11	3
	Private Ser. Holder	25	9.7
	Business	07	2.7

Monthly Income	Below 10000	176	67.6
	10001-20000	48	18.5
	20001-30000	16	6.2
	Above 30000	20	7.7

4.2: Measurement model

.2:1 Reliability analysis

The measurement model was applied to measure the construct reliability, and discrimination validity criteria, Cronbach's Alpha, and composite reliability were used to test the construct reliability. Cronbach's ideal alpha level is 0.70, but in case of exploratory research finds it optimal to be 0.40 or above (Hair et al., 1995). The table below indicates that the perspective on Cronbach's Alpha for reliability is 0.82, and the Alpha is 0.855 for responsiveness. Cronbach's Alpha of 0.86 indicates ease of usage. Cronbach's Alpha for Security is 0.810, while Cronbach's Alpha for Behavioral Intentions is 0.62. All statements can be used for further investigation because the aggregate Cronbach's Alpha is more considerable than 0.60. It will be superior to analysis if Cronbach's Alpha is more significant than 0.804

.2:2 Factor loading

The exploratory factor loading was conducted using the principal component analysis extraction technique and promax rotation to understand better the latent dimensions of the observed variables in the survey. The present study employed the Kaiser-Meyer-Olkin (KMO) sample adequacy test and Bartlett sphericity tests to assess the suitability of the dataset for factor analysis. It may be asserted that the adequacy of the data set for factor analysis can be determined by examining the Kaiser-Meyer-Olkin (KMO) value, which should exceed 0.5, as well as the "p" value obtained from the Barlett test, which should be less than 0.05 (Field, 2009). The study findings indicate that the KMO value is 0.907, suggesting high sampling adequacy. Additionally, the Barlett test yielded a significant result at the 0.000 level, indicating that the data is suitable for factor analysis. The data suggests that the dataset is enough for factor analysis.

Factors	Items	Cronbach's Alpha	Statements	Factor Loading
Reliability	2	.822	R1: ATM functions 24/7 basis	0.714
			R2: ATM offer a reliable and unwavering provision of services.	0.674
Responsiveness	6	.855	R1: The ATM system reimburses for in correct deductions.	0.561
			R2: Problems with ATMs are resolved to my satisfaction.	0.691
			R3: A designated individual is accessible to address any problems with the ATM.	0.715
			R4: ATM breakdowns are swiftly rectified.	0.592
			R5: ATM cards are swiftly replaced.	0.667
			R6: The ATM banking system effectively resolves customer concerns	0.660

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			within a fair timeframe.	
Ease of Use	5	.859	EOU1: ATM offers explicit guidelines on its operation.	0.718
			EOU2: ATMs are user-friendly and facilitate flawless transactional processes.	0.750
			EOU3: ATM instructions is easy to understand.	0.698
			EOU4: ATM offers visual representations and promotional materials pertaining to banking services.	0.678
			EOU5: The ATM offers educational resources and guidance on its usage	0.614
Security& Privacy	3	.810	SP1: I feel a sense of security when engaging in ATM transactions.	0.649
			SP2: I possess confidence in the ATM.	0.696
			SP3: I worry about the safety of my personal information	0.613
Customer Satisfaction	1		1.I am satisfied to the overall service.	0.719
Behavioral Intentions	3	.622	BI1: I intend to return to the ATM in the future.	0.738
			BI2: I suggest the ATM services to both my friends and other people.	0.567
			BI3: I would increase the frequency of my transactions to the ATM.	0.848

Table 3: Factor on overall reliability is 0.936.

4.3: Structural model

This study examines the relationship between several independent variables, namely dependability, responsiveness, ease of use, security, and privacy, and their impact on the dependent variable of customer satisfaction. In the second layer, customer satisfaction is considered the independent variable, while behavioral intentions are regarded as the dependent variable. The present study aims to examine the relationship between the independent variables and the dependent variable. To test this hypothesis, multiple regression analysis was used. In Table 4, F-values indicate that the factors under investigation significantly impact customer satisfaction and behavioral intentions. So, all the hypotheses are accepted.

Regression analysis and hypothesis testing

Model		F value	t – value	R ²	Adjusted R ²	Sig.
Reliability ➡	Customer satisfaction	123.013	11.091	.323	.320	0.00
Responsiveness ➡	Customer satisfaction	238.818	15.454	.481	.479	0.00

Ease of Use →	Customer satisfaction	215.985	14.696	.556	.554	0.00
Security →	Customer satisfaction	111.612	10.565	.302	.299	0.00
Customer Satisfaction →	Behavioral Intentions	115.103	33.927	.817	.816	0.00

Table 4: Regression analysis and hypothesis testing

4.4: Discussion

The study aims to discover the most essential aspects impacting respondents' behavioral intentions and customer satisfaction among ATM users in our country. The study aims to determine the respondents' behavioral intentions as ATM users in Bangladesh. Five hypotheses have been formed from previous literature to determine the relationship between customer satisfaction and behavioral intentions among Bangladeshi ATM users.

Firstly, in the case of Hypothesis One (H1), The findings elucidated that reliability significantly and positively impacted customer satisfaction among ATM users. Table 4 shows a positive relationship between reliability and customer satisfaction. That means if the instrument (ATM) is trustworthy, the customer will happily accept it. Additionally, the result was consistent with the observations of (Khan, 2010); Katono, 2011).

Secondly, in hypothesis two (**H2**), The findings revealed a positive relationship between responsiveness and customer satisfaction. That means customers will readily adopt this pleasantly if the services (ATM) are frequent and timely. This result is also aligned with Ibrahim et al. (2016).

Thirdly, another hypothesis (**H3**) elucidates the findings that ease of use had a significant and positive impact on the customer satisfaction of ATM users. Table 4 shows a positive relationship between ease of use and customer satisfaction. We got the same types of findings from previous literature pieces (Al-Hawari et al., 2005; Khan, 2010).

On the other hand, hypothesis four (**H4**) revealed that Security and privacy had a significant and positive impact on ATM users' customer satisfaction at the Bangladesh Barishal division. Table 4 shows a positive relationship between Security, privacy, and job satisfaction. This finding validates prior scholarly investigations (Hammoud et al., 2018).

Finally, hypothesis five (**H5**) elucidated a positive relationship between customer satisfaction and behavioral intentions. That means satisfied customers have a positive intention to use the instruments frequently. The results were consistent with the observations of (Lin & Hsieh, 2006; Burton et al., 2003).

Managerial implications, Limitations, Future Research and Conclusion

5.1: Implications

The study's main aim was to identify the key factors influencing customer satisfaction and behavioral intentions among ATM users in Bangladesh. This research endeavor aims to enhance customer happiness and behavioral intentions to utilize ATM services provided by banks, benefiting both management and marketing managers.

5.2: Limitations of the study

The fundamental limitation of this study is the non-probabilistic nature of the sampling procedure used (convenience sampling). Additionally, the information was taken from a single city of barishal division and, all data was obtained immediately, but customer demand, expectations, and satisfaction levels constantly changed. Another point is that, the sample has high percentage of respondents who are young. So, the findings cannot be generalized and applicable to all people of Bangladesh.

5.3: Future research

Technology will be updated daily as time passes. Furthermore, the need for ATMs is changing. As a result, ATM providers are altering the services and technologies they offer at various levels. For this reason, several new elements may impact on consumer happiness. ATM service providers should constantly monitor the elements that influence consumer attitudes and behavioral intentions (expectations, perceived quality, non-payment, client loss, word-of-mouth, image, satisfaction, and loyalty). Future research can add all the divisions of Bangladesh, if the population is generalized, and data should be collected over a lengthy time. Further, probability sampling techniques can be used for ensuring more robustness of data set which can be better predictor of the variables.

5.4: Conclusion

This study aims to evaluate the relative significance of various components in predicting customers' intentions to utilize ATM services. Additionally, the study seeks to investigate multiple factors influencing customers' intentions to adopt ATM services and construct an integrated model for assessing these relationships. Based on the existing literature framework, we developed a theoretical model. Based on the conducted reliability study and hypothesis testing, it has been shown that service quality substantially impacts both customer satisfaction and their intent to utilize ATMs. The findings suggest that the simplicity of use holds the highest significance level in relation to the subject at hand.

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