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Impact of Accounting Ratios on Stock Market Price of Listed companies in Colombo Stock Exchange

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Abstract
This study investigates the impact of accounting ratios on stock market price of top twenty companies based on the highest market capitalization listed in the Colombo Stock Exchange (CSE). The objectives of this study were to examine the impact of Earnings per Share (EPS) on stock market price; to examine the impact of Dividend per Share (DPS) on stock market price, to examine the impact of Price Earnings ratio (PE) on stock market price and to examine the impact of Market to Book ratio (MB) on stock market price. The panel data was collected from the top twenty companies for the period of five years from 2015 to 2019. EPS, DPS, PE and MB ratios were used as the proxies for the independent variables and stock price was used as the proxy for the dependent variable for this study. In order to perform the inferential analysis Pearson correlation analysis, panel regression with fixed effect, random effect and pooled linear regression were used. Hausman test was adopted in order to choose either random effect regression or fixed effect regression. According to pooled regression analysis, EPS, DPS and PE ratios had positive significant impact on stock market price. MB ratio had a negative significant impact on stock market price. According to fixed effect regression analysis, EPS, PE and MB ratios had positive insignificant impact on stock market price whereas DPS had a positive significant impact on stock market price. This study offers an insight to the potential investors to make the rational investment decisions in the stock market.

Keywords: Dividend Per Share (DPS), Earnings Per Share (EPS), Price Earnings (PE) Ratio, Market to Book (MB) Ratio, Colombo Stock Exchange (CSE)

1. Introduction

1.1. Background of the Study

General purpose financial statements are one of the modes of financial reporting. The objective of general-purpose financial reporting is to deliver the accounting information of the reporting entity that is valuable to

existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity (International Accounting Standards Board, 2020), Thus, it ensures the quality of information and supports the decision-making process. Accounting information should be relevant and reliable to make the investment decisions for the investors. Accounting information can be recognized as one of the utmost important sources to analyze the share price and value of companies (Sarifudeen, 2016; Dorcas & Francis, 2010). Investors should be more aware of the stocks when they start to invest in the stock market. Stock price of a company is an important factor as it directs an investor to identify which company is most profitable company to invest (Dorcas & Francis (2010). IASB is emphasizing improving the quality of accounting information in order to increase the transparency in the financial reporting. Accounting information is essential in making proper investments and reduces the information asymmetry between managers and other stakeholders of an organization. Stocks enable companies to pursue long term financing. Stock exchange in every country quickens economic growth by improving domestic savings and quantity of investments. Accounting ratios play a significant role in determining the stock price. Accounting information parameters had significant impact on share price of a stock market (Modi & Pathak, 2014 & Ndubuisui, Fidelis, Chinyere & Leonard, 2018). This study identified four accounting ratios such as Earning per Share (EPS), Dividend per Share (DPS), Price Earnings (PE) ratio and Market to Book (MB) ratio. This research focuses on how these accounting ratios affect market price of top twenty listed companies in Sri Lanka.

1.2. Research Problem

Stock market has become popular nowadays among the investors as they are more concerned about the forecasting of share prices. Most investors rely on accounting ratios to make their decisions. Also, companies which provide good quality information have an advantage of lower cost in share pricing. Investigation of the value relevance of accounting information is very important in deciding market price (Ndubuisui, Fidelis, Chinyere & Leonard, 2018). The accounting ratios provide investors with crucial information to assess their rational investments decisions. Therefore, it is envisioned to investigate the impact of accounting ratios on share price. The following research questions are derived from the research problem:

- Does the EPS impact on stock market price?
- Does the DPS impact on stock market price?
- Does the PE ratio impact on stock market price?
- Does the MB ratio impact on stock market price?

1.3. Relevant Literature

This section gives the relevant empirical literature.

1.3.1. Empirical Literature

Using 120 Nigerian companies for the period of three years from 2001 to 2003, Oyerinde (2009) examined a study on the impact of accounting ratios on stock market price. The findings of this study revealed that EPS had positive significant impact on share price. Majority of the companies' book value was sensitive to the market price of share. Another study conducted by Dorcas and Francis (2010) about the role of accounting figures in the Nigerian Stock Exchange found that there was a significant relationship between accounting figures and share prices of companies. Titiliyo, Salako, Folashade and Obiamaka (2015) explored a study on the impact of accounting information on stock prices in the Nigerian Stock Exchange using the value relevance of accounting information. The findings showed that accounting information had a significant relationship with share prices.

A study by Modi and Pathak (2014) on the value relevance of accounting ratios on the Indian stock market revealed that accounting ratios had significant impact on stock market price. The P/E ratio was positively correlated with the share price. Miah (2012) explored a study to investigate the empirical relationship between equity share prices and accounting variables in the 105 listed companies in Dhaka Stock Exchange for the period

of sixteen years from 2000 to 2015 using Book value per share, EPS, DPS, PE and Dividend payout ratio. The study found that EPS, DPS and book value per share had a significant impact on the market price of share. Khan, Gul, Rehman, Razzaq and Kamran (2012) studied the ability of EPS, dividend yield and MB in forecasting stock return for 100 non-financial companies listed on the Karachi Stock Exchange for the period of seven years from 2005 to 2011. Findings of this study revealed that the EPS had positive significant impact on stock return and MB ratio had negative significant relationship with stock return. Using 60 listed companies in Shanghai Stock Exchange in 2011, Wang, Fu and Luo (2013) explored a study to analyze the relationship between accounting ratios and stock market price. The findings revealed that EPS and ROE had positive significant impact on the stock price. Uwuigbe, Igbinoba, and Oni-Ojo (2016) investigated a study on the value relevance of financial information on the share price of 15 listed Banks in Nigeria for the period of five years from 2010 to 2014. The study analysis showed that EPS and book value per share had significant positive impact on the share price. Asif, Arif and Akbar (2016) studied the impact of accounting information on the share price for the companies listed in the Karachi Stock Exchange, covering the period of 8 years from 2006 to 2013. The study concluded that accounting information parameters had significant impact on the share price.

Using the valuation model, Hassan, Hasan and Haque (2017) studied the relationship between the value-relevance of accounting information and the share prices of 93 companies from six broad industries listed on the Dhaka Stock Exchange. Findings revealed that EPS and book value had a significant impact on share prices. For the period of 10 years from 2006 to 2015, Pražák and Stavárek (2017) investigated the impact of the microeconomic factors on the stock prices of energy industry companies listed in Prague Stock Exchange and Warsaw Stock Exchange. The analysis showed that financial leverage ratio had a positive significant impact on stock price and the liquidity ratio had negative significant impact on the stock price. Ndubuisui, Fidelis, Chinyere and Leonard (2018) examined a study to identify the effect of accounting information on the market price per share of listed companies on the Nigeria Stock Exchange over the period of 7 years from 2010 to 2016. The analysis found that EPS, DPS and ROE had positive significant impact on the market share price. Hung, Ha and Binh (2018) analyzed the impact of accounting information on financial statements on the stock price of 44 energy enterprises listed on Vietnam's stock market over the period of 11 years from 2006 to 2016. The findings revealed that return on assets, enterprise size, current ratio and accounts receivable turnover were positively correlated with the stock price.

Menike and Prabath (2014) investigated a study on the impact of accounting variables on the stock price of 100 listed companies in the Colombo Stock Exchange (CSE) for the period of years from 2008 to 2012. The study found that EPS, DPS, book value per share had positive significant impact on the stock price. Perera and Thrikawala (2010) investigated a study on the impact of accounting ratio on the share price of Sri Lankan banking sector from the year 2006 to 2009. Findings showed that EPS, earning yield and ROE had value relevance on market price. Vijitha and Nimalathasan (2014) explored a study to examine the impact of value relevance of accounting information on share price of selected listed companies in Sri Lanka. The analysis showed that EPS, net assets value per share and ROE were significantly associated with the share price. PE ratio was negatively correlated with the share price. Regression analysis found that EPS and net assets value per share had significant impact on share price and ROE and PE ratio were found insignificant impact on the share price. Using 65 listed companies in Sri Lanka from the food and beverage, tobacco, manufacturing, plantation, land and property and chemicals and pharmaceutical industries, Sarifudeen (2016) examined impact of EPS, DPS and Net assets value per share on stock prices for the period of 5 years from 2010 to 2014. Results revealed that coefficients of correlation between independent and dependent variables were significant

According to the above literature it can be observed that most of the research studies have been conducted using panel data. Also, there are different accounting ratios were used to identify their impact on stock price and there was no any order of variables used. Throughout the keen literature review the current study identifies there is an existence of relationships between accounting ratios and stock prices.

1.4. Objectives of the Study

The objectives of this study are as follows:
To examine the impact of EPS on stock market price.
To examine the impact of DPS on stock market price.
To examine the impact of PE ratio on stock market price.
To examine the impact of MB ratio on stock market price.

1.5. Hypotheses and Their Correspondence to Research Design

Following Hypothesis built to achieve the stated objectives in the study.
H1: There is a significant relationship between EPS and the stock market price.
H2: There is a significant relationship between DPS and the stock market price.
H3: There is a significant relationship between PE ratio and the stock market price.
H4: There is a significant relationship between MB ratio and the stock market price.

The remaining of this research paper is structured as follows: Section 2 describes Methods and/or techniques; section 3 shows the results; section 4 shows the discussions and section 5 shows the conclusion of this study.

2. Methods and/or techniques

This section covers the research approach, population and sample of the study, data collection, variables, conceptual framework and operationalization of the study variables, mode of data analysis, hypotheses of the study and econometric model used in this study.

2.1. Research approach

This study adopted a descriptive approach. Quantitative method was employed in this study.

2.2. Population and sample of the study

Target population is the all companies in CSE. As at 20th of January, 2019 there were 290 companies listed in CSE representing 20 GICS industry groups. The samples of this study represent top twenty companies as per the market capitalization based on the judgment sampling method.

2.3. Data Collection

This study used secondary data. The data was collected from the selected companies annual reports from year 2015 to year 2019. This study analyzed the impact of accounting ratios on stock market prices over these five years. No. of observations used in this study were 100. In addressing these objectives, this thesis used the panel data set covered the longitudinal aspects.

2.4. Variables

The dependent variable is stock market price. EPS, DPS, PE and MB ratios were used to investigate the effect of stock market price as dependent variables.

2.5. Conceptual framework

The following Figure-1 exhibits the conceptual framework of this study:

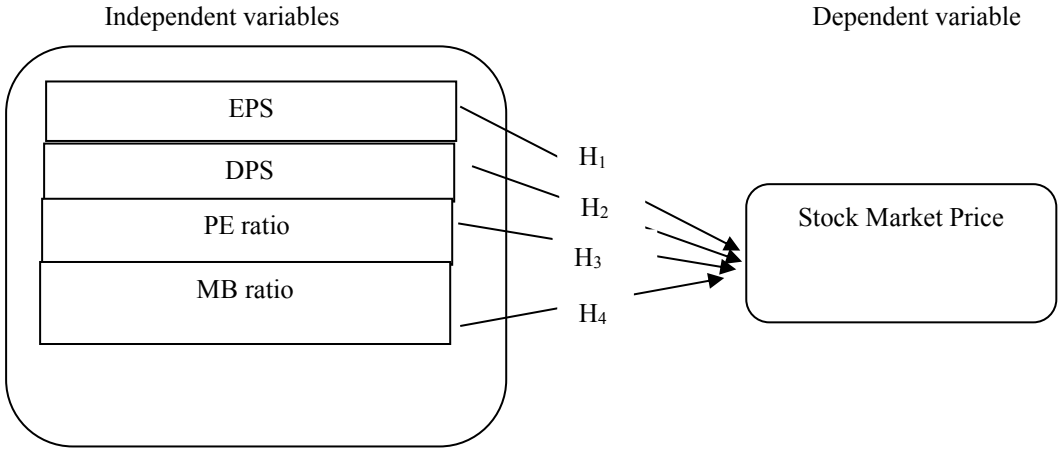

Figure 1: conceptual framework

Source: Researcher's own compilation based on Literature review.

2.6. Operationalization of Study Variables

Table 1 illustrates the operationalization of the selected independent and dependent variables**.**

Table 1: Operationalization of Study Variables

Type of variable	**Proxies**	**Acronym**	**Measurement**	**Extant studies**
Independent Variable	Earnings per share	EPS	Net profit (after tax) – preference dividends / Weighted average common shares	Miah (2012), Khan, Gul, Rehman, Razzaq and Kamran (2012), Uwuigbe, Igbinoba, & Oni-Ojo (2016), Wang, Fu and Luo (2013), Hassan, Hasan and Haque (2017), Ndubuisui, Fidelis, Chinyere and Leonard (2018), Vijitha and Nimalathasan, (2014) and Sarifudeen (2016)
	Dividend per share	DPS	Total dividends / Number of shares outstanding	Miah (2012), Ndubuisui, Fidelis, Chinyere and Leonard (2018) and Sarifudeen (2016)
	Price Earnings ratio	PE	Market stock price per share / Earnings per share	Miah (2012) and Vijitha and Nimalathasan, (2014)
	Market to Book ratio	M/B	Market capitalization / Total book value	Khan, Gul, Rehman, Razzaq and Kamran (2012)
Dependent Variable	Stock price	SP	Annual Report of the companies	

Source: Researcher's own compilation based on Literature review.

2.7. Mode of data analysis

In order to perform the inferential analysis, Pearson correlation analysis, panel regression analysis in terms of fixed effect, random effect and pooled linear regression were performed. Hausman test was adopted in order to choose either random effect regression or fixed effect regression analyzing the panel data set.

2.8. Empirical Model

Effectiveness of EPS, DPS, PE and MB ratios with the market price were be analyzed by using the following econometric model:

$SP = \beta_0 + \beta_1 EPS + \beta_2 DPS + \beta_3 PE + \beta_4 MB + \varepsilon$

Where;

$\beta 0$=Constant

β_{1-4}=Parameters

SP= Stock price

EPS=Earnings per share

DPS=Dividend per share

PE=Price Earnings Ratio

MB=Market to Book Ratio

ε = Error term

Results which are performed using Stata software are discussed in the next section.

3. Results

This section presents the descriptive statistics, multicollinearity test, correlation and multiple regression analysis. Panel model has been applied for data interpretation with the help of Stata 13 version.

3.1. Descriptive statistics

Table 2: Descriptive statistics

Variables	Obs.	Mean	SD	Min	Max
EPS	100	25.2337	41.1670	0.18	306.21
DPS	100	12.2794	18.5304	0.05	80.00
PE	100	15.6617	15.2336	0.13	80.69
MB	100	5.5149	11.7059	0.03	64.45
SP	100	5.1492	1.3918	2.20	7.79

Table 2 describes the descriptive statistics for the accounting ratios (independent variables) and stock market price (dependent variable). The analysis includes 100 observations which were gathered from the annual reports of the twenty companies listed in CSE based on the highest market capitalization. According to table 2, it shows 25.2337 as the mean value of EPS. The EPS ratio spreads between the minimum value of 0.18 and maximum value of 306.21. Standard deviation of EPS is 41.167. Average DPS, PE and MB of company's sample are 12.2794, 15.6617 and 5.5149 respectively. The minimum DPS is 0.05 and 80.00 is recorded as the maximum. The minimum value of PE and MB are 0.13 and 0.3 and the maximum values are 80.69 and 64.45 respectively. The standard deviation of DPS, PE and MB are 18.53044, 15.23359 and 11.70589 respectively. SP indicates a mean value of 5.1492 with the standard deviation 1.3918 and the minimum and maximum values as 2.2 and 7.79 respectively.

3.2. Multicollinearity test

Table 3: Collinearity statistics

	Variance Inflation Factor (VIF)	1/VIF
EPS	1.46	0.685331
DPS	2.80	0.357051
PE	1.02	0.984506
M/B	2.16	0.464024

Table 3. shows the result of the VIF and the tolerance factor of the independent variables. It shows that there is no multicollinearity, as the highest value of VIF is less than 10 and the tolerance factor denotes below 1.

3.3. Correlation analysis

Table 4: Correlation analysis

	SP	EPS	DPS	PE	M/B
SP	1.0000				
EPS	0.4939	1.0000			
DPS	0.3122	0.5275	1.0000		
PE	0.2297	0.0251	0.1026	1.0000	
M/B	- 0.0100	0.2434	0.7139	0.1207	1.0000

As illustrated in the Table 4 shows the correlation between the independent variables. According to the result, it depicts 49.39% relationship exists between EPS and SP. At the same time, it describes the 31.22% relationship between DPS and SP and the 22.97% relationship that exists between PE and SP. MB depicts a negative relationship with SP. Therefore, the result denotes that there is a positive relationship between EPS and SP.

3.4. Multiple regression analysis

Table 5: Multiple regression analysis

	Fixed Effect	Random Effect	Pooled Regression
EPS	0.0021 (1.21)	0.0028 (1.63)	0.0130*** (3.98)
DPS	0.0146*** (3.04)	0.0141*** (3.03)	0.0270*** (2.63)
PE	0.0037 (1.10)	0.0046 (1.36)	0.0210*** (2.79)
MB	0.0117 (0.87)	0.0033 (0.28)	-0.0464*** (-3.22)
Constant	4.7947 (38.77)	4.8148 (16.65)	4.4086*** (24.58)
Number of obs.			100
F (4,95)			13.56
Prob>F			0.0000
R-Squared			0.3634
Adj R-Squared			0.3366

Notes: *** indicate statistical significance at the 1%; Numbers in parentheses are t-statistics;

As illustrated in the Table 5, according to the pooled regression analysis, the coefficient of Adjusted R- Square is 0.3366, which denotes that 33.66% of the variation of stock market price can be explained by the independent variables namely EPS, DPS, PE and MB, while remaining 66.34% of the variation of stock market price explained by other factors which were not included in this study. Based on the F value statistics 13.56 along with the P-value of 0.000 which is lower than 0.05. Therefore, it has been proved that the model utilized in the current study is significant at the 1% level. The constant value denotes the stock market price when all the other variables are remaining unchanged. In this study, the constant value depicts 4.4086 which illustrates that while EPS, DPS, PE and MB are being left unchanged with the stock market price is 4.4086.

The pooled regression equation can be expressed as follows:

$SP = 4.4086 + 0.0130\ \beta1 + 0.0270\ \beta2 + 0.0210\ \beta3 - 0.0464\ \beta4 + \varepsilon$

The outcome of the regression analysis indicated the three variables namely EPS, DPS and PE had a positive impact on the stock market price. MB had a negative impact on the stock market price. When it comes to the association between EPS and SP, the coefficient value was found 0.0130 at 0.000 where p value is less than 0.05. It is an indication that there is a positive significant relationship between EPS and SP. When it comes to the association between DPS and SP, the coefficient value was found 0.0270 at 0.010 where p value is less than 0.05. It is an indication that there is a positive significant relationship between DPS and SP. When it comes to the association between PE and SP, the coefficient value was found 0.0210 at 0.006 where p value is less than 0.05. It is an indication that there is a positive significant relationship between PE and SP. When it comes to the association between MB and SP, the coefficient value was found -0.0464 at 0.002 where p value is less than 0.05. It is an indication that there is a negative significant relationship between MB and SP. According to fixed effect analysis, the p value of EPS in 0.231 where p value is higher than 0.05 and insignificant. Thus, H1 is not supported. The p value of DPS in 0.003 where p value is less than 0.05 and significant. Thus, H2 is supported. The p value of PE in 0.274 where p value is higher than 0.05 and insignificant. Thus, H3 is not supported. The p value of MB in 0.386 where p value is higher than 0.05 and insignificant. Thus, H4 is not supported. According to pooled regression analysis EPS, DPS and PE had a positive significant impact on Stock price. MB had a negative significant impact on Stock price. According to fixed effect regression analysis, EPS, PE and MB had positive insignificant impact on stock price. DPS only had a positive significant impact on stock price.

3.5. Hausman Test

Using the data with fixed effect, random effect and the result based on the pooled regression analysis was presented as a part of comparative analysis above table 5. Based on the Hausman test for as dependent variable SP Prob. >chi2 value, if this value is less than 0.05 fixed effect is appropriate and if it is greater than 0.05 random effect is appropriate.

H_0: Random effect is suitable.

H_1: The fixed effect is suitable.

According to the Hausman test results, since there was no enough evidence to reject the null hypothesis of deference in coefficients are not systematic, it is concluded that the fixed effect model is the most suited for understanding the impact of accounting ratios on stock price. According to the Hausman test for as dependent variables of SP prob.>chi2 value is 0. 0000. since this value less than 0.05then fixed effect method is more understanding the impact of EPS, DPS, PE and MB on SP. So H_1 is supported while H_0 is not supported.

4. Discussions

According to the fixed effect regression analysis, it was found that only DPS had positive significant impact on SP. The results are inconsistent with the findings obtained by Sarifudeen (2016) and Miah (2012). Other variables were found insignificant impact on SP. According to the pooled regression analysis, it was found that EPS had positive significant impact on SP. The results are in line with the findings obtained by Miah (2012), Khan, Gul, Rehman, Razzaq and Kamran (2012), Uwuigbe, Igbinoba, & Oni-Ojo (2016), Wang, Fu and Luo (2013), Hassan, Hasan and Haque (2017), Ndubuisui, Fidelis, Chinyere and Leonard (2018), Vijitha and Nimalathasan, (2014) and Sarifudeen (2016). DPS had positive significant impact on SP. The results are in line with the findings obtained by Ndubuisui, Fidelis, Chinyere and Leonard (2018). PE also had positive significant impact on SP. The results are in line with previous studies performed by Miah (2012) and contradict with finds obtained by Vijitha and Nimalathasan (2014) who found insignificant impact of PE on SP. MB had negative significant impact on SP. The results are in line with the findings obtained by Khan, Gul, Rehman, Razzaq and Kamran (2012). The next section gives the conclusion to the study.

5. Conclusions

In this study an attempt has been made to investigate the impact of accounting ratios on stock market price in listed companies in CSE, Sri Lanka. Major findings of the study as analyzed by pooled regression analysis, EPS, DPS and PE had significant positive relationship with SP. There is negative impact of MB on SP. Finally, this study concludes that impact on accounting ratios to the stock market price. In line with the findings of the study it can be recommended to investors should pay their attention on the accounting ratios like EPS, DPS, PE ratio and MB ratio in assessing the companies' financial statements and making investment decisions. This will assure the investors for more secure investments.

The results of this study raise several policy implications that can be taken into consideration by stock market regulators and potential investors. The findings of the study can be used to generalize the other listed companies in terms accounting ratios and share price. There are some contributions from this research. This study, employing of 20 companies as sample size as well as a longitudinal approach for data analysis, could result in a comprehensive understanding with regard to the impact of accounting ratios on stock price of the companies listed in CSE. Further researchers should focus on more companies, cover longer year periods and include more accounting ratios as independent variables. Future studies could also be done including non-linear relationships among the variables.

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The Combined Effects of Managerial and Operational Performance of Various Fundamental Components on Stock Selection

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Abstract
This study aims at quantifying fundamental components such as the country economy, stock market development, economic sectors, and company's performance computed by Data Envelopment Analysis (DEA) built-in MATLAB program and combined using a top-down approach. It was conducted in the East African region specifically Kenya, Tanzania, Uganda, and Rwanda from 2015 to 2018. A secondary data extracted from the listed company's websites, capital market authorities of each country, and World Bank. The study found that the combined performance of various components has a great impact on screening the stocks to be used for portfolio construction. It gives a signal to the authorities of capital markets, investors, policymakers, and other regulatory bodies to take immediate measures on designing policies and best practices. Further recommendation to the capital market authorities within the region is to ensure the growth of managerial and operational performance of stock exchanges. Also, regulatory bodies, policymakers, and higher-level administration of each country within the region to take responsibility to uplift the country's economy as well as economic sectors growth. The board of directors and management of listed companies should formulate strategies to improve both managerial and operational performance.

Keywords: Fundamental Components, Managerial Performance, Operational Performance, Stock Selection, Top-down Approach

I. Introduction

It is a conventional practice of the researchers to regress several factors and estimate the expected returns of shares. Guerard, Markowitz and Xu (2015) considered 10 factors while Loncarski and Skocir (2018) regressed 8 factors including 5 factors proposed by Farma and French (2014). They both agreed that the multifactor model increases the explanatory power of expected returns. Generally, the scholars look at the decomposition of systematic risk into several components depending on the number of factors included in the model and conclude which factor has

a higher influence on expected returns. This study looks at the root cause by evaluating the managerial and operational performance of Decision-Making Units (DMUs) where those factors incorporated in the models are extracted and measured by Data Envelopment Analysis (DEA). This led to an effective model with the higher predictive power of returns, its volatility, and sensitivity.

DEA is the well-known model used to measure efficiency and it has been applied in various studies that relate share selection and portfolio construction such as the study of Lim, Oh, and Zhu (2014) and Jothimani, Shankar and Yadav (2017) in different approaches. They are mostly used as an alternative measure of share and portfolio performance. This study used the DEA to measure the managerial and operational performance of various components and used as the base of share selection. Various studies have associate managerial and operational efficiency and effectiveness with technical efficiency of DMUs measured by various DEA models which are Constant Return to Scale (CRS) and Variable Return to Scale (VRS) model (Maria and Sunchez, 2007; Kumar and Gulati, 2008; Wong and Deng, 2016). The scholarly work of Banker, Charnes, and Cooper (1984) addressed that CRS model measures the Overall Technical Efficiency (OTE) and VRS model measures Pure Technical Efficiency (PTE) and the ratio of OTE and PTE measure the Scale Efficiency (SE). Kumar and Gulati (2008) further interpreted that the OTE helps to determine inefficiency due to the input/output configuration as well as the size of operations, PTE measures the management performance and SE measures the management ability to choose the optimum size of available resources. Maria and Sanchez (2007) reported that the PTE measures the management effectiveness. Contrary to the study of Wong and Deng (2016) who remain silent, they only mentioned that it to be the measure of efficiency. Somewhere across the lines, Wong and Deng compared PTE with effectiveness. The study of Yannick, Hongzhong, and Thierry (2016) clarified that OTE could be broken into two categories which are PTE and SE, while PTE measures management efficiency which means how well resources are managed and SE measure operational efficiency which means how well resources are utilized. It was stressed that the effectiveness requires goal achievement and efficiency requires minimization of resources used. It was further explained by Bartuseviciene and Sakalyte (2013) that the product of efficiency and effectiveness result in performance. Impliedly, Input Oriented (IO) DEA is more on efficiency, Output Oriented (OO) is more on effectiveness and product of IO and OO is the performance as illustrated in Figure 1. Therefore, mathematically management effectiveness can be defined as PTE computed using OO, management efficiency can be referred to as PTE computed using IO and management performance is the product of PTE-OO and PTE-IO. Likewise, operational effectiveness corresponds to SE computed using OO, operational efficiency is the SE computed using IO and operational performance is the product of SE-OO and SE-IO.

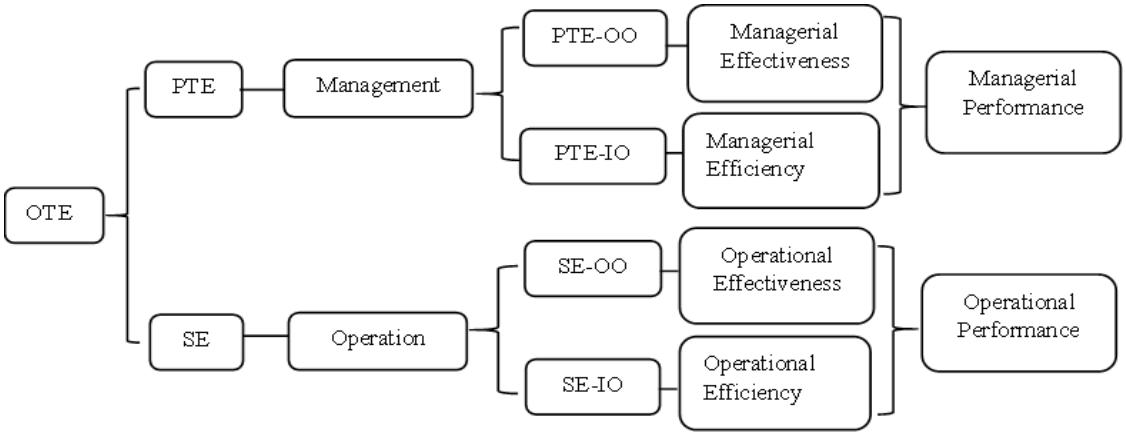

Figure 1: The Flow of Technical Efficiency

The methodology of determining the managerial and operational performance, and the limited previous studies incorporating components like stock market development, economic sector growth and country economy with the company's fundamentals remain the reasons of conducting of this study. Broadly, this study is plagued with conceptual and methodological issues that have precluded by other researchers from concluding the combined influence of managerial and operational performance on share selection.

The proposed model was tested in East African Capital Market (EACMs) which comprise Nairobi Securities Exchanges (NSE), Dar es salaam Stock Exchanges (DSE), Uganda Securities Exchanges (USE) and Rwanda Stock Exchanges (RSE). The selection of the region were influenced by its growth compare to another region in the continent (ADB, 2019), equity is the best stock to trade in the region, although brokers are not competitive, local investors within the national stock markets are less confident on trading equity stock rather they invest on government bonds (Kimani, Aduda and Mwangi, 2017) also, there is an ongoing project sponsored by World Bank to integrate EACMs in one trading platform (Biau, 2018), most important this study is unique on its kind to be conducted in the region.

The integrated model is useful to practitioners and policymakers on understanding the efficiency of various listed companies concerning the country's economy, economic sectors, and stock market development. The following sections of this study will be organized follow; Section 2 will review the related literature. Section 3 will explain the data and techniques used. Section 4 will present and discuss the results. Section 5 will conclude and propose a future study to be conducted.

II. Literature Review

Investors or fund managers commonly use fundamental or technical analysis to select shares to be included in different portfolios. Though both analyses have common objectives of maximizing the accuracy of predicting the future price movement and profit of shares, this approach is different. The fundamental analyst examines the proxies of the country's economy, its stock market, economic sectors and company listed. While technical analysts are emphasized on examining the behavior, trend, intensity, and quality of the past price of shares (Petrusheva and Jordanoski, 2016). Studies conducted in different stock markets to compare fundamental and technical analysis found that fundamental outperform technical models (Jakpar, Tinggi and Tak, 2018; Beyaz, Tekiner, Zeng, and Kean, 2018; Kulkarni and Kulkarni, 2013). Although various scholars suggested using a hybrid model that combines both fundamental and technical analysis for best results (Souza, Ramos, Pena, Sobreiro and Kimura, 2018; Bonga, 2015; Drakopoulou, 2015; Waworuntu and Suryanto, 2010; Markwat, Dijk, Swinkels, and Zwart, 2008), few of them show the clear methodology of merging these two models. Several studies were confined to the standard fundamental analysis framework by looking at screening criteria extracted from audited financial statements. Shen and Tzheng (2015); Jothimani, Shankar, Yadav (2017) considered profitability, growth, liquidity, solvency, valuation, and operational efficiency ratios as screening criteria of fundamental analysis. Likewise, Wong and Deng (2016) used absolute value including assets, loans, deposits, investments, total cost, and interest on deposits.

A recent study of Tarczynski and Tarczynska-Luniewska (2018) reconsidered the Graham and Dodd framework by including other components like macroeconomic, sectoral analysis, and company financial conditions to account companies' fundamental strength that can lead to long term sustainability. However, they overlooked the identification of the proxies used for economic, market, and sectoral analysis. Precisely, company liquidity, profitability, indebtedness, and management efficiency are the only criteria they used. An empirical study of Baresa, Bogdan, and Ivanovic (2013) addressed the importance of incorporating macroeconomic and sectoral analysis during the share selection process. They considered GDP, unemployment rate, interest rate, budget deficit, and inflation as key macroeconomic proxies that affect share returns. Similarly, different sectors within the market have a different level of risk, therefore diversification across different sectors will minimize risk and maximize the portfolio returns. Sukcharoensin and Sukcharoensin (2013) analyzed stock market development in ASEAN-5 Equity Markets by looking into the size, accessibility, efficiency, and stability of the stock market and able to classify the market development which is very useful information to investors who are interested to cross border share trading. Therefore, the broad scope of fundamental analysis includes the components such are country economy development, economic sectors, stock market, and listed company.

Country's Economy

The relationship between the country's economy and stock selection is associated with the study of Rose (1976) when introduced to APT. The country's economy proxies including interest rate spread, inflation rate, and

industrial production growth rate were used to explain the different levels of risks that can influence stock returns. Studies conducted to measure the sensitivity of macroeconomic variables on expected returns show contradicting results. Amtiran, Indiastuti, and Masyata (2017) confirmed that macroeconomic variables have a strong influence on stock returns. French (2017) reported that industrial production growth shows significant contribution and other variables are poorly explained the expected returns. Gabriel, Semion, and Akpoede (2016) and Elhusseiny, Michieka, and Bae (2019) both concluded that all macroeconomic variables have a very low contribution to stock returns. Recent scholars, therefore, opt to regress more variables such as a change in export, gross domestic product, unemployment rate, domestic credit, exchange rate, and observe the effect on expected returns (Oyetayo and Adeyeye, 2017; Elshqirat, 2019). All those variables are commonly used to explain the country's economic position.

Most of the cross-countries studies conducted were more interested in understanding collectively the efficiency of the country economy. They classified macroeconomic variables into two main categories which are input factors and output factors and evaluated using the performance evaluation method commonly DEA. Skare and Rabar (2016) emphasized that the DEA is the best measure of country economic efficiency, it provides valuable insights in cross country comparisons and has been widely used in OECD countries and somehow in developing and developed nations. It was stressed that different studies used different macroeconomic indicators to evaluate country economic efficiency ranging from the gross domestic product (GDP), inflation, and unemployment, as the primary variables, to a series of less used variables such as consumer price index, access to credit, business cycles. Tasnim and Afzal (2018) argued the benefits of the global entrepreneurship system on the country's economic efficiency over macroeconomic factors which are commonly used in other studies. Using data extracted from 59 countries and DEA, the results revealed the influence of the global entrepreneurship system as among the factors that can be used to evaluate the country's economic efficiency. It was insisted that the DEA was able to segregate the countries based on efficiency. Ozkan and Ayan (2017) used DEA to evaluate the efficiency of OECD countries on utilizing national income for social development. Deliktas and Gulan (2016) conducted a comparative study between low income, upper-middle, and high-income countries on efficient use of labour, capital, and energy on economic growth using DEA. Overall, the studies witnessed the power of DEA on identifying an efficient country and they recommended using the technique to evaluate the individual or cross-country efficiency (Skare and Rabar, 2016).

However, other scholars are more focused on comparing the countries with a wide gap of financial resources (Ozkan and Ayan, 2017; Deliktas and Gulan, 2016) which end-up to fail to draw a general conclusion. Still, there is a gap in a body of literature of cross-country efficiency comparison which has a comparable level of the economy. Although labour force and capital are observed to be common inputs used while GDP is dominated as output factor. Some studies conducted include more inputs or outputs variables that fit with the study objective. Ozkan and Ayan (2017) included socio-economic development indicators as output variables since the study aims to determine the effectiveness of the countries on socio-economic development provision. Tasnim and Afzal (2018) involved the global entrepreneurship index as among the inpuvariablesble to observe its influence on the overall economy of the country however, the results were inconsistent compare to common input/output factors used.

Stock Market Development

The analysis of stock market development was firstly understood by Calderon-Rossell in 1991 who come-up with a partial development model of stock market growth (Yartey, 2008 and El-Wassal, 2013). The model explained that stock market development is the function of stock market liquidity and country economic growth. Some studies focused on evaluating the ability of the stock market on capital allocation, providing opportunities to investors to diversify the risk, and to trade economically (Sukcharoensin and Sukcharoensin, 2013). Further was elaborated that, the World bank introduced Financial Sector Development Indicators (FSDI) in 1996 which captures other dimensions of development such as access, stability, efficiency, and size. While stock market access can be assessed by number of listed companies and newly listed companies. Market stability can be determined using market fundamental information extracted from its financial statements. Stock market efficiency can be measured by observing the proportion of listed companies with autocorrelations and zero returns. Stock market

size are market capitalization, volume and value of share traded. Most of the studies conducted on examining the influence of market development are skewed on identifying the significant contribution of each indicator and overlooked to identify the overall strength of the market. Onoh, Ukeje, and Nkama (2017) found that trade volume has a negative significant contribution while market turnover has a positive significant contribution. Saeed and Hassan (2018) reported that Market depth liquidity measured by turnover rate and volume of share traded found to be positively correlated with stock returns. Kuvshinov and Zimmermann (2018) found that the stock market size and the market capitalization to GDP ratio is a reliable indicator for stock market growth and financial development which is also influenced stock returns. Eze (2019) found that market capitalization of Nigeria stock exchange had a positive and significant impact on stock returns.

Few of the studies focused on a general understanding of the stock market and draw a conclusion based on market access, stability, efficiency, and size. Yi, Chang, Xing, and Chen (2019) revealed that the fluctuation of relative valuation efficiency of the Hong Kong stock market is less than the mainland stock market, this signified the maturity and stability of the Hong Kong stock market. When the valuation level and valuation efficiency of the DEA and P/E ratio are compared, the P/E values are found to be overestimated while DEA is found to fit the real situation. Kuo, Lu, Dinh (2020) argued that the findings contradict previous studies explaining that fundamental information of listed companies is the proxies of evaluating stock market performance (Zhang, 2007; 2008). Sharma (2018) concluded that the managerial efficiency measured by PTE and operational efficiency measured by SE of Indian banks show different significance levels on stock market performance.

Generally, the studies conducted do not consider the variables which directly measure the stock market development as suggested by Calderon-Rossell or FSDI instead they used the inputs and outputs variables related to listed companies and draw a conclusion with the respect to the efficiency of the companies (Yi, Chang, Xing and Chen, 2019; Dong, et al., 2016 and Sharma; 2018). While the recommendations of Dong, et.al. (2016) lead to improve market stability and market access which are among the FSDI, yet the indicators were not included in the model. A recent study of Kuo, Lu, Dinh (2020) concluded that the companies fundamentals cannot explain the stock market performance, other factors like information asymmetry need to be considered to improve market efficiency. Although, Sharma (2018) reported that operational efficiency computed using fundamental information of listed banks significantly explained the stock market development.

Economic Sectors

Among the earliest study conducted on the analysis of economic sector growth are conducted by Lewis (1954); Kuznet (1966); Chenery (1975) and Kuznet (1979) who hypothesized as a structural change involved the reallocation of capital outflow, labor, tax revenue as well as the structural term of trade across economic sectors (Hussin and Ching, 2013 and Lankauskiene and Tvaronaviciene, 2013). Generally, the indicators which are commonly used to evaluate economic sectors are growth which measures the value added by individual sectors to the country economy, productivity which is the ratio of value-added to labour input, profitability measured by net profit margin or return on assets, International trade measured by Revealed Comparative Advantage (RCA) or export market share, Foreign Direct Investment (FDI) measured by the ratio of inward FDI to value-added or ratio of outward FDI to value-added (Tahamipour and Mahmoudi, 2018; Lankauskiene and Tvaronaviciene, 2013; Ahmad and Malik, 2009).

Studies conducted to observe the variability of stock returns across different economic sectors incincludenjaman and Aralas (2017) who found that the technology sector shows the highest returns while in the telecommunication sector showshows lowest returns although the difference was not significant. Tandon and Walia (2015) revealed that the pharmaceutical sector performs better than media, finance, and metal. The discussion note released recently by Norges Bank (2019) examined the importance of country and economic sectors in global equity returns found that mixed results over time. By applying Heston and Rouwenhorst (1994) methodology which decompose sectors and country effect into factor and regress with stock returns. It was concluded that in recent decades the sectors have a higher contribution to global equity returns. At least Norges Bank (2019) regret to regress sectoral factors and country factors due to the existence of perfect collinearity among regressors.

Other studies managed to identify some variables which can explain the sectoral effect and evaluated them using DEA. Yet the results contradict among scholars, the context of the study, type of model used, and orientation. Nazako and Chodakowska (2015) contended that DEA only explained managerial efficiency and excluded the impact of exogenous factors such as country economic condition. The Tobit regression results revealed that country GDP is the main contributor to the productivity of the industrial sector. Atici and Podinovski (2015) disclosed that different DEA models produced different results however, the conventional model which is VRS and CRS produce poor efficiency compare to the production trade-off DEA model. Yang, Shi, Qiao, and Wanga (2017) evident that there are different technical efficiencies of the selected steel industry in China in different provinces, areas, economic zone, and country development plans. Yannick, Hongzhong, and Thierry (2016) found Ivorian commercial banks are not operationally efficient. Also, the efficiency score was decreased when the VRS assumption was held.

The reported findings of the selected studies revealed that DEA ccouldevaluate the efficiencies of different economic sectors. The question of identifying input and output factors still raised concern among the scholars. Yannick,et al.. (2016) measured the efficiency of the banking sector found the exclusion of local and foreign ownership among the input/output parameter was not an appropriate decision. Likewise, Nazako and Chodakowska (2015) forgone GDP in the initial stage while measuring the efficiency of the industrial sector result to have a false conclusion. It worth noting that, the type of DEA model used results to have unexpected results. Atici and Podinovski (2015) stressed that both CRS and VRS produced poor efficiency when they used to measure the agricultural sector in a different region in Turkey. Although was justified that mainly caused by many input variables used.

Company's Fundamental

Analysis of company fundamentals on share selection was associated with the criteria suggested by Graham and Dodd (1934). The most common criteria used was Price to earnings (P/E) ratio, price to book value (P/BV) ratio, dividend yield, current ratio, positive earnings per share (EPS), debt to equity (D/E) and market capitalization (Kok, Ribando and Sloan, 2017; Kabrt, 2015; Otuteye and Siddiquee, 2015; Lee, 2014). Current studies which have tested the Graham and Dodd framework found that profitability and market-based ratios have strong predictive power on share returns (Mohammad and Ali, 2018; Ma, Ausloos, Schinckus, Chong, 2018).

Recent studies incorporated the Graham and Dodd criteria with various DEA models to strengthen the relationship between company fundamentals and future payoff. Some of them even combined the mean-variance (MV) framework and examine the deference. Lim, Oh and Zhu (2014) concluded that portfolio selection based on MV-DEA cross efficiency evaluation is more effective than pure DEA cross efficiency and benchmark market index. Although a hybrid model was found to be effective and recommended by scholars, it was criticized by Mashayekhi and Omrani (2016) complained that the methodology of merging MV with DEA cross efficiency was not conducted simultaneously. This means that all the constraints such as maximize portfolio returns, minimize weighted covariance of the returns, maximize portfolio efficiency, and minimize weighted covariance of the firm efficiencies need to be considered concurrently. It was explained that the stocks were selected based on DEA cross efficiency and portfolios were constructed using MV framework. Using the same criteria used by Lim, Oh, and Zhu (2014), the study further revealed that when the merging is conducted simultaneously the portfolio performance becomes lower although it shows good diversity of the Pareto solution. Other studies intensified on the enhancement of the DEA model and preliminary selection of shares before portfolio construction to maximize the portfolio returns. Jothimani, Shankar, and Yadav (2017) reported that the DEA-PCA model helps reduce curse dimensionality which is reported as a major drawback of standard DEA. A total of 115 firms were found efficient when the standard DEA model was while only 41 remained when DEA-PCA was used. Higher variability was merely caused by many inputs/outputs that directly increase the dimensionality of data which causes difficulty in solving an optimization problem using standard DEA. Edirisinghe and Zhang (2010) found that the correlation between company fundamentals with expected returns was maximized and portfolios developed were demonstrated to be superior when expert information (EI) is incorporated in DEA model. Conclusively, studies that evaluate the company fundamentals using DEA and examine their relationships with stock returns realized marginal improvement though differs from the model used. The question of efficiency of the company

fundamentals and their contribution of excess returns remains a hot discussion in the field especially in the methodology and identification of inputs and output factors.

Integration of Fundamental Components

There are two common approaches that investors can use to integrate the components which are considered during fundamental analysis. There are top-down and bottom-up. The top-down approach is the one where the analysts put more emphasis on analyzing the economy of the country followed by the stock market and industry, and less emphasis on company analysis. Under the bottom-up approach, more emphasis is on company analysis followed by industry and market with little importance on analysis of the economy of the country (Navas and Bentes, 2013; Baresa, Bogdan, and Ivanovic, 2013; Li and Sulivan, 2011). The study of Juozapaitis and Stasytyte (2015) added a mixed approach after top-down and bottom-up. The mixed approach is involving the implementation of both top-down for economic activities and bottom-up for the company's activities. This means that both macroeconomic variables and company fundamentals are broadly evaluated, while other components like the stock market and economic sectors received little attention. However, top-down approach is recommended when the investor aims to conduct geographical diversification. Where for that case, indeed must emphasize on evaluating the economic condition of the countries and compare before making an investment decision (Navas and Bentes, 2013). Correspondingly, this study involves four countries with different economic status in which the top-down approach fit the minimum requirements.

III. Methodology

Data and Data Source

The data used in this study are classified into four components and range from 2015 to 2018. There are country economies and economic sectors data that are extracted from the word bank database, stock market data are extracted from Capital Market Authority (CMA) of each country, and company data are extracted from the company's database. The defined inputs and outputs variables of each dimension are presented in Table 1.

Table 1: Summary of Data and Data Sources

Dimension	DMUs	Inputs	Outputs
Country Economy	Kenya, Tanzania, Uganda and Rwanda	Government spending % of GDP and Investments % of GDP.	Inflation rate and Public debt % of GDP
Stock Market	NSE, DSE, USE and RSE	Listed shares and Market Capitalization.	Turnover and All share index
Economic Sector	Agriculture, Industry and Service	Labour force % of total employment.	Value added % of GDP and Growth rate
Company Fundamentals	51 listed shares (36-NSE, 9-DSE, 4-USE and 2-RSE)	Equity, total Assets and Investing Cash flow.	Turnover, Net profit, Financing and Operating cash flow

Sampling Framework

All companies selected are domestic companies from each stock exchange. The cross-listed companies were excluded to avoid redundancy. Only companies that have published audited financial statements and all defined inputs and outputs constrained from 2015 to 2018 are considered.

Managerial and Operational Performance Evaluation

CCR and BCC models in both orientations as shown in Table 2 were incorporated in MATLAB.

Table 2: Models Used

Model 1: Input Oriented	Model 2: Output Oriented
$\min_{u,v} \theta - \varepsilon\left(\sum_{i=1}^{m} S_i^- + \sum_{r=1}^{s} S_r^+\right)$	$\max_{u,v} \vartheta_j + \varepsilon\left(\sum_{i=1}^{m} S_i^- + \sum_{r=1}^{s} S_r^+\right)$
Subject to.	Subject to;
$\sum_{j=1}^{n} x_{ij}\lambda_j + S_i^- = \theta x_{io} \quad or\ i = 1,2,\dots m$	$\sum_{j=1}^{n} x_{ij}\lambda_j + S_i^- = \vartheta x_{io} \quad or\ i = 1,2,\dots m$
$\sum_{j=1}^{n} y_{rj}\lambda_j - S_i^- = y_{io} \quad for\ r = 1,2,\dots s$	$\sum_{j=1}^{n} y_{rj}\lambda_j - S_i^- = y_{io} \quad for\ r = 1,2,\dots s$
$\lambda_j \geq 0 \quad for\ j = 1,2,\dots n$	$\lambda_j \geq 0 \quad for\ j = 1,2,\dots n$
$S_i^- \geq 0\ ;\quad S_r^+ \geq 0$	$S_i^- \geq 0\ ;\quad S_r^+ \geq 0$
For BCC, $\sum_{j=1}^{n} \lambda_j = 1 \quad for\ j = 1,2,\dots n$ is added	For BCC, $\sum_{j=1}^{n} \lambda_j = 1 \quad for\ j = 1,2,\dots n$ is added

The evaluation of managerial and operational performance of the country's economy, market, economic sectors and listed companies follow the following steps.

1. Identification of Inputs and outputs of all DMUs

— For input and output matrix, each raw represent one DMU and each column represent one constraint.

— The input of $j^{th}DMU$ is defined as $X = \{x_{1j},\ x_{2j} \dots, x_{ij}\}$, the output is defined as $Y = \{y_{1j},\ y_{2j} \dots, y_{rj}\}$ where $j \in \{1, n\}$.

— The proportional increase of outputs is (S_r^+) and proportional decrease of input is (S_i^-).

— The multiplier λ_j represent a combined inputs and output weights.

2. Computation of Overall Efficiency

— The overall efficiency is denoted by θ_j is evaluated using Mode 1

— The objective function defined as *f = [zeros (1, n) -epsilon*ones (1, s) -epsilon*ones (1, m) 1]*

— The equality constraints *Aeq* and *beq* which are left-hand matrix and right-hand vector, respectively. *Aeq = [Y', -eye(s,s), zeros(s,m+1); -X', zeros(m,s), -eye(m,m), X(j,:)']* and *beq = [Y (j, :)'; zeros (m,1)]*.

— To solve the optimization problem, the command *z = linprog (f, [],[],Aeq, beq, lb)* was used.

3. Computation of Overall Effectiveness

— The overall effectiveness is represented by ϑ_j is evaluated using Model 2

— The objective function defined as *f = - [zeros (1, n), epsilon*ones (1, s+m), 1]*

— The equality constraints Aeq and beq which are left-hand matrix and right-hand vector, respectively. The *Aeq = [-Y', eye(s,s), zeros(s,m), Y(j,:)'; X', zeros(m,s), eye(m,m), zeros(m,1)]* and *beq = [zeros(s,1); X(j, :)']*.

— The optimization problem was solved using command *z =linprog(f, [],[],Aeq,beq,lb).*

4. Computation of Managerial Efficiency

— The management efficiency is defined as φ_j is evaluated using model 1 with additional constraint $\sum_{j=1}^{n} \lambda_j = 1 \quad for\ j = 1,2,\dots n$

— The objective function is defined as *f = [zeros (1, n) -epsilon*ones (1, s+m) 1]*

— The equality constraints Aeq and beq which are left-hand matrix and right-hand vector, respectively. The *Aeq = [Y', -eye (s, s), zeros (s, m+1); -X', zeros(m,s), -eye(m,m) X(j,:)'; ones(1,n), zeros(1,s), zeros(1,m+1)]* and *beq = [Y (j, :)'; zeros (m,1);1]*.

— To solve optimization problem, the command *z = linprog(f, [],[],Aeq,beq,lb).*

5. Computation of Managerial Effectiveness

— The managerial effectiveness is denoted by $\emptyset_j$ is evaluated using Model 2 with additional constraint $\sum_{j=1}^{n} \lambda_j = 1 \quad for\ j = 1,2, \dots n$

— the objective function is defined as *f = -[zeros(1, n), epsilon*ones(1,s+m), 1]*

— The equality constraints, *Aeq* and *beq* which are left-hand matrix and right-hand vector, respectively. The *Aeq = [-Y', eye (s, s), zeros(s,m), Y(j,:)'; X', zeros(m,s), eye(m,m), zeros(m,1); ones(1,n), zeros(1,s+m+1)]* and beq = [zeros(s,1); X (j, :)';1].

— The optimum solution is obtained using the command *z = linprog(f, [],[],Aeq,beq,lb).*

6. Computation of Operational Efficiency, $\emptyset_j$

The operational efficiency which is represented by $\emptyset_j$ is formulated by dividing overall efficiency with management efficiency which are θ_j and φ_j respectively, as shown in the equation 3.

$$\emptyset_j = \frac{\theta_j}{\varphi_j} \tag{3}$$

7. Computation of Operational Effectiveness, ϱ_j

The operational effectiveness which is denoted by ϱ_j can be computed by dividing overall effectiveness with management effectiveness which are ϑ_j and ϕ_j respectively, as shown in the equation 4.

$$\varrho_j = \frac{\vartheta_j}{\phi_j} \tag{4}$$

8. Computation of Managerial Performance, ξ_j

The Managerial performance which is denoted by ξ_j is computed by multiplying management efficiency φ_j and management effectiveness ϕ_j as shown in the equation 5.

$$\xi_j = \varphi_j \times \phi_j \tag{5}$$

9. Computation of Operational Performance, ς_j

The Operational performance which is denoted by ς_j is computed by multiplying operational efficiency $\emptyset_j$ and operational effectiveness ϱ_j as shown in the equation 6.

$$\xi_j = \emptyset_j \times \varrho_j \tag{6}$$

10. Combined Evaluation

The performance score of each component (economy, market, sector and companies) were combined. Four steps were involved during the combination process top-down approach.

— The DMUs of the company analysis which are the listed companies were considered as the reference.

— The scores of each component were assigned in respect to listed company arranged column-wise.

— The component's matrix was developed with column of listed companies and rows of component's scores.

— The combined score of each DMUs is computed by summing up the scores of each component weighted by top-down ($w_e > w_m > w_s > w_c$). The basic assumptions of weight generation, $\sum_i w_i = 1$ and $w_i \geq 0$, where $i = 1,2 \dots n$ were held. Therefore, the formulation of the combined score can be presented using the equation 7

$$S_T = w_e S_e + w_m S_m + w_s S_s + w_c S_c \tag{7}$$

Whereas S_T is the combined score or total score, S_e is the economy score, S_m is the market score, S_s is the sector score and S_c is the company score.

11. Selecting Companies

The short-listed companies are those which are performed equally or above minimum average out of all four years in all three measures which are overall, managerial and operational.

IV. Results

Country Economy

Table 4.1 presents the managerial, operational, and overall performance of the four countries under EAC from 2015 to 2018. The degree of the economy among EAC members is inconsistent throughout. Kenya and Tanzania are fully performed in all three measures with a score of 1. That signified their capability of managing and identifying ideal expenditures and investments to maintain the required rate of inflation and balance of the public debt. This builds confidence to existing and prospective investors both within and outside these countries while making an investment decision. The full performance of Kenya was associated with a huge investment of China-Kenya's Nairobi-Mombasa railway, which was completed since 2016, although the consequence was expected on public debt and in Tanzania was associated with strengthening domestic resource mobilization via enhancing tax administration and collection (United Nations Economic Commission for Africa, 2018). The performances of Uganda and Rwanda fluctuated throughout 2015-2018. Comparatively, Uganda records higher managerial and operational performance in the entire time. However, both were suffered from recognizing the optimal level of government expenditure and investment to minimize inflation and public debt. Various tax reforms including enhancing tax collection, avoid tax evasion, and increase the efficiency of public spending are among the reasons associated with such performance. ADB (2018) addressed that 65 percent of Rwanda's 2016 budget was funded by the domestic tax, non-tax revenue, and domestic financing. Correspondingly, government expenditure reported hitting 12.9 percent which is the second after Tanzania which records 15.8 percent.

Table 1: Development Degree of EAC States

	Country	Performance		
		Overall	Managerial	Operational
2015	Kenya	1.00	1.00	1.00
	Tanzania	1.00	1.00	1.00
	Uganda	0.98	1.00	0.98
	Rwanda	0.32	0.54	0.60
2016	Kenya	1.00	1.00	1.00
	Tanzania	1.00	1.00	1.00
	Uganda	1.00	1.00	1.00
	Rwanda	1.00	1.00	1.00
2017	Kenya	1.00	1.00	1.00
	Tanzania	1.00	1.00	1.00
	Uganda	0.92	1.00	0.92
	Rwanda	1.00	1.00	1.00
2018	Kenya	1.00	1.00	1.00
	Tanzania	1.00	1.00	1.00
	Uganda	0.85	0.90	0.95
	Rwanda	0.46	0.64	0.72

EACMs Performance Trends

Four EACMs were evaluated from 2015 to 2018 and the performance score were summarised in the Table 4.2. The DSE record full performance in all measures throughout and NSE record full performance for the last three year from 2016 to 2018. USE performance of all measures was bumpy throughout. While in RSE's account full managerial performance from 2015 to 2018 and other measures were varied from time to time.

Table 2: EACMs Development

Year	Country	Performance		
		Overall	Managerial	Operational
2015	NSE	0.51	1.00	0.51
	DSE	1.00	1.00	1.00
	USE	0.52	0.79	0.65
	RSE	0.33	1.00	0.33
2016	NSE	1.00	1.00	1.00
	DSE	1.00	1.00	1.00
	USE	0.55	0.97	0.56
	RSE	0.29	1.00	0.29
2017	NSE	1.00	1.00	1.00
	DSE	1.00	1.00	1.00
	USE	0.59	0.84	0.71
	RSE	0.24	1.00	0.24
2018	NSE	1.00	1.00	1.00
	DSE	1.00	1.00	1.00
	USE	0.79	1.00	0.79
	RSE	0.28	1.00	0.28

An interesting observation was found in 2018 where all four stock exchanges record 100 percent on managerial performance. DSE and NSE both were able to detect the optimal number of listed companies and market capitalization required to meet the required level stock turnover and market returns. Contrary to USE and RSE where both management and operation were unable to achieve and spot the ideal volume of listed companies and a market capitalization that can generate the required market turnover and returns. Except for DSE, the overall performance of EACMs was not impressive, operationally are not convincing investors to make an immediate decision, although the management of individual stock exchanges shows exemplary performance. The findings supported by Biau (2018) who reported that the individual markets are very small with few numbers of listed shares, they are illiquid with small market capitalization. It was further suggested to speed-up the EACMs integration process solve the existing problem. Likewise, Bright Africa (2018) insisted that asset allocation within the region is dominated by fixed income allocations mostly local bonds, alternative investment opportunities are still very limited. Similarly, the performance of EACMs is also associated with high requirements and cost associated with new entrants, lack of investors' confidence and risk appetite, weak local currencies, policies are changed drastically (Raubenheimer, 2018).

Economic Sectors Growth

Overall, managerial and operational performances of various economic sectors in each country from 2015 to 2018 are summarised in Table 3. The results indicated that only the industry sector in Tanzania records 100 percent performance on overall, managerial, and operational throughout from 2015 to 2018. Uganda and Rwanda both records 100 percent on managerial performance in the service sector for the last three years from 2016 to 2018. None of the sector in Kenya, which is fully performed in any measure, at least the agricultural sector performance reaches 3 percent which is higher than rest of the countries.

Table 4.3: Economic Sectors Performance from 2015 to 2018 for EAC member states

Date	Country	Economic Sector	Overall	Managerial	Operational
2015	Kenya	Agriculture	0.02	0.11	0.17
		Industry	0.43	0.66	0.66
		Service	0.13	0.59	0.22
	Tanzania	Agriculture	0.01	0.07	0.17
		Industry	1.00	1.00	1.00

		Service	0.17	0.55	0.32
	Uganda	Agriculture	0.01	0.04	0.18
		Industry	0.55	0.59	0.93
		Service	0.35	0.59	0.59
	Rwanda	Agriculture	0.01	0.08	0.16
		Industry	0.51	0.64	0.79
		Service	0.28	0.53	0.53
	Kenya	Agriculture	0.02	0.13	0.16
		Industry	0.40	0.60	0.67
		Service	0.12	0.56	0.22
	Tanzania	Agriculture	0.01	0.08	0.15
		Industry	1.00	1.00	1.00
		Service	0.16	0.56	0.29
2016	Uganda	Agriculture	0.01	0.05	0.17
		Industry	0.58	0.73	0.79
		Service	0.34	1.00	0.34
	Rwanda	Agriculture	0.01	0.09	0.15
		Industry	0.27	0.48	0.58
		Service	0.27	1.00	0.27
	Kenya	Agriculture	0.03	0.17	0.16
		Industry	0.37	0.59	0.64
		Service	0.11	0.47	0.23
	Tanzania	Agriculture	0.01	0.10	0.14
		Industry	1.00	1.00	1.00
		Service	0.16	0.48	0.33
2017	Uganda	Agriculture	0.01	0.05	0.18
		Industry	0.58	0.75	0.78
		Service	0.35	1.00	0.35
	Rwanda	Agriculture	0.02	0.13	0.13
		Industry	0.25	0.46	0.55
		Service	0.27	1.00	0.27
	Kenya	Agriculture	0.03	0.21	0.15
		Industry	0.33	0.56	0.59
		Service	0.11	0.47	0.22
	Tanzania	Agriculture	0.01	0.09	0.16
		Industry	1.00	1.00	1.00
		Service	0.16	0.51	0.31
2018	Uganda	Agriculture	0.01	0.05	0.16
		Industry	0.51	0.70	0.73
		Service	0.34	1.00	0.34
	Rwanda	Agriculture	0.01	0.08	0.16
		Industry	0.44	0.66	0.66
		Service	0.27	1.00	0.27

Weak infrastructure, such as transportation networks, access to energy, irrigation system, and stock holding facilities are main setbacks that slowdown agricultural sector performance (OECD/FAO, 2016; African capacity-building foundation, 2017, ADB, 2019). Apart from structural change which made most of the skilled labour forces shift from the agricultural sector to industry and service sectors, most of the country within the region fail to reach an optimal level, especially in the industrial sector. The exemplary performance of the industry sector in Tanzania was associated with new government policies which are among them is to make Tanzania an industrialized country. Page (2016) reported that the rising star of Tanzania on economic growth not reflected on industrial sectors of international benchmark. However, when African economies are considered as a benchmark, the industry sector in Tanzania is growing faster than the economy. It was insisted that Tanzania records the most

rapid growth in manufactured exports compare to other EAC's member states. The main reasons are the growth in formal manufacturing has been above the average rate of economic growth, although not as rapid as the services business. Also, many micro and small enterprises have entered manufacturing since 2005.

Listed Companies Performance

The results presented in Table 4.4 show the performance score of the listed companies in different measures from 2015 to 2018. Five companies which are BAT, FTGH, KQ, SCOM, and BOBU records 100 percent overall, managerial and operational performance in all four years. Only the MSC maintains full performance for three years continuously from 2015 to 2017 in all performance measures while TPCC maintains for two years which are 2017 and 2018. Astonishing capabilities of the listed companies within the region is to manage and optimize the shareholders' funds, company's assets, and investments to generate the required revenue, profits as well cash required for operation and financing activities are associated with a foreign professional which hold the highest management position in most of the listed companies. This was also observed by Jumanne (2018) when compared the performance between foreign and local owned companies and it was revealed that there is a significant difference in performance between these two categories. Although the listed companies are working hard to safeguards shareholders' interest, other scholars pinpoint the challenges which are beyond to company's management. Ndiritu and Mugivane (2015) addressed various factors that lead to the poor performance of the listing companies in the region including institutional factors, environmental factors, regulatory factors, historical factors, and information factors. It was stressed that there is a lack of well-trained professionals in the market and the interest rate yield is always high and unstable in all countries within the region. It is worth noted that all the countries within the region share a common problem for years. Since the study of Onyuma, Mugo, and Karuiya (2012) addressed that cross-listing within EACMs was not helpful to boost listed companies' performance. Low improvements in firm performance in term of liquidity and profitability have been observed which were also not significant.

Table 4: Performance of various listed companies from 2015 to 2018

	2018			2017			2016			2015		
Shares	Overall	Mg	Op	Overall	Mg	Op	Overall	Mg	Op	Overall	Mg	Op
BAMB	0.53	0.58	0.91	0.66	0.71	0.92	0.75	0.87	0.86	0.79	0.86	0.92
BAT	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BERG	0.99	1.00	0.99	0.82	0.85	0.97	0.89	1.00	0.89	1.00	1.00	1.00
BOC	0.78	1.00	0.78	0.31	0.48	0.64	0.31	0.46	0.68	0.33	0.42	0.79
BRIT	0.50	0.55	0.92	0.57	0.58	0.97	0.57	0.61	0.93	0.56	0.57	0.97
CFC	0.97	1.00	0.97	0.47	0.56	0.83	0.66	0.76	0.86	1.00	1.00	1.00
CIC	0.66	0.69	0.96	0.57	0.59	0.97	0.60	0.66	0.91	0.59	0.60	0.99
COOP	0.78	0.84	0.93	0.48	0.65	0.75	0.63	0.76	0.82	0.71	0.78	0.91
DTK	0.90	1.00	0.90	0.43	0.57	0.76	0.63	0.71	0.88	0.82	1.00	0.82
FTGH	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
HFCK	1.00	1.00	1.00	0.52	0.56	0.93	0.62	0.64	0.97	0.75	0.77	0.98
I&M	0.55	0.87	0.63	0.53	0.61	0.88	0.58	0.68	0.86	1.00	1.00	1.00
JUB	0.34	0.37	0.91	0.54	0.57	0.94	0.54	0.63	0.86	0.55	0.59	0.92
KCB	0.57	1.00	0.57	0.42	0.64	0.66	0.64	0.86	0.75	0.62	0.80	0.77
KNRE	0.89	0.97	0.92	0.50	0.53	0.95	0.56	0.58	0.95	0.55	0.59	0.94
KUKZ	0.45	0.51	0.89	0.45	0.60	0.74	0.46	0.56	0.82	0.52	0.57	0.92
NIC	0.59	0.62	0.96	0.45	0.57	0.79	0.60	0.72	0.83	0.81	0.82	0.99
NMG	0.90	0.94	0.96	0.50	0.58	0.87	0.77	0.78	0.99	0.83	0.84	0.99
SCAN	0.70	0.72	0.97	0.75	0.78	0.96	0.78	0.89	0.87	0.53	0.69	0.78
SGL	0.62	0.67	0.92	0.69	0.70	0.98	0.72	0.74	0.97	0.71	0.75	0.94
TCL	0.55	0.61	0.89	0.54	0.56	0.96	0.58	0.66	0.88	0.88	0.89	0.98
TOTL	1.00	1.00	1.00	0.88	1.00	0.88	0.89	1.00	0.89	1.00	1.00	1.00
TPSE	0.42	0.45	0.93	0.45	0.53	0.85	0.46	0.52	0.88	0.38	0.42	0.90

EQTY	0.74	0.81	0.92	0.79	1.01	0.78	0.92	1.00	0.92	1.00	1.00	1.00
KEGN	0.96	1.00	0.96	0.45	0.54	0.83	0.63	0.72	0.87	0.91	1.00	0.91
KPLC	1.00	1.00	1.00	0.67	0.77	0.88	0.70	1.00	0.70	0.92	1.00	0.92
MSC	0.80	0.82	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PORT	1.00	1.00	1.00	0.45	0.50	0.89	0.71	0.73	0.97	1.00	1.00	1.00
UNGA	1.00	1.00	1.00	0.85	0.87	0.98	0.79	0.88	0.91	1.00	1.00	1.00
EABL	0.93	0.96	0.97	0.97	1.01	0.96	1.00	1.00	1.00	1.00	1.00	1.00
KAPC	0.64	0.75	0.85	0.40	0.52	0.78	0.44	0.56	0.79	0.30	0.35	0.85
KQ	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SCOM	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SASN	0.40	0.48	0.84	0.22	0.32	0.67	0.28	0.33	0.82	0.31	0.34	0.91
C&G	0.83	0.84	0.99	1.00	1.00	1.00	0.74	0.84	0.89	0.86	0.87	0.98
CARB	0.29	0.62	0.47	0.23	0.41	0.55	0.60	1.00	0.60	0.44	0.57	0.77
CRDB	0.55	0.77	0.71	0.56	0.70	0.80	0.57	0.65	0.89	0.61	0.69	0.87
DCB	1.00	1.00	1.00	0.45	0.55	0.82	0.74	1.00	0.74	0.43	0.60	0.71
NMB	0.64	0.66	0.96	0.70	0.85	0.83	0.56	0.59	0.95	0.73	0.74	0.98
SWIS	0.72	1.00	0.72	0.68	0.78	0.87	0.92	1.00	0.92	1.00	1.00	1.00
TBL	0.84	0.85	0.99	0.79	0.80	0.99	0.94	1.00	0.94	0.92	0.92	1.00
TCC	0.87	0.87	1.00	0.82	0.84	0.97	0.86	0.88	0.98	1.00	1.00	1.00
TCCL	0.67	0.72	0.94	0.48	0.50	0.97	0.42	0.47	0.90	1.00	1.00	1.00
TOL	0.47	1.00	0.47	0.25	0.39	0.64	0.41	0.58	0.71	0.65	1.00	0.65
TPCC	1.00	1.00	1.00	1.00	1.00	1.00	0.79	0.82	0.96	0.83	0.83	0.99
BOBU	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DFCU	0.93	1.00	0.93	0.74	0.86	0.86	0.67	0.72	0.93	0.60	0.66	0.90
UMME	0.77	0.79	0.97	1.00	1.00	1.00	0.96	0.98	0.98	0.74	0.75	0.99
NVL	0.80	1.00	0.80	0.60	0.83	0.72	1.03	1.03	1.00	0.80	1.00	0.80
BOK	0.37	0.44	0.84	0.41	0.42	0.97	0.44	0.46	0.97	1.00	1.00	1.00
BRL	0.70	0.77	0.91	0.73	0.75	0.98	0.80	0.81	0.99	0.82	0.83	0.99

Note: Mg stands for Managerial and Op stands for Operational

Combined Performance Evaluation

Table 4.5 shows the company's combined score for overall, managerial, and operational performance from 2015 to 2018.

Table 5: Combined Performance Score of Listed Companies

	2018			2017			2016			2015		
share	Overall	Mg	Op	Overall	Mg	Op	Overall	Mg	Op	Overall	Mg	Op
BAMB	0.82	0.87	0.94	0.84	0.89	0.94	0.85	0.91	0.94	0.72	0.92	0.78
BAT	0.87	0.91	0.95	0.87	0.92	0.95	0.88	0.92	0.96	0.74	0.93	0.79
BERG	0.87	0.91	0.95	0.86	0.90	0.95	0.87	0.92	0.94	0.74	0.93	0.79
BOC	0.84	0.91	0.93	0.80	0.87	0.93	0.81	0.87	0.94	0.67	0.87	0.77
BRIT	0.77	0.85	0.91	0.78	0.85	0.91	0.78	0.87	0.89	0.63	0.88	0.73
CFC	0.82	0.89	0.92	0.77	0.85	0.90	0.79	0.89	0.89	0.68	0.92	0.74
CIC	0.79	0.86	0.91	0.78	0.85	0.91	0.78	0.88	0.89	0.64	0.88	0.73
COOP	0.80	0.88	0.91	0.77	0.86	0.90	0.79	0.89	0.89	0.65	0.90	0.73
DTK	0.81	0.89	0.91	0.77	0.85	0.90	0.79	0.88	0.89	0.66	0.92	0.72
FTGH	0.87	0.91	0.95	0.87	0.92	0.95	0.82	0.92	0.90	0.74	0.93	0.79
HFCK	0.82	0.89	0.92	0.77	0.85	0.91	0.79	0.88	0.90	0.65	0.90	0.73
I&M	0.78	0.88	0.88	0.78	0.85	0.91	0.78	0.88	0.89	0.68	0.92	0.74
JUB	0.76	0.83	0.91	0.78	0.85	0.91	0.78	0.87	0.89	0.63	0.88	0.72
KCB	0.78	0.89	0.87	0.76	0.86	0.89	0.79	0.90	0.88	0.64	0.90	0.71

KNRE	0.81	0.89	0.91	0.77	0.85	0.91	0.78	0.87	0.90	0.63	0.88	0.72
KUKZ	0.75	0.79	0.95	0.75	0.79	0.95	0.75	0.78	0.96	0.61	0.78	0.78
NIC	0.78	0.86	0.91	0.77	0.85	0.90	0.78	0.88	0.89	0.66	0.90	0.73
NMG	0.81	0.89	0.91	0.77	0.85	0.91	0.80	0.89	0.90	0.66	0.90	0.73
SCAN	0.79	0.87	0.91	0.80	0.87	0.91	0.80	0.90	0.89	0.63	0.89	0.71
SGL	0.78	0.86	0.91	0.79	0.86	0.92	0.80	0.89	0.90	0.65	0.89	0.73
TCL	0.82	0.87	0.94	0.83	0.87	0.95	0.84	0.89	0.95	0.73	0.92	0.79
TOTL	0.87	0.91	0.95	0.86	0.92	0.94	0.87	0.92	0.94	0.74	0.93	0.79
TPSE	0.76	0.84	0.91	0.77	0.85	0.91	0.77	0.86	0.89	0.62	0.86	0.72
EQTY	0.80	0.88	0.91	0.80	0.90	0.89	0.82	0.91	0.90	0.68	0.92	0.74
KEGN	0.82	0.89	0.91	0.77	0.85	0.90	0.79	0.88	0.89	0.67	0.92	0.73
KPLC	0.82	0.89	0.92	0.79	0.87	0.91	0.79	0.91	0.87	0.67	0.92	0.73
MSC	0.79	0.82	0.95	0.81	0.83	0.97	0.80	0.83	0.97	0.66	0.82	0.80
PORT	0.87	0.91	0.95	0.82	0.87	0.94	0.85	0.89	0.95	0.74	0.93	0.79
UNGA	0.87	0.91	0.95	0.86	0.90	0.95	0.86	0.91	0.95	0.74	0.93	0.79
EABL	0.86	0.91	0.95	0.87	0.92	0.95	0.88	0.92	0.96	0.74	0.93	0.79
KAPC	0.77	0.82	0.94	0.75	0.79	0.95	0.75	0.78	0.96	0.59	0.76	0.78
KQ	0.82	0.89	0.92	0.82	0.89	0.92	0.82	0.91	0.90	0.68	0.92	0.74
SCOM	0.82	0.89	0.92	0.82	0.89	0.92	0.82	0.91	0.90	0.68	0.92	0.74
SASN	0.75	0.79	0.94	0.73	0.77	0.95	0.73	0.76	0.96	0.59	0.76	0.78
C&G	0.81	0.88	0.92	0.82	0.89	0.92	0.80	0.90	0.89	0.66	0.91	0.73
CARB	0.80	0.87	0.91	0.80	0.86	0.93	0.84	0.92	0.91	0.68	0.89	0.77
CRDB	0.79	0.88	0.90	0.79	0.87	0.91	0.79	0.88	0.90	0.79	0.88	0.90
DCB	0.83	0.90	0.92	0.78	0.85	0.91	0.81	0.91	0.88	0.78	0.87	0.89
NMB	0.80	0.87	0.92	0.80	0.88	0.91	0.79	0.87	0.90	0.81	0.88	0.91
SWIS	0.80	0.90	0.89	0.80	0.87	0.91	0.82	0.91	0.90	0.83	0.91	0.92
TBL	0.98	0.98	1.00	0.98	0.98	1.00	0.99	1.00	0.99	0.99	0.99	1.00
TCC	0.99	0.99	1.00	0.98	0.98	1.00	0.99	0.99	1.00	1.00	1.00	1.00
TCCL	0.97	0.97	1.00	0.95	0.95	1.00	0.94	0.95	1.00	1.00	1.00	1.00
TOL	0.95	1.00	0.95	0.92	0.94	0.99	0.94	0.96	0.98	0.97	1.00	0.97
TPCC	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	0.98	0.98	1.00
BOBU	0.75	0.96	0.78	0.72	0.95	0.75	0.73	0.99	0.74	0.72	0.86	0.84
DFCU	0.74	0.96	0.77	0.69	0.94	0.73	0.70	0.96	0.73	0.68	0.82	0.83
UMME	0.72	0.94	0.77	0.72	0.95	0.75	0.73	0.99	0.74	0.69	0.83	0.83
NVL	0.72	0.96	0.75	0.67	0.94	0.72	0.74	0.99	0.74	0.70	0.86	0.82
BOK	0.36	0.80	0.45	0.58	0.94	0.62	0.59	0.95	0.62	0.38	0.72	0.53
BRL	0.43	0.76	0.56	0.61	0.87	0.70	0.62	0.88	0.71	0.41	0.73	0.57

Note: Mg stands for Managerial and Op stands for Operational

When the performance of the country's economy, stock market, and economic sectors are combined, the score of the listed companies in various measures are changed. This signified that, although the financial statements portrayed that companies are well performed yet not guarantee investors to select the company as a prospective investment (Grimm, 2012). The decreasing performance of listed companies in EACMs among other factors is associated with the country's economic status and stock market development (Ndiritu and Mugivane, 2015).

Literally, giant companies within the region were most affected when economic, market and economic sector growth are incorporated in the model compared to companies with moderate performance. Companies such as BAT, FTGH, KQ, SCOM and BOBU records 100 percent overall, managerial and operational performance in all four years consecutively before combination, and all of them were underperformed after combination. MSC which records full performance for three years consecutively observed to decline after combination. Only, TPCC which was full performed in all measures for two years consecutively which is 2017 and 2018 before combination maintained the same after combination. Surprisingly, TOL which was among least performed shares with minimum overall performance score of 25 percent during 2017 move to the list of most performed shares.

The companies from Tanzania particularly from industry sector found to perform well. This may be associated to well perform economic condition, stock market and industry sector. The results are in line with study of Page (2016) that Tanzania is among the leading stars of 'African growth miracle' also, the growth of industry sector is faster than economy. Page (2016) was further instated that the manufacturing industry in Tanzania show rapid growth compare to neighbouring countries which in turn influence the firm performance.

Comparison of Company's Performance before and after combination

Figure 2, 3 and 4 illustrates variability of performances of 51 companies listed in EACMs before and after combination with other components which country economic performance, market listed and economic sector for 2015, 2016, 2017 and 2018 in overall, managerial and operational performance, respectively.

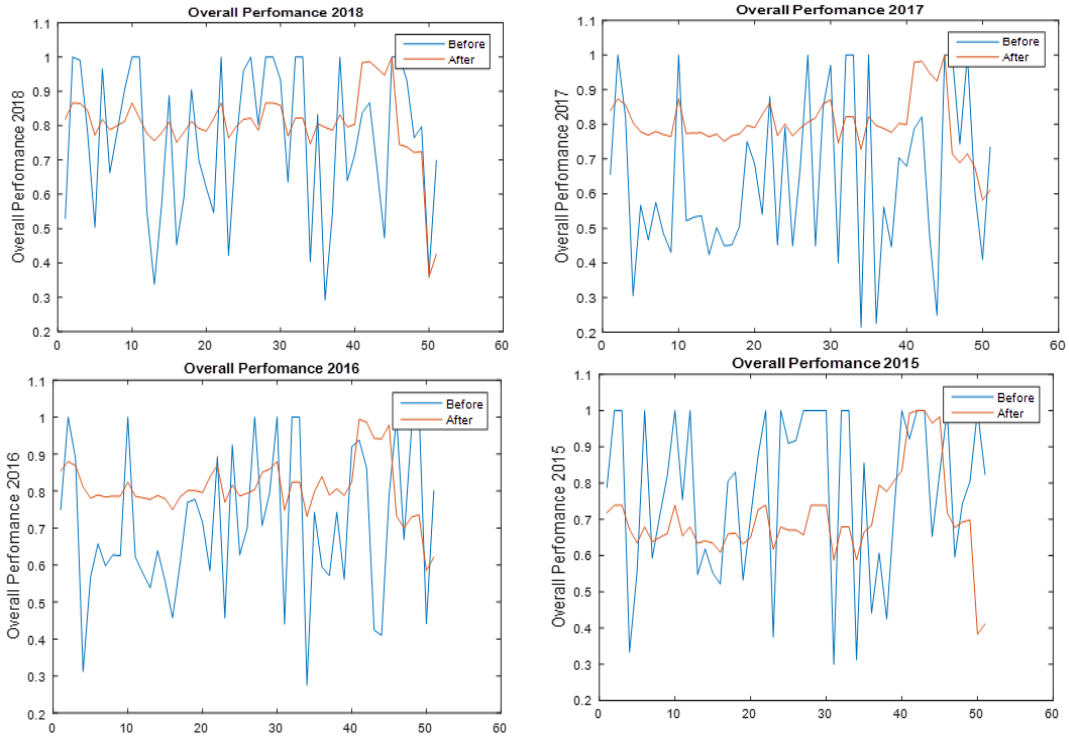

Figure 2: Company's Overall Performances in Various Measures Before and After Combination, 2015-2018

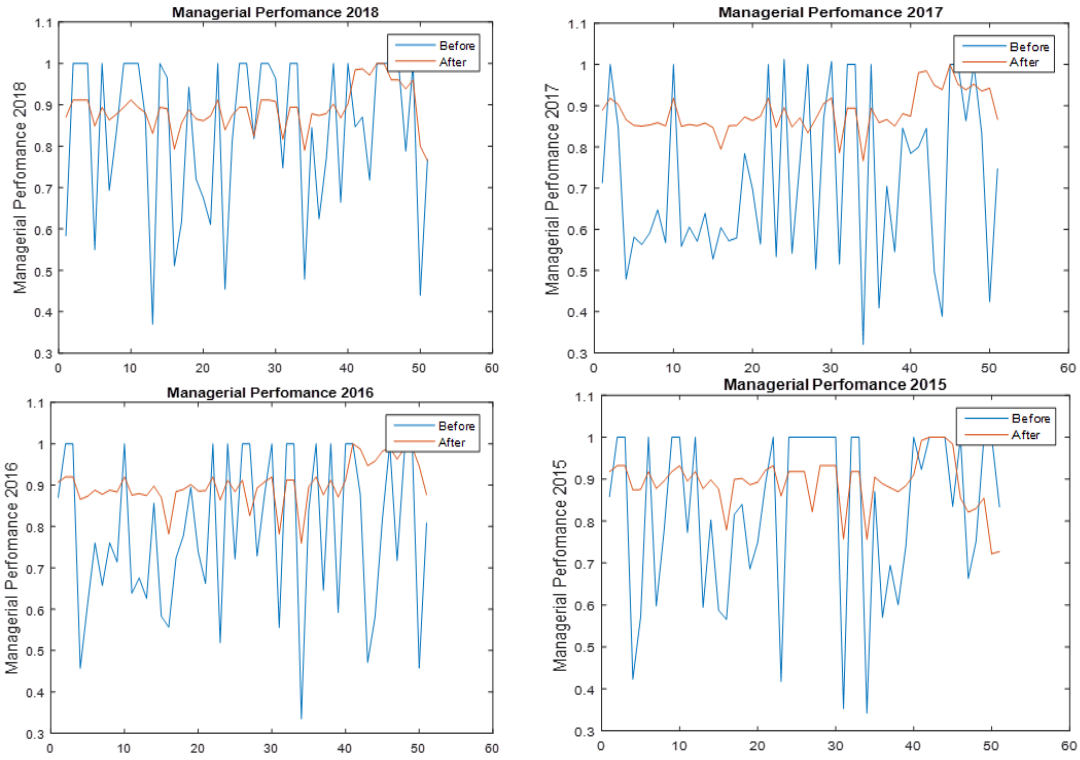

Figure 3: Company's Managerial Performances in Various Measures Before and After Combination, 2015-2018

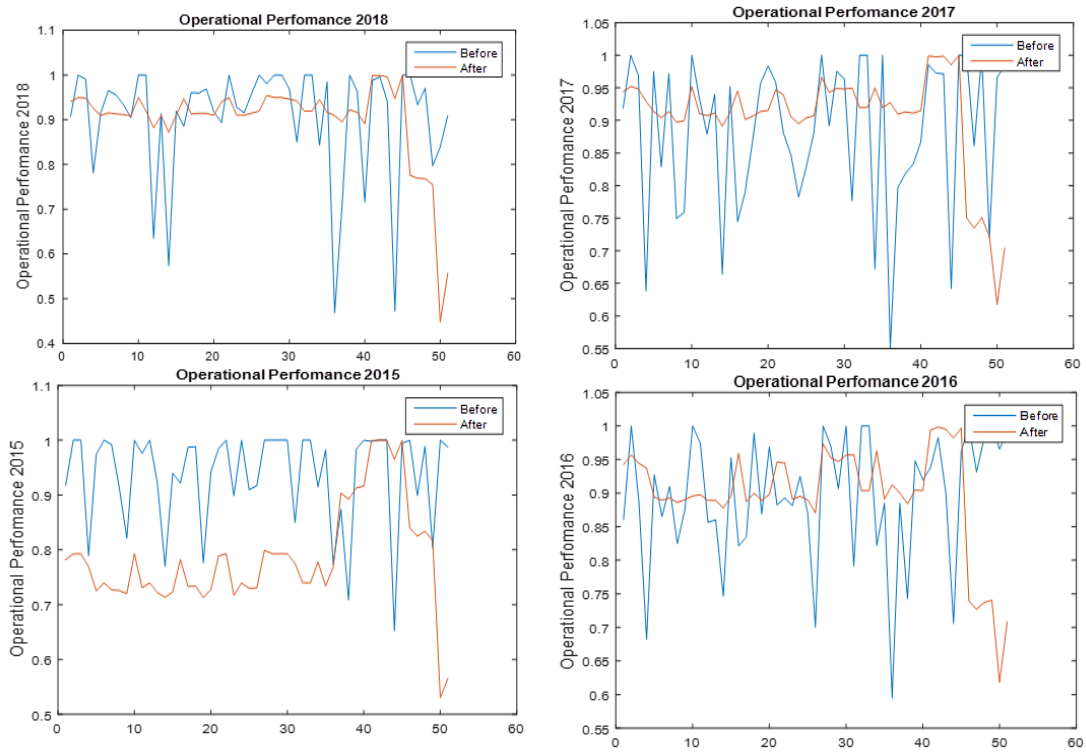

Figure 4: Company's Operational Performances in Various Measures Before and After Combination, 2015-2018

The significant mean difference can be observed when performance of the various companies before and after combination with other components is compared. Table 6 summarised the independent t-test conducted in all three measures from 2015 to 2018. In all four years, the significant difference of managerial performance before and after combination was observed with $p \leq 0.05$. Only during 2018 there was no significant difference in the

performance of listed companies before and after considering the performance of other components in overall and operational performance as the $p \geq 0.05$. Some inconsistences also have been observed in the years which is 2017 and 2016 where the overall and managerial performance of the listed companies has been significantly affected by the country's economy, stock market, and economic sector transformations which took place within the region while operational performance was not affected. Contrary to 2015 where all three measures were significantly interrupted by the changes that took place in the country's economy, stock markets, and economic sectors. The existence of significant difference in previous years 2015 to 2017 was associated by wide gap between company performance and other fundamental components. However, such gap observed to lessened in the resent years as the performance difference before and after combinantion found not significant. An interesting observation was found on the variability of the performance scores before and after the combination. The variances of the average performances have minimized and even approach zero when other components were included in the model.

Table 6: Independent t-test of Company Performance before and After Combination

Year	Performance Measure	Before		After		P-value	Decision
		Mean	Variance	Mean	Variance		
2018	Overall	0.76	0.05	0.80	0.010	0.090	Not Significant
	Managerial	0.83	0.03	0.89	0.003	0.020	Significant
	Operational	0.90	0.02	0.90	0.010	0.430	Not Significant
2017	Overall	0.64	0.06	0.80	0.006	0.000	Significant
	Managerial	0.71	0.04	0.88	0.002	0.000	Significant
	Operational	0.88	0.01	0.90	0.006	0.114	Not Significant
2016	Overall	0.71	0.04	0.81	0.006	0.000	Significant
	Managerial	0.78	0.04	0.90	0.006	0.000	Significant
	Operational	0.89	0.01	0.89	0.006	0.473	Not Significant
2015	Overall	0.78	0.05	0.70	0.010	0.017	Significant
	Managerial	0.83	0.04	0.89	0.004	0.014	Significant
	Operational	0.93	0.01	0.79	0.01	0.000	Significant

It is worth saying, country economy, stock markets, and economic sector performance play a major role to normalize the listed companies' performance. Technically, this will increase confidence to investors and the scope of selecting shares to be included in the portfolio.

Selected Companies

The minimum average performance after combination for each measure from any year shown in Table 6 was used as a benchmark of identifying shares which can be used for portfolio construction. Therefore, the qualified shares are all shares with an overall performance score of 70 percent and above, a managerial performance score of 88 percent and above as well as an operational performance score 79 percent and above throughout from 2015 to 2018. The selection criteria are more tolerable compare to that of Jothiami, et., al. (2017) who strictly consider the shares with 100 percent performance throughout for the period of 8 years where out 523 stocks only 41 stocks were qualified. Table 7 summarised the selected shares which meet the minimum required criteria. All companies from Uganda and Rwanda and all companies from the service and manufacturing sectors in the region were underperformed therefore were excluded for further analysis. Only some companies fall under the industry sector in Kenya and Tanzania were shortlisted as they meet the minimum requirements. Out of 11 companies, 6 are from Kenya which is equivalent to 16 percent of the total companies, and 5 from Tanzania which is equivalent to 56 percent of the total companies evaluated from Kenya and Tanzania, respectively.

Table 7: Summery of Selected Companies

Sn	Code	Company	Market	Country	Business	Sector
1	BAT	BAT Kenya	NSE	Kenya	Cigarette	Industry
2	BERG	Berge Paint	NSE	Kenya	Paints	Industry

3	FTGH	Flame Tree Group Limited	NSE	Kenya	Plastic	Industry
4	TOTL	Total Kenya	NSE	Kenya	Oil	Industry
5	UNGA	Unga Group Plc	NSE	Kenya	Food	Industry
6	EABL	East African Breweries	NSE	Kenya	Beer	Industry
7	TBL	Tanzania Breweries Plc	DSE	Tanzania	Beer	Industry
8	TCC	Tanzania Cigarette Company	DSE	Tanzania	Cigarette	Industry
9	TCCL	Tanga Cement Company	DSE	Tanzania	Cement	Industry
10	TOL	TOL Gas Limited	DSE	Tanzania	Gas	Industry
11	TPCC	Tanzania Portland Company	DSE	Tanzania	Cement	Industry

V. Conclusion

This study able to demonstrates the technique of quantifying the operational and managerial performance of fundamental components using DEA models. It reveals a different level of performance of each component which are country economy, economic sectors, stock markets as well as shares listed in East African Stock Exchanges. It was found that when all components are integrated, the combined score of the listed companies was changed in all three measures. The independent t-test confirmed that there are significant mean differences in the performance of the various companies before and after combination with other components.

The theoretical gaps addressed in this study is on computation and combination of operational performance as well as the managerial performance of a country's economy, stock market, economic sector, and company fundamentals computed by DEA using top-down approach. The study found that combining the performance of various components has a major impact on screening the stocks to be used for portfolio construction. The developed hybrid model combined various scholarly works including the study of Rose (1976) addressed the influence of country economy proxies, Calderon-Rossell (1991) suggested the importance of stock market development, Lewis (1954); Kuznet (1966); Chenery (1975), and Kuznet (1979) hypothesized on economic sector growth, also Graham and Dodd (1934) who focused on company fundamentals.

The practical implications of the findings can be observed by stakeholders in EACMs such as capital markets authorities, individuals' investors, institutional investors, etc. When the combined effect of the managerial and operational performance is understood would give a signal to the authorities of capital markets, investors, policymakers and other regulatory bodies to take immediate measures on designing policies and practices. Therefore, this study recommends that.

- The capital market authorities within the region must ensure the growth of managerial and operational performance of stock exchanges. This can be achieved by increasing the number of listed shares, market capitalization, market turnover as well as a market index of the respective stock exchange.
- Regulatory bodies, policymakers, and higher-level administration of each country within the region must take responsibility to uplift the country's economy and economic sectors. They can reduce the inflation rate, public debt, government spending, and increase country investment for the case of country economy. Also, they can increase the labour force, value-added as well as the growth rate of various economic sectors such as the service sector, industry, and agriculture.
- The board of directors and management of listed companies should formulate strategies to improve both managerial and operational performance. They can raise the company's equity, total assets, revenue, company profit as well as proper management of cash flow including operating, financing, and investment cash flows.

Among the limitations of this study are the data used in this study were collected in a short time frame which is from 2015 to 2018 and only for four countries. Although the data are aging but also was due to the nature of the stock markets as they are still very young, some of them were opened from 2011 with a limited number of listed shares and other country like South Sudan do not have a stock exchange. This study employed top-down approach to combine various components instead of using both bottom-up and top-down approaches, although it is a recommended approach when the combined components involve more than one country. Also, the methodology is still new in the field of stock selection, also limited literature demonstrated DEA performance evaluation of each

component. Therefore, this study would suggest possible future studies to be conducted with a long-time frame and a wide range of countries, stock markets, economic sectors, and company fundamentals to validate these study findings. Also, employing both bottom-up and top-down approaches when combining the performance scores of various components and compare the results. It might be likely that a different number and type of stocks can be generated. Also, combining both and observe the list of stocks which qualify for further analysis.

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Trade Deficit of Bangladesh with China: Patterns, Propensity and Policy Implications

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Abstract
This paper aims to examine export, import and trade intensity, export specialization index, Herfindahl-Hirschman index for bilateral concentration and diversification indices to analyze the specializations, structure and trends of deficit in bilateral trade between Bangladesh and China from 1995 to 2018 and policy recommendations in this regard. The results reveal that the gap of export and import intensity between Bangladesh and China is widening rapidly perennial. The export specialization indices expose very significant outcomes where among the analyzed 16 sectors; 6 sectors exhibit high specialization, 3 sectors demonstrate medium, 3 sectors exhibit low and the rest of the 4 sectors disclose no specialization for Bangladesh's export to China. The findings of the Herfindahl-Hirschman Index (HHI) reveal that from 1995 to 2010 the export of Bangladesh to China concentrated within few sectors but from the year 2011 to 2018 the export has been reclassifying steadily into diversification. The overall analysis of the indices suggests the necessity to be improved of the level of intra-industry trade between China and Bangladesh. Moreover, emphasis should be given to the sectors having a high specialization that endure the capacity to narrow the trade deficit. Furthermore, the export baskets of Bangladesh to China require to be diversified. Hereafter, various measures and implications are also suggested in the policy recommendation for further improvement.

Keywords: Bilateral Trade, Trade Deficit, Export Specialization, Bangladesh, China

1. Introduction

The relationship between the overall trade balance and its determinants may not necessarily be the same as with the bilateral trade balances (Figure 1). It is imperative to mention that export has performed strongly in Bangladesh's context with the aid of the booming manufacturing sector. Although Bangladesh performed impressively in increasing its exports, imports at the same time were enhanced to a greater degree together with the presence of a narrow export basket (Kundu 2015). The Sino-Bangla ties date back to 1975 and over the years, it has been deepened and fostered. Currently, Bangladesh and China are enjoying a robust and comprehensive

partnership. Bangladesh-China bilateral trade has been increasing significantly over the years, both in terms of absolute amount and percentage change among Bangladesh's top trade partners.

Bangladesh-China trade volume is on the rise and grew roughly seven-fold between 2004 and 2018 (figure 1). Notably, from 1971 till 2004, India was the largest trading partner of Bangladesh which has been replaced by China from 2004 onward (Kohli 2015).

'The share of Chinese exports in all exports to Bangladesh increased from 13.6 percent in 2000 to 22 percent in 2018 (Appendix 2). According to the Chinese Embassy in Dhaka, 'the economic and trade cooperation between China and Bangladesh have maintained good momentum in recent years. Bangladesh now has become China's third-biggest trade partner in South Asia, while China is the largest origin of Bangladesh's imports (DCCI 2016). The trade volume reached 913.4 million USD in the year 2000 to 14,708.5 million USD in 2018; around 16 times more than that of 2000.

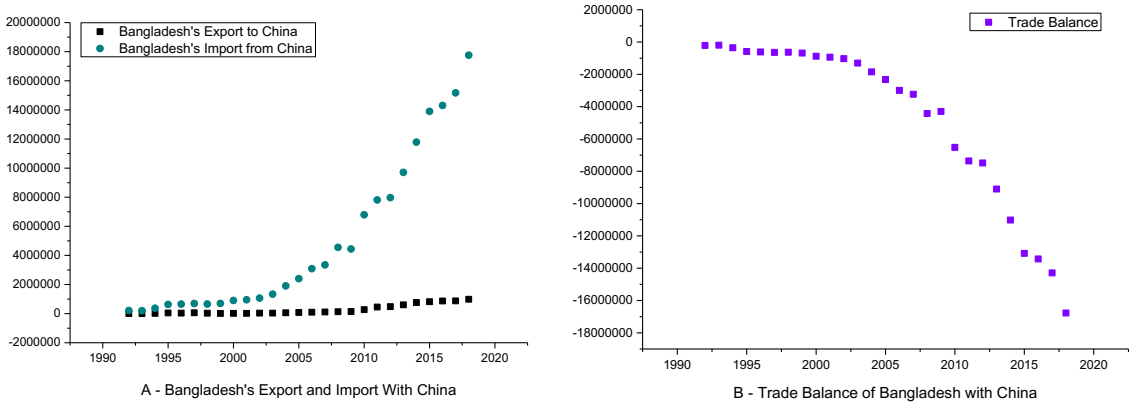

Figure 1: Export-Import (A) and Trade Balance (B) of Bangladesh with China from 1995-2018

Source: World Integrated Trade Solution statistics (WITS) [4] and WTO [5] database, compiled by the Authors in March 2021

But the problem lies in a huge trade imbalance that favors China. For instance, in 2018, Bangladeshi imports from China amounted to $ 17,759.54 million while Bangladeshi exports to China amounted to $ 985.41 million, resulting in a trade ratio between Dhaka and Beijing in 1:17.3 and a trade gap of $ 16774.13 million as noted by Dhaka Chamber of Commerce and Industry and Bangladesh Bank (Bank 2021; DCCI 2016)and WITS trade data.

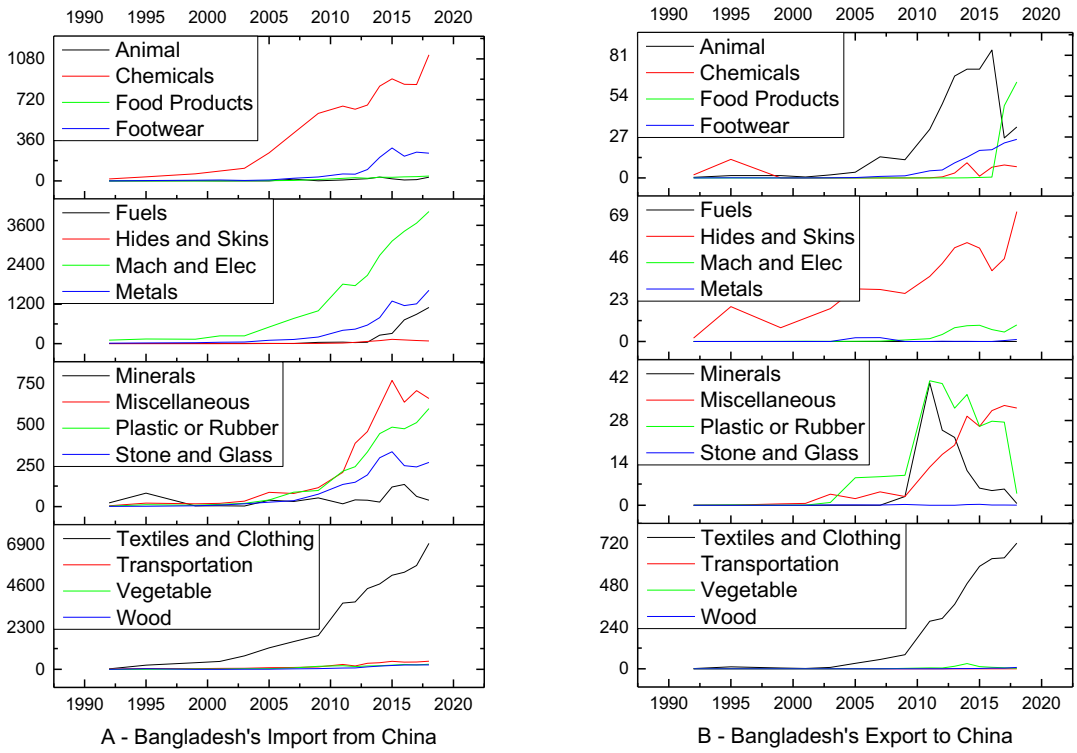

Figure 2: The Composition of Bangladesh's Import (A) and Export (B) (Million USD) with China for all products from 1995-2018

Source: World Integrated Trade Solution statistics (WITS) [4] and WTO [5] database, compiled by the Authors in March 2021

Bangladesh's trade with China is now about 26.5 percent of its total trade with the world, which is the highest with a rising trend. Bangladesh's export growth to China has averaged about 40 percent per annum in the past five years. On the other hand, import growth averaged 23 percent annually (Kabir 2016; Islam 2016). Figure 1 shows the trade balance of Bangladesh with China from 1995 to 2018 and the figure reveals the immense trade deficit of Bangladesh with China.

According to the data of Bangladesh Bank (Database 2021), China is the largest import partner accounting for 29 % of the import share. Accordingly, India 14%, Singapore 6%, Indonesia 3%, Japan 3% South Korea 2%, Malaysia 3% and the USA 3%, are the top import partners of Bangladesh's import basket. If we look at the import share of Bangladesh from China in 2018; Textiles 29%, Machines 23%, Chemical Products 6.3%, Metals 9.1% Miscellanies 4%, plastic and rubbers 3.4%, transportation 2.5%, Fuels 6% and stone and glass 1.5% mineral products 2.4 % of the share of total import products (Lab 2021).

According to the statistics of 2018 (Database 2021), it shows, the intermediate product group accounts for the largest import share and the others are textile and clothing, capital goods, machine and electronics metals, chemicals, etc. (figure 2). The latest data of Bangladesh Bank reveals that the country imported cotton, cotton yarn/thread and cotton fabrics 19.6 %; man-made staple fibers and knitted or crocheted fabrics 10.1 %; man-made filaments, strip and the like of manmade textile materials 3.8 %; and other fabrics and apparel accessories 2.8 %. The other notable import items are boilers, machinery, mechanical appliances and their parts 16.4 %; electrical machinery and equipment and parts 12.2 %; and fertilizer, plastic, chemicals, iron and steel 13.1%. The country also imports some food items from China. (Kabir 2016, Bank 2016).

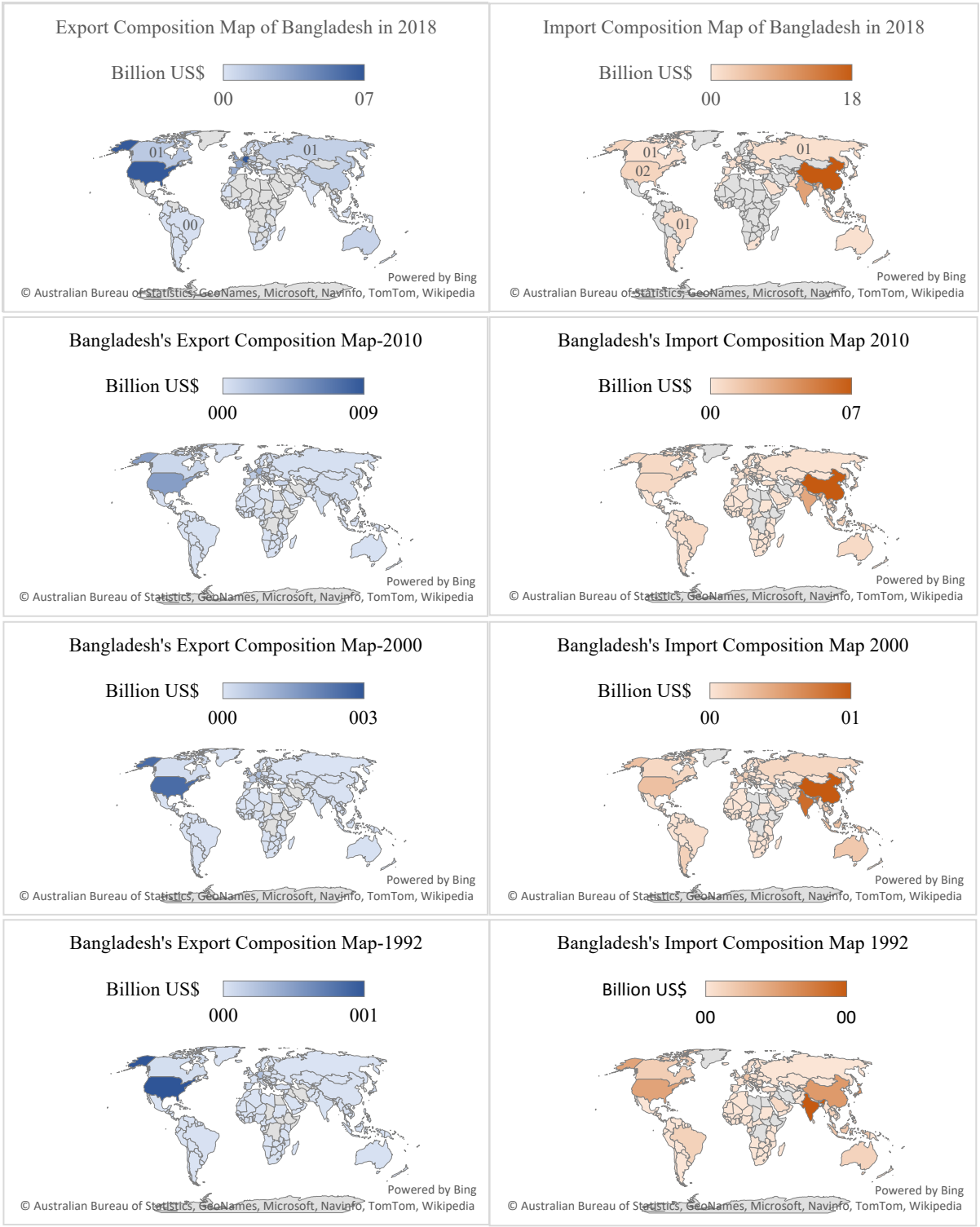

Figure 1: Top Export Destinations (left) and Import Sources (Right) of Bangladesh in 2018

Source: Export Promotion Bureau of Bangladesh, [46], compiled by the Authors in February 2021;
http://epb.gov.bd/site/view/epb_export_data/-

However, in terms of export China accounts for 1% of the total export share of Bangladesh. China offered a zero-tariff facility to 95 percent of products of the least developed countries (LDCs) since July 2010 and Bangladesh got a zero-duty benefit for exports of 4,721 types of products to China China (Islam 2012). After that, the export basket of Bangladesh to China has changed significantly. In 2009 the export amount to China was USD 118.30 Million and it became more than double in 2010 amounting to $259.20 million; in 2018 the export grew up to 6 amounting to USD 803.70 million (Database 2021). According to the database of MIT Media lab, in 2018 Bangladesh's export products group to China were textile and clothing 74%, animal products 3.4&, hides and skin

7.2%, 2.6%, vegetable items 3.9%, instruments 3.2%, foot wares 2.6%, mineral products 0.6% are shared the largest ones (Wahid 2016; Lab 2016) . Among the products group, the textile and clothing sector showed the most potential sector for Bangladesh's export to China (figure 2). Next to textile and apparel, consumer goods, intermediate goods, raw materials, animal products, hides and skin, plastic and rubber, miscellaneous, foot wares, and vegetables are accounted for the most share of export of Bangladesh to China in 2018 (figure 2).

Despite these positive developments in bilateral trade, there are certainly gray areas and constraining factors disfavoring Bangladesh in optimizing mutual gains from trade. The first and foremost is a very high amount of negative trade balance of Bangladesh, which is currently 85 percent of total bilateral trade. According to the data (figure 2), the trade deficit of Bangladesh with China becomes around three times in 2018 (USD 16.8 Billion) than in 2010 (USD 6.5 Billion).

In our investigation, it is found that except for some articles in newspapers, there exist very little academic researches regarding the deficit of trade of Bangladesh with China and its patterns and policy implications. The facts inspire us to explore the insights which could add value to the current literature gap in this area as well as for the policymakers on both sides. We've contributed to the literature by providing a theoretical background as well as empirical analysis on the bilateral trade between Bangladesh and China. We tested several indices related to trade intensity, specializations and diversification of trade between the two nations. Moreover, in this research we explored the following objectives;

(i). To explore the trend of export, import and trade deficit of Bangladesh to China.
(ii). To evaluate and explore the potential sectors for Bangladesh which could minimize the deficit.
(iii). To find reasonable solutions and policy implications to reduce the trade deficit of Bangladesh with China.

The article itself is divided into four additional sections. Section II briefly introduces the status of the trade imbalance between Bangladesh and China and summarizes the theoretical background of the analyzed methods based on related constructs of international trade. The explanation of applied data and methods is covered in section III. Section IV covered the core findings and discussion part of the article. The brief concluding remarks and policy implications are presented in Section V.

Brief literature review on the Trade Deficit and Bilateral Trade of Bangladesh with China

Trade deficits have further widened in most of the developing countries since the early 1990s, and the growth of exports has been fairly robust except 2008 and 2009 when there was a sharp drop in this growth because of economic recession. Bangladesh, as a comparatively new player in the trade game, has made considerable progress in the last two decades. Bangladesh's trade growth has been one of the significant characteristics of the country for the last couple of decades. Specifically, export has displayed robust growth in the face of diverse economic and political setbacks, both in the local and the global context. Bangladesh has progressed from a predominantly aid-dependent economy to a trading economy in the last two decades and able to make one of the manufacturing hubs of the world (Kundu 2015).

The major trade partners of Bangladesh are European countries where Germany accounts for 15%, UK 9.4%, France 6.7%, Span 6%, Italy 4.2%, Netherlands 3.6%, Poland 2.5%, Belgium 3.6%Russia 2%, Denmark1.9%, and Australia 1.6% are most mentionable. The second destination is North America, where the USA acconted16% and Canada 3.3% of Bangladesh's export share. In recent year's Asian region has emerged as a potential export destination for Bangladesh's export. In 2014 Bangladesh's export share to Turkey was 3.1% accordingly, Japan 2.8%, China 2.2%, India 1.5%, South Korea 1% are the largest ones. In terms of her import, China is the largest partner accounting for 32 % of the import share. Accordingly, India 17%, Singapore 8.5%, Indonesia 3.7% Hong Kong 3.7%, South Korea 3.4%, Malaysia 3.3%, and Japan 3.1% are the top partners of Bangladesh's import basket (Lab 2016). In the last couple of decades, Bangladesh has been continuing with a negative trade balance being an import-oriented manufacturing country. From the last decade, China is the largest import partner but the export to China is so insignificant that results in a huge trade deficit between the two nations, and the deficit has been in favor of China.

Very few researches have been found that investigated the bilateral trade deficit of Bangladesh with China. Among them, Kundu (2018) explored the phenomenon and relationships between the trade balances of Bangladesh with BRICS countries from 1991-2013 and the analysis showed that the economy of Bangladesh in recent years had improved its growth performance and strengthened its macroeconomic structure, despite an unfavorable trade balance position. Mohammad Rafiqul Islam Islam (Islam, Mahfuz, and khanam 2013) and et al. explored the motives for investing in Chinese companies in Bangladesh and their outwards FDI. Although the article was not related to the bilateral trade and trade deficit between Bangladesh and China, the article gave an insight into Chinese outward investment in Bangladesh that could contribute to minimizing the trade gap between the two nations to some extent Islam (Islam, Mahfuz, and khanam 2013).

Researchers have explained variations in the indexes over time and across bilateral trading relationships by analyzing the nature and importance of various resistance factors. Trade may be more intense with a country and its trading partners than with the rest of the world because the resistance between them is lower (Bano 2014). Trade intensity provides a way of measuring these trading relations without the bias resulting from the comparative size of the trading partners (Raj, Wing, and Ambrose 2014). Several studies have developed various indexes to analyze the bilateral trade cooperation and the extent countries trade with each other (Folfas 2010). There are two models analyzing the trade flows; one is a gravity model and the other one is a trade intensity index model and they used the later method, because it might help to more readily understand the current Sino-Australian trade. Brown (Brown 1974) and Kojima (Kojima 1964) proposed trade intensity (TI) to monitor trade flows and patterns (Ji, Hu, and Mao 2014).

The empirical findings are also inconclusive. More specifically, Chang-In Yoon and Jiheung Kim (2006) (Yoon and Kim 2006) analyzed the Comparative Advantage of the Service and Manufacturing Industries of Korea, China and Japan using RCA and Trade Specialty Index. Narayan Chandra Nath (Nath 2012) examined the dynamics of trade pattern and competitiveness of Bangladesh and implications for her future development. He highlighted the trade intensities as indicators of global integration and analyzed the dynamics of structure and growth of exports and imports of Bangladesh by commodities and markets. Dalia Bernatonyte and Akvile Normantiene (2001) estimated the trade specialization for the Baltic States. Where they found that trade specialization evolves over time, bringing with it patterns of economic development that vary from country to country and from region to region. Therefore the nature and pattern of trade specialization has been the subject of much study (Bernatonyte and Normantiene 2015). Moreover, Mohammad Mafizur Rahman (Rahman 2005) applied trade intensity to examine the trend, structure of Bangladesh-India trade and suggested to have cooperation among governments, private investors and businessmen of both countries must work together to bring these measures into reality, where there exists similar trade balance like China and Bangladesh.

However, another index named export diversification theory came to the fore in the second half of the twentieth century, in opposition to the classical and neoclassical theories of foreign trade. It defends the positive impact of trade diversification on the economic performance of a country. The question of how much big economies diversify their exports in the case of product groups and export destinations was answered in that paper. Bohdan Vahalík (VAHALÍK 2015) analyzed the export diversification of the European Union and BRICS countries with Herfindahl–Hirschman index of diversification. The findings of his research was that the EU achieved the greatest long-term export diversification on the contrary the BRICS countries have increased their export position in the world economy through the intensive and extensive margin, but from the perspective of diversification, they experienced very different developments of product and territorial diversification. Yanrui Wu and Zhangyue Zhou (Wu and Zhou 2006) investigated the major trends of and changes in the bilateral trade between China and India and explored the issues associated with trade intensity, intra-industry trade and comparative advantages in the two countries. Sayeeda Bano and Jose Tabbada (Bano and Tabbada 2012) analyzes the direction, composition and trends in the trade relations between New Zealand and the Philippines; identified the trade intensity indices, trade potentials, complementarities and revealed comparative advantages.

While a common characteristic observed in the export compositions of developing countries is a broadening of their productive base, and a diversification in their export offerings. A mainstream theme developed as early as Adam Smith's Wealth of Nations (1776) links higher productivity and economic growth with an increased degree

of specialization. This is notably proper in the tradition associated with Ricardo's Classical Comparative Advantage model of trade (Kellman 2010). Successful expansion of exports requires relatively high levels of productivity, either as determinant, or as the result of an increased specialization. Hence, one would expect to find a positive relationship between increased exports and production specialization. The direct relationship between export driven economic growth and specialization is given an additional theoretical foundation when explicit consideration is given to scale economies. (Iapadre 2001; Ferrarini and Scaramozzino 2011).

In this research, we've analyzed the factors related to the bilateral trade and trade deficit of Bangladesh with China by constructing several indices. Among them, Export, Import and Trade Intensity (TI) results exhibit the clear scenario of the intensity of trade between Bangladesh and China. Through the Trade Specialization Index [31] we've analyzed the specialization of the export of Bangladesh to China for 20 sectors/product groups. The findings produce very impressive results that provided a clear indication regarding the sector specialization of Bangladesh's export to China. The Herfindahl-Hirschman Index (HHI) for Bilateral Concentration of Indices/Export Diversification Index also exhibits very inclusive results to illustrate the prospects of concentration and diversification of bilateral trade between Bangladesh and China.

Empirical Model Specification and Data

Trade Intensity

The intensity of trade index was pioneered by Brown (Brown 1974) and was later developed and popularized by Kojima (Kojima 1964). Kojima's intensity of trade index concentrates on variations in bilateral trade levels that result from differential resistances Bano (Bano 2014). Trade may be more intense with a country and its trading partners than with the rest of the world because the resistance between them is lower. Trade intensity provides a way of measuring these trading relations without the bias resulting from the comparative size of the trading partners (Bano 2014). In studying the strength of trade ties, it is often desirable to take into account the importance of a country's trade partners' share in world trade (Bhattacharyay and Mukhopadhyay 2015). One group of indices that does this is the trade intensity index (TII) (WITS 2021). The intensity of bilateral trade between two countries can be measured from either an export or import perspective. The trade intensity statistic is the ratio of two export shares (Raj, Wing, and Ambrose 2014). The numerator is the share of the destination of interest in the exports of the region under study. The denominator is the share of the destination of interest in the exports of the world as a whole (UNSCAP 2021).

In order to examine whether the bilateral trade relationship between Bangladesh and China is strengthening or weakening, here export-intensity index, import-intensity index and Trade intensity have been estimated. Here, Bangladesh is reported as the home country i and trading partner (China) as country j. For trade flows from country i to country j, the indices are measured as follows:

i. Export Intensity Index

$$MII = \frac{M_w / M_{iw}}{X_{jw} / (Xw - Xiw)} \quad (1)$$

ii. Import Intensity Index

$$MII = \frac{M_w / M_{iw}}{X_{jw} / (Xw - Xiw)} \quad (2)$$

iii. Trade Intensity Index

$$TII = \frac{X_{ij} / X_{it}}{X_{jw} / X_{wt}} \quad (3)$$

Where; XII_i represents the export intensity index for country i; MII_i represents the import intensity index for country i; TII represents the trade intensity index for country i; X_{ij} represents the value of country i's exports to country j; X_{iw} represents the value of country i's total exports to the world; M_{jw} represents the total value of imports from the world into country j; M_w represents the value of total world imports; M_{iw} represents the total value of imports from the world into country i; M_{ij} represents the value of imports from country j into country i; X_{jw} represents the total value of country j's exports to the world; X_w represents the total value of world exports; X_{ij} represents the value of country i's exports to country j; X_{it} represents the value of country i's total exports to the world; X_{jw} represents the total value of country j's exports to the world and X_{wt} represents the total value of world exports.

The index determines whether bilateral trade between countries i and j is greater or lesser than might be expected given the importance of the trading partner's share in total world trade. As discussed by Bano (2008) (Bano and Tabbada 2012), trade intensity indices provide a way to measure the strength of trading relations without the bias caused by the comparative size of the trading partners. A value greater than one (TII>1) indicates that the relationship between the home country and the trading partner is greater than is expected given the trading partner's share of world trade, while a value of less than one (TII<1) indicates that the strength of the trading relationship is less than is expected (Bano and Tabbada 2012).

Limitations: As with trade shares, high or low-intensity indices and changes over time may reflect numerous factors other than trade policy (WITS 2021).

Export Specialization Index

A country's production capabilities is an important pattern of its trade flows as existence of capabilities is seen essential for the long-term growth prospects of a country. It is very difficult to measure capabilities directly, because of their complex nature (Ferrarini and Scaramozzino 2011). The recent analysis of capabilities and trade rests on the notion that the observed profile of trade specialization of a country provides indirect information about its productive capacity. Hushmann (Hausmann and Klinger 2006) used sectoral trade flow data to obtain a representation of the product space that is consistent with the global pattern of revealed comparative advantage. The location of a country in the product space is related to its underlying production capabilities. In turn, export specialization is able to explain cross-section differences in growth performance (Hausmann, Hwang, and Rodrik 2007) (Ferrarini and Scaramozzino 2011).

The export specialization (Reshetnikova) index is a slightly modified Revealed Comparative Advantage (RCA) index, in which the denominator is usually measured by specific markets or partners. It provides product information on revealed specialization in the export sector of a country and is calculated as the ratio of the share of a product in a country's total exports to the share of this product in imports to specific markets or partners rather than its share in world exports:

$$ESI = \frac{X_{ij} / X_{it}}{M_{kj} / M_{kt}} \quad (4)$$

Where; X_{ij} and X_{it} are export values of country i in product j, respectively, and where M_{kj} and M_{kt} are the import values of product j in market k and total imports in market k. If the ESI is near to 1, this indicates a greater level of specialization in the market while a value nearer to 0 implies comparative disadvantage in the export in a specific market (Lee 2011; WITS 2021).

1.1 Herfindahl-Hirschman Index (HHI) for Bilateral Concentration of Indices

The Hirfindahl-Hirschman Index (HHI) index posited by both Hirschman (1945, 1964) (Hirschman 1945, Hirschman 1964) and Herfindahl (Herfindahl 1950) (1950) as a measure of trade and industry concentration. The concentration index shows how exports and imports of individual countries or group of countries are concentrated on several products or otherwise distributed in a more homogeneous manner among a series of products

(Vassilopoulos 2003). The index is normally calculated for all trading partners, but it can be broken down by specific trading partners for more detailed analysis (Berger 2014). Therefore bilateral concentration index enables user to specify the group of countries as destination/origin (Tesfay and Solibakke 2016). It has been normalized to obtain values ranking from 0 to 1, with values close to 0 indicating highly diversified exports and values close to 1 indicating highly concentrated exports. The formula is as following:

$$H_{jk} = \frac{\sqrt{\sum_{i=1}^{n}\left(\frac{X_{ijk}}{X_{jk}}\right)^2} - \sqrt{1/n}}{1-\sqrt{1/n}} \tag{5}$$

With $X_{jk} = \sum_{i=1}^{n} X_{ijk}$

Where H_{jk} = concentration index of country or country group *j* exports to / imports from partner country group *k*. X_{ijk} = exports or imports of product *i* for reporter country *j* and trading partner *k*. X_{ik} = total value of exports/imports for country *j* to/from country *k* and product *i*
and *n* = number of products (WITS 2021; Canada 2016).

Data Sources and Preparation

We've explored the issues by constructing various trade indices using secondary data in various aspects and aggregated at the product group classification based on 2 digits level Standard International Trade Classification (SITC Rev 2) and Harmonized System (HS) 1988/92 for the period 1995-2018 based on the data sources of United Nations Commodity Trade database-UN COMTRADE (Database 2021), World Trade Organization (WTO 2021), Bangladesh Bank (Bank 2021), and Export Promotion Bureau of Bangladesh (EPB) (Export Promotion Bueraue of Bangladesh 2021). To analyze the indices, Microsoft Excel and SPSS software were used and the following product codes (table 1) have been applied:

Table 1: The Products code according to HS and SITC System

Product Group	Classification	Product Codes
Animal	HS 1988/92	01,02,03,04,05
Vegetable	HS 1988/92	06,07,08,09,10,11,12,13,14,15
Food Products	HS 1988/92	16,17,18,19,20,21,22,23,24
Minerals	HS 1988/92	25,26
Fuels	HS 1988/92	27
Chemicals	HS 1988/92	28,29,30,31,32,33,34,35,36,37,38
Plastic or Rubber	HS 1988/92	39,40
Raw Hides, Skins, Leather, & Furs	HS 1988/92	41,42,43
Wood and Wooden Products	HS 1988/92	44,45,46,47,48,49
Textiles and Clothing	HS 1988/92	50,51,52,53,54,55,56,57,58,59,60,61,62,63
Footwear	HS 1988/92	64, 65, 66, 67
Stone and Glass	HS 1988/92	68,69,70,71
Metals	HS 1988/92	72,73,74,75,76,78,79,80,81,82,83
Mach and Elec.	HS 1988/92	84,85
Transportation	HS 1988/92	86,87,88,89
Agricultural Raw Materials	SITC Rev2	114
Chemicals	SITC Rev2	367
Food Products	SITC Rev2	306
Fuels	SITC Rev2	50
Textiles	SITC Rev2	370

2. Empirical Results and Discussion

The analyzed results of the intensity, specialization and concentration indices of bilateral trade between Bangladesh and China are as following;

The intensity of Export, Import and Trade

Figure 3 gives the export, import and trade intensity indices between Bangladesh and China. From the analyzed results the following reconciliations are come out. The export intensity value of Bangladesh to China is derived near to zero (0) which means that the export level from Bangladesh to China is highly lower than that of China's in the world market share. Even according to the statistics of MIT media lab, in 2014 China's export share to Bangladesh was 0.49 % (accounting for $11.7 billion) of its total export to the world ($2.37 Trillion). Moreover, the export share of Bangladesh to China in 2018 (appendix 3) shows 3% which is a bit higher than past years but still lower than the import share (22%). The result shows a bit decreased in 2000 (0.006) than the value of 1995 (0.049). Later on, the intensity has been increasing a little year by year reaching 0.027 in 2018. It can be concluded from such a declining trend that Bangladesh could not diversify its export basket enough over the years to the Chinese market, and it has been exporting similar items, whose demands have been declining over the years. This demonstrates that Bangladesh`s commodity concentration in export is more than in its import from China.

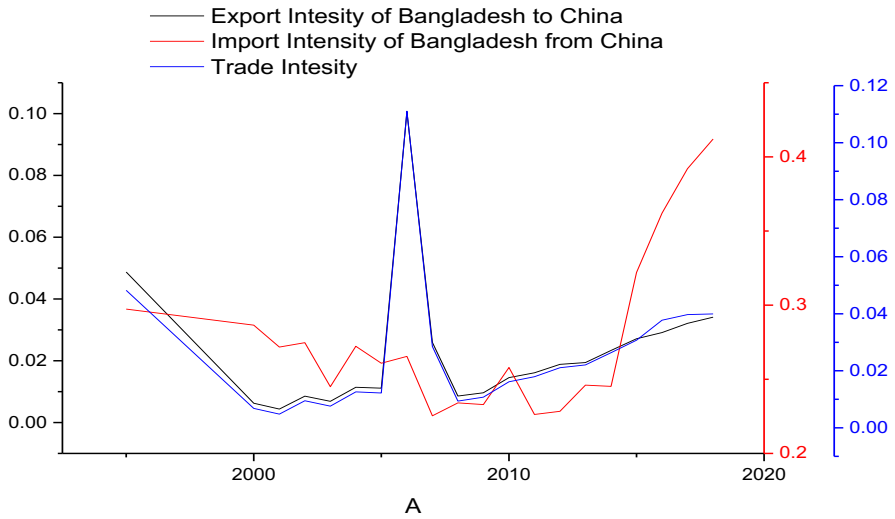

Figure 3: Analyzed values of Trade Intensity Indices for Bangladesh's Bilateral Trade with China, from 1995-2018.

In terms of import intensity of Bangladesh from China during 1995 to 2018 is less than one [13] but not very near to Zero (0) which interprets that the import level from China to Bangladesh is higher than that of Bangladesh's share of import from the world. If we see the statistics, it shows the share of imports of Bangladesh from China is 22%. The inter-temporal change of import intensity over years shows; in 1995 it was 0.30 in 2005 it was 0.26 and in 2018 the value increased to 0.32. The bilateral trade balance also shows the same scenario (figure 1) indeed. However, the import intensity index is much more noticeable compare to the export intensity index. The increasing trend in imports may be credited to the fact that China is also a major import partner of Bangladesh and its importance has been growing in recent years.

Regarding the trade intensity, the intensity declined to 0.01 then the value in 1995 (0.05) but from 2010 the intensity has been increasing. This implies Bangladesh has much potential to increase its trade with China. This also may be due to immense economic structural change in both countries in the last two decades. In 1995 Bangladesh was more an importing country than an exporting. On the contrary in 2018, Bangladesh becomes one of the important manufacturing countries in the world. Especially, the textile and apparel sector of Bangladesh which is in the top second suppliers of readymade garments in the world after China.

Export Specialization Index

The examined export specialization patterns of Bangladesh with China for 16 sectors throughout 1995-2018 are shown in appendix 4 as well as categorized according to their degree of specialization in table 2.

Table 2: Level of Specialization of Sectors according to the analyzed values of ESI

Hierarchy	High Specialization (ESI≥1)	Medium Specialization (1>ESI>o.5)	Low Specialization (0.5>ESI>0)	No Specialization (ESI=0)
1	Animal Products	Footwear	Vegetables	Mach and Elec.
2	Hides and Skins	Wood Products	Metals	Food Products
3	Textiles and Clothing	Transportation	Chemicals	Stone and Glass
4	Minerals			Fuels
5	Plastic or Rubber			
6	Miscellaneous			

Note: In table 2 we categorized the sectors/product group according to the TSI value range based on our understanding and analysis.

The analyzed results of the export specialization indices compose very splendid findings regarding the specialization of the export of Bangladesh to China from 1995 to 2018. According to the analyzed result, the 8 sectors reveal the highest specialization having an average score of 1 or more than 1 (ESI≥1) which means a very high level of specialization of these 8 sectors for Bangladesh's export to China. Among these 8 sectors, the Animal and Animal Products sector reveal the highest specialization having an average score of 126.0 in the last two decades. This sector includes major export products of the agricultural sector of Bangladesh. According to the trend, this sector shows future potentiality where Bangladesh's exporters and policymakers should focus further.

The next sector's (Hides and Skins) average ESI value is 118.3 from 1995-2018. This sector also shows high potentiality for Bangladesh's export basket to China. The third one is the textiles and clothing sector which exhibited very high specialization having an average ESI score of 32.8 in the last two decades. Being the major manufacturing sector of Bangladesh, the textile and clothing sector accounts for more than 85% share of the total export of the country. For export to China, this sector also accounts the highest share (65% in 2014). In our observation, the textile and clothing sector shows the most diverse of products in terms of Bangladesh's export to China and this sector has immense capacity to contribute further expansion of her export to China (Md. Ekram Hossain et al. 2017).

The fourth positioned sector is the raw materials sector which also exhibits a very high level of specialization from 1995 (ESI-27.82) up to 2018 (ESI- 8.14) and 17.9 average ESI value for the last two decades. During this entire two-decade, this sector has maintained steady decreasing synopsis. If the economic structure of Bangladesh is analyzed the causes are very clear. Being manufacturing countries both Bangladesh and China import the raw materials for their respective industries. The ESI value gives us a clear scenario of the structural change of Bangladesh's manufacturing sector as well as the economy as a whole. The industrial diversification of Bangladesh was not more diverse in 1995 as now. The steady decrease of this value indicates the more utilization of its raw resources for the domestic manufacturing sector rather than export. The fifth positioned one the mineral products exhibit an average ESI value of 4.5 from 1995 to 2018. The sector revealed quite potential for the export of Bangladesh to China. The statistics show that this sector is a new product group for the export basket of Bangladesh to China where the concerned stakeholders could focus on future improvement.

The next one, the Plastic or Rubber sector's analyzed average ESI value is 2.7 which indicates high specialization for Bangladesh's export to China. According to the trends, the sector could lose specialization in the coming years. According to the manufacturing industry structure, this sector also poses a potential sector for Bangladesh. The consumer goods sector stands in the seventh position having an ESI 1.7 average in the last two decades. According to our observation and analysis, this sector is a new sector for the export basket of Bangladesh for its export to China. In sum, it can be said that the ESI growth of this sector is very impressive and this sector could be one of the core sectors which have the potentiality to contribute to reducing the existing trade deficit of Bangladesh with

China. The 8th positioned sector belongs to the miscellaneous sector which exhibited an average ESI value of 1.6 in the last two decades. The sector could also grow more if the export basket of Bangladesh in this sector could be diversified. Because of the massive change in the economic structure in China and their increasing middle class, more demand on this sector will appear and this sector has future potential to get more shares in Bangladesh export basket to China. In this regard, the exporters and other stakeholders should focus on it very tactically.

The sectors having medium ESI values are the Footwear sector, Wood Products sector, and Transportation sector respectively. Having an average ESI value from 1>ESI>o.5, the sectors exhibit medium specialization for the export of Bangladesh to China. Among the sectors, the footwear sector has quite potential for its export because of the availability of raw materials (raw skins, garments) in Bangladesh. The low specialization category belongs to four sectors accordingly; Vegetables, Metals, Intermediate goods and the Chemicals sector. The sectors score values ranging from 0.5>ESI>0 from 1995 to 2018. In our investigation, it is found that among the sectors in the last decade; the agriculture sector of Bangladesh has developed very significantly and the country has got its sufficiency of production in this sector while exporting the rest portions. Bangladesh has been exporting vegetable products to many other destinations since the last decade. Because of the growing rate of middle-class demand and their purchasing power parity (PPP) in China, the future potentiality of this sector is highly anticipated.

The rest of the sectors that have no specialization for Bangladesh's export to China are respectively, Machinery and Electronics sector, Capital goods, Food Products, Stone and Glass and Fuels. Since the sector's ESI value equal to zero (0), the sectors have no specialization for Bangladesh's export. The trade structure of Bangladesh could explain these sectors to some extent. Bangladesh mostly imports the products belongs these sectors from other nations for her domestic market's demand rather than export.

Herfindahl-Hirschman Index (HHI) for Bilateral Concentration of Indices

Figure 4 shows the analyzed value of Herfindahl-Hirschman Index (HHI) or the Export Diversification indices for Bangladesh's Bilateral Trade with China from 1995-2018.

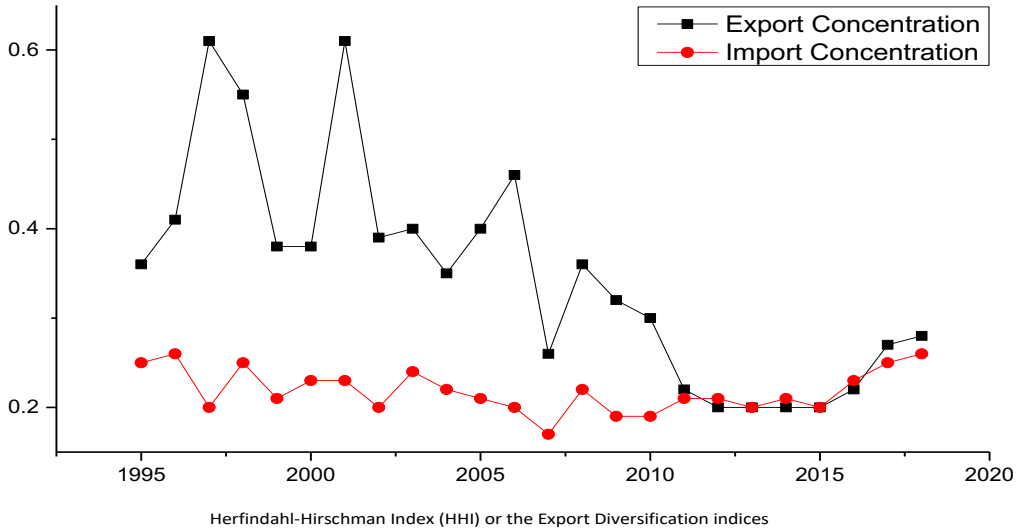

Figure 4: Analyzed values of Herfindahl-Hirschman Index (HHI) or the Export Diversification indices for Bangladesh's Bilateral Trade with China, 1995-2018

The analyzed result of export concentration shows; from 1995 to 2006 the HHI values range on average 0.5 which means concentration of export in particular industries of Bangladesh to China. From 2007 to 2018 the export concentration has changed significantly and the average HHI values shrank down to 0.21 which indicates; during this period the export pattern of Bangladesh to China has gradually converted from concentration to diversification. The export share of Bangladesh in 1995 was 1.2% but the share dropped down up to 2005. The export share began

to increase from 2005 and after a decade to share reached 2.89% in 2018. After the year 2010, the export share showed growing significantly. At the same time, the HHI value for export concentration also dropped down significantly and changed steadily to export diversification. It could be the effect of China's duty-free, quota-free (DFQF) market access program for 33 LDCs including Bangladesh on 1 July 2010 covering products of 4,788 tariff lines (8-digit level) to export to the Chinese market (Bangladesh 2020).

However, the trend of import concentration values shows 0.21 on average from 1995 to 2018. The values indicate import diversification because China is one of the largest import sources of Bangladesh and the imports are from various products and industries.

Concluding Remarks and Policy Implications

This paper explores the propensity of export, import and trade deficit of Bangladesh with China on an empirical basis alongside constructing several trade indices through a rigorous data analysis. An empirical analysis, our results imply that Bangladesh has been facing a high deficit of trade with China and the trend shows a higher deficit will be continued in coming years. Based on the findings as well as existing literature review, policy implications are recommended at the end of this concluding part. Let's summarize our findings and suggested implications based on the results.

Regarding export, import, and trade intensity; our results reveal that the gap between import intensity and export intensity is widening year by year. So the level of intra-industry trade between the two countries becoming worse and needed to be improved. This may be because China's import items from Bangladesh are composed of primary and intermediary goods on the contrary Bangladesh's imports from China are mostly the intermediate, capital, and machinery goods for her manufacturing industry. Therefore, it is stated from the results that the volume of imports from Bangladesh is much higher than its export to China. Secondly, very lower indices for exports and imports are far from the desired level of 1 which implies that Bangladesh-China trade was not as high as it should be. So there is a scope for mutual trade expansion too.

Through the analysis of the export specialization index, very impressive and prudent outcomes have been explored. Especially, our analysis has given a very clear indication for the potential sectors of Bangladesh that could contribute to minimizing the trade deficit of Bangladesh with China. In this research, we've analyzed 20 sectors/product groups of Bangladesh in its export to China. Among the sectors; 8 sectors found high specialization and revealed very potential sectors for Bangladesh's export to China. We've also discovered 3 moderate potential sectors and 4 sectors having low specialization for the export basket of Bangladesh to China. On the other hand, 5 sectors reveal no specialization for the export of Bangladesh to China. Based on our analysis it is suggested that the 15 sectors that belong to three levels of specializations respectively (table 2) have the potential to minimize the deficit of trade for Bangladesh with China. Concerning this, initiatives should be taken by the stakeholders in all sectors at public, private, and industry levels.

The last one is the analyzed values of Herfindahl-Hirschman Index (HHI) or the export diversification indices for Bangladesh's Bilateral Trade with China. The results confess the indications of Bangladesh's export to China where still a wide level of export diversification is needed to grab the huge diversified demand of the Chinese market. Especially with the rapid growth of the Chinese economy as well as the middle classes in China, the opportunity for Bangladesh to expand its export product and market diversification is immense. The policymakers in the public and private sector of Bangladesh, exporters, and industry stakeholders should be attentive enough to take initiative to grab this opportunity.

However, based on our overall analysis of the indices, the existing literature, and reports, several policy recommendations are suggested to minimize the trade deficit of Bangladesh with China. First of all, special focus should be given to the high potential sectors of Bangladesh that can narrow the exiting trade deficit. Among the sectors; Animal Products, Hides and Skins, Textiles and Clothing, Raw materials, Minerals, Consumer goods, and Miscellaneous exhibit the most potential sectors for Bangladesh to boost up its export basket to China.

Secondly, Bangladesh should focus on product diversification, especially on the goods that China imports for its local consumption. Despite enjoying a zero-tariff facility in exporting its products to the Chinese market Bangladesh has failed to utilize the facility fully due to a lack of product diversification.

Thirdly, Bangladesh could join the 'One Belt One Road and 21st Century Maritime Silk Road Project of China' that creates an enormous investment opportunity for Bangladesh in its infrastructure sector as well as investment from the emerging Chinese multinationals in different sectors of Bangladesh.

Fourthly, establishing a Bangladesh-China free trade area to get duty-free access to more Bangladeshi products to the Chinese market could reduce the deficit to a bigger extent. According to the suggestion of the Bangladeshi Commerce ministry, Bangladesh needs to sign a free trade agreement (FTA) with China aiming to narrow the yawning trade gap between the two nations as well as to access the trillion dollars' worth Chinese consumer market.

Finally, China's outward investment in Bangladesh could assist to reduce the gap in another aspect [49]. Chinese investment in Bangladesh's industry sectors, particularly relocating some of its low-value-added industries that are not cost-effective due to higher labor costs in China could contribute to narrow the gap to some extent. Bangladesh government should also remove trade barriers and bottlenecks in attracting outward investments from [49, 50].

Hereafter, regarding further research direction, we would like to suggest more dense research on the textile and clothing industry of Bangladesh to what extent the sector could contribute to narrow the gap. Furthermore, academic research is needed to find out the potentiality of Bangladesh to join and to be benefited from the 'One Belt One Road and 21st Century Maritime Silk Road Project' of China. Moreover, very rigorous and investigative research is also needed to explore the FTA potentialities and insights between the two countries.

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Conflict of Interests Statement

There are no conflicts of interest declared by the authors.

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APPENDIX

Appendix 1: Analyzed values of Sectoral Export Specialization indices (ESI) for Bangladesh's Bilateral Trade with China, 1995-2018

Sectors	1995	2000	2005	2007	2011	2013	2017	2018
Raw Materials	27.82	14.83	32.35	12.45	20.27	13.98	10.56	8.14
Consumer Goods	0.07	1.48	1.03	0.77	1.71	2.99	2.80	3.21
Intermediate Goods	0.77	0.70	0.49	0.43	0.23	0.37	0.38	0.34
Capital Goods	0.37	0.11	0.29	1.50	0.04	0.05	0.05	0.04
Animal	4.72	0	8.23	3.76	7.91	8.18	3.04	6.12
Hides and Skins	3.23	4.06	7.28	7.49	4.7	3.67	9.27	6.68
Textiles and Clothing	9.56	0.45	0.57	0.92	1.52	1.31	1.62	1.94
Plastic or Rubber	0	0.27	2.22	8.17	4.05	3.63	1.27	0.93
Miscellaneous	3.5	5.56	2.9	0.66	0.47	1.07	0.75	0.59
Footwear	0	0.01	0.45	0.56	1.04	1.51	1.01	1.07
Vegetable	0	0	0	0	0.76	0.45	2.39	0.94
Mach and Elec.	0.33	0.14	0.63	0.24	0.04	0.03	0.05	0.05
Minerals	0	0	0	0.02	1.88	38.67	6.48	0.75
Wood	0	0	0.06	0.17	0.01	0.04	0.13	0.17
Chemicals	5.95	0	0	0.01	0	0.06	0.18	0.02
Food Products	0	1.7	0	0.12	0	0.04	0.03	0.17
Stone and Glass	0.33	0	1.45	0.01	0.11	0.01	0.01	0.02
Transportation	0.31	0	3.68	1.77	0.22	0.66	0.02	0.03
Metals	0	0	0.49	1.38	1.38	0.02	0.02	0.02
Fuels	0	0	0	0	0.12	0.01	0.01	0.02

Appendix: 2 Analyzed Herfindahl-Hirschman Model, Export, Import and Trade Intensity Index Results between Bangladesh and China from 1995-2018

Year	Intensity Index			Herfindahl-Hirschman Index	
	Export Intensity of Bangladesh to China	Import Intensity of Bangladesh from China	Trade Intensity	Export Concentration	Import Concentration
1995	0.05	0.3	0.05	0.36	0.25
2000	0.01	0.29	0.01	0.38	0.23
2001	0	0.27	0	0.61	0.23
2002	0.01	0.27	0.01	0.39	0.2
2003	0.01	0.24	0.01	0.4	0.24
2005	0.01	0.26	0.01	0.35	0.22
2006	0.1	0.27	0.11	0.4	0.21
2007	0.03	0.23	0.03	0.46	0.2
2008	0.01	0.23	0.01	0.26	0.17
2009	0.01	0.23	0.01	0.36	0.22
2010	0.01	0.26	0.02	0.32	0.19
2011	0.02	0.23	0.02	0.3	0.19
2012	0.02	0.23	0.02	0.22	0.21
2014	0.02	0.25	0.02	0.2	0.21
2016	0.02	0.25	0.03	0.2	0.2
2018	0.03	0.32	0.03	0.2	0.21

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The Effect of Labor, Export, and Government Expenditure on Economic Growth

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Abstract
The purpose of this study is to explain the effect of labor on economic growth, the effect of exports on economic growth, the effect of government expenditure on economic growth, the effect of labor, exports, and government expenditure on economic growth. The variables used in this study are labor, exports, and government expenditure. The method used in this research is quantitative method. The type of data used in this study is secondary data in the form of times series data from 1990-2020 which is sourced from Badan Pusat Statistik (BPS). The results showed that (1) labor has a positive and significant effect on economic growth, (2) Exports has positive and significant effect on economic growth (3) Government expenditure has positive and significant on economic growth (4) Labor, exports, and government expenditure together affect on economic growth 96.1%.

Keywords: Labor, Export, Government Expenditure, Economic Growth.

Introduction

One of the important benchmarks in determining the success of economic development is economic growth. Economic growth is a process, not an economic picture in a certain period, there are developments or changes and the use of time (Boediono, 1992). Economic growth shows the extent to which economic activity will generate additional income for the community within a certain period, because basically government expenditure activity is a process of using expenditure variables to produce output, which in the process will produce services for development. However, high economic growth still leaves problems that must be faced in the development of a country. One of the realities of development is the creation of development gaps, namely the occurrence of differences in growth rates between regions which causes a gap in prosperity and progress between regions (Mudrajat Kuncoro, 2003). Quick economic growth will cause inequality in income distribution, this is because it does not pay attention to whether the growth is greater or less than the population growth rate or changes in economic structure. To obtain high economic growth, the role of the government is needed, namely by carrying out appropriate policies that can spur economic growth in a country, one of which is government expenditure.

According Sukirno (2000), Government expenditure is part of fiscal policy, which is a government action to regulate the course of an economy by determining the amount of government revenues and expenditures each year. The purpose of this fiscal policy is to stabilize prices, output levels, as well as employment opportunities and spur or encourage economic growth. Government expenditure is measured by the total routine expenditure and development expenditure allocated in the state budget. The greater the productive government expenditure, the greater the level of the economy of a region. Anaman (2004), states that government spending that is too small will harm economic growth, proportional government spending will increase economic growth and wasteful government consumption spending will hamper economic growth. In general, government spending has a positive impact on economic growth as stated in research conducted by Lorena (2014) in her research that government expenditure has an impact and is proven to stimulate economic growth. Chude (2013) in his research states government expenditure has positive effect on economic growth and very important instrument for economic growth in developing countries.

Another factor that determines the success of growth in the economic field is human resources in this case is the workforce. Human resources are both the subject and the object of development covering the human life cycle. Economic growth does not only depend on human resources, but also their efficiency (Jhingan, 2004). The low quality of human resources will have an impact on low productivity in the world of work or those involved in the production process. According to Todaro (2002) population growth and the growth of the Labor Force are considered as one of the positive factors that spur economic growth. Labor participation is one of the factors that have a significant effect on economic growth in Pakistan (Sahid, 2014). Research conducted by Jajri (2010) states that the quality of labor on labor productivity affects the economic growth of a country.

Sitindaon (2013) in his research suggests that labor has a positive and significant effect on economic growth, which means that an increase in the number of labor will encourage increased economic growth. The more people who are involved in the world of work, will cause the goods and services produced by the community to increase so that the income of a country increases and this will have an impact on the economic growth of a country. Labor is the driving force for the wheels of development that spur economic growth and affect the output of a region. One of the main themes in the employment sector is labor absorption. Employment is one of the indicators to assess the success of a country's economic development. This becomes very important because the greater the absorption of labor, the progress of the community's economic activities will be better. The ideal condition of economic growth on labor growth is when economic growth is able to change the use of labor in a larger way (Dimas, 2009). One of the problems regarding employment in Indonesia is the imbalance between job seekers and the number of available fields. From the data that the researchers found, it can be seen that the size of the labor in Indonesia can not be fully absorbed by the existing job opportunities, because the number of existing labor is not balanced with the availability of job opportunities.

In addition to labor, another factor that influences economic growth is exports. Kim & Lim (2005), Bruckner & Lederman (2012), Adeleye (2015), stated that exports affect economic growth. In Indonesia, it seems that there are still problems related to exports. It is because exports are a form of international trade and are different from domestic trade. Domestic trade that occurs in Indonesia almost does not have any obstacles. This is different from international trade. One of the things that make international trade unable to run smoothly is the exchange rate or commonly known as the exchange rate which results in low exports and has an impact on low economic growth.

From this explanation, the author is interested in studying the extent to which the influence of labor, exports, and government expenditure on economic growth with the aim of explaining the effect of labor on economic growth, the effect of exports on economic growth, the effect of government expenditure on economic growth, the effect of labor, exports, and government spending on economic growth.

Method

The type of data used in this study is secondary data in the form of times series data for 1990-2020 which is sourced from the Badan Pusat Statistik (BPS) in Indonesia. The variables in this study consist of independent variables including labor, exports and government expenditure, while economic growth is the dependent variable.

Data processing in this study uses quantitative analysis. Quantitative analysis is used to see whether the independent variables have an effect or not on economic growth by using a linear regression analysis model. Before performing linear regression, the classical assumption test was first tested, namely; multicollinearity test and autocorrelation test to obtain data analysis results that meet the test requirements. If the data has met the requirements, it will be continued with hypothesis testing using regression testing.

Result and Discussion

1. Classic Assumption Test

To obtain data analysis results that meet the test requirements, this test uses classic assumption test consisting of:

1.1. Multicollinearity Test

Multicollinearity test was used to test whether the regression model found a strong correlation or relationship between the independent variables. To see multicollinearity, can look at the VIF value. If the VIF value is more than 10 then multicollinearity occurs, otherwise if the VIF value is less than 10 then it is free from multicollinearity.

Table 1: Multicollinearity Test Results

Tolerance	VIF
.194	5.150
.715	1.399
.217	4.603

From these results, it can be seen that there is no independent variable that has a tolerance value of less than 10%, which means that there is no correlation between independent variables whose value is more than 95%. The results of the calculation of the variance inflation factor (VIF) also show the same thing that there is no one independent variable that has a VIF value of more than 10. So, it can be concluded that there is no multicollinearity between independent variables in the regression model.

1.2. Autocorrelation Test

The autocorrelation test is used to test whether in the linear regression model there is a correlation between the confounding error in period t and the confounding error in the previous period (t-1). To see whether there is a correlation, you can do the Durbin Watson test.

Table 2: Autocorrelation test results

R Square	Adjusted R Square	Durbin-Watson
.965	.961	1.727

The results of the data processing carried out showed that the dw test with n of 30 and k = 3 obtained the values of dl = 1.214 and du = 1.650. Dw count is 1.727 so that the calculated dw is in a position between du to 4-du as follows: du < dw < 4-du i.e., 1.650 < 1.727 < 4-du then the autocorrelation coefficient is equal to zero. That is, there is no autocorrelation.

1.3. Hypothesis Test

After the classical assumption test was carried out, then the data was declared not to have multicollinearity and heteroscedasticity, so it was possible to test the hypothesis using multiple linear regression analysis. Hypothesis testing was carried out to see whether or not there was an effect of exports, labor, and government spending

partially and simultaneously. The results of the regression tests that have been carried out using the SPSS program are as follows:

Table 3: Result of Regression Analysis

Variable	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
Export	1.651	.165	10.001	.000
Labor	.085	.135	2.631	.034
Government Expenditure	.634	.347	1.829	.043

From the table above, the export regression coefficient is 1.651. This shows that every 1% increase in exports will be followed by an increase in economic growth of 1.651 with the assumption that other factors are constant. The results show that the t count for exports is greater than the t table, namely 10.001 > 1.697 which indicates that partially exports have a significant effect on economic growth. This calculation is in line with the hypothesis stated by Taufik (2014), Saad (2012), and Bakari (2017) which states that exports have positive effect on economic growth. This shows that exports are one of the important variables to support economic growth in a country.

The labor regression coefficient is 0.085. This shows that every 1% increase in labor will be followed by an increase in economic growth of 0.085 with the assumption that other factors are constant. The results show that the t count for labor is greater than the t table, 2,631 > 1,697 which indicates that partially labor has a significant effect on economic growth. This is in line with the research conducted by Elisabeth Bawuno (2015) that labor affects economic growth. Research conducted by Sayekti (2009) also states that labor has an influence on economic growth in Indonesia. This is also in line with the research conducted by Korkmaz that labor has a relationship with economic growth, both of which have a reciprocal relationship with one another.

The government expenditure regression coefficient is 0.634. This shows that every 1% increase in government expenditure will be followed by an increase in the economic growth of 0.634 with the assumption that other factors are constant. The results show that the t count for labor is greater than the t table, 1,829 > 1,697 which indicates that partially government expenditure has a significant effect on economic growth. The results of this study are in line with research conducted by Haryanto (2013) which states that government expenditure affects economic growth in Indonesia. This is also in line with research conducted by Aregbe (2015), Chipaumire (2014), Torki (2015) that government expenditure affects economic growth in a country. This shows that government expenditure is one of the important factors that affect the economic growth of a country.

Table 4: Result of Simultaneous Effect

Model	R	R Square	Adjusted R Square	F	Sig.
1	.982[a]	.965	.961	36.396	.000[a]

From the results of the F test in table 4, show that F count is greater than the F table, namely 36.396 > 3.35, which indicates that exports, labor and government expenditure together affect on economic growth.

Conclusion

From the results of the analysis that has been carried out by researchers, it can be briefly concluded that government spending, exports and labor partially or simultaneously affect economic growth. This means that the greater the export, labor and government spending, the greater the economic growth.
Suggestion

a. The government should be able to create new jobs that can reduce unemployment. With more people working or productive people, later on, economic growth will also increase. In addition to opening new business fields, the government should also be able to increase labor productivity through increasing the existing budget allocation by providing skills training for workers and expanding job opportunities so that output increases and in the end can spur economic growth in Indonesia.
b. The government can expected to optimize the use of government expenditure for infrastructure development activities and increase capital expenditures to increase economic growth
c. In the export sector, the government is expected to encourage export activities in Indonesia by reducing high costs, simplifying export document licensing, improving infrastructure in the trade sector, facilitating the flow of goods distribution and increasing domestic market security so that economic growth in Indonesia increases.

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Demonetization Impact on Liquidity of Large Corporates in India

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Abstract
This paper 'Demonetization Impact on Liquidity of Large Corporates in India' focuses on the changes in the Liquidity pattern of the companies' in-order to cope up with the Business Risk that emerged due to the unforeseen Demonetization Policy of the Government of India. The study aimed at finding the performance of various sectors on liquidity parameters during pre and post demonetization period. The study covered the companies listed in NIFTY 50 over the period of 6 years from 2014-2019. The methodology used for analysis is the longitudinal study under descriptive analysis as it involves the repeated observations of the same variables over a period of time. As the paper focuses on the top companies listed, though companies faced the uncertainty during that particular period of demonetization, they bounced back at the earlier than the MSME companies. Some sectors like FMCG, Pharmaceutical were immune to demonetization as it has an inelastic demand in the market and demonetization created giant opportunities for the software sector as the country has been shifted towards digitalization. Found short-term implications for the cash-intensive sectors but in the long run it helps in the growth of the economy, which in turn will have a positive correlation with the growth of companies.

Keywords: Demonetization, Liquidity, Corporates, MSME, Langitudinal

INTRODUCTION

Currency notes are a medium of exchange predominantly used in India. In the rural markets, currency notes are almost 90% transactional medium in all economic activities. Indian economy is largely rural-based. Withdrawing units of money from circulation is demonetization; units of money are denied the status of legal tender. Demonetization is defined as a process by which currency units will not remain legal tender. The currency notes will not be taken as a valid currency. Demonetization is a step taken by the government where currency units are ceased of their status as legal tender. Demonetization is a basic condition to change national currency. In other words, demonetization can be said a change of currency where new units of currency replace the old one. It may involve the introduction of new notes or coins of the same denomination or a completely new denomination.

The unique experiment with demonetization, announced on November 8, 2016 by the Prime Minister of India has established that the Central Government is serious about tackling the menace of corruption. Broadly, the

demonetization of high currency notes had a two-fold objective – first, choking the funding channels of militancy and terrorism from across the border and fighting corruption.

Since then, in continuing the focus on corruption, the government has placed emphasis on digitizing India. The experiment of demonetization by the Government has largely been successful in educating the masses about the benefits of electronic payments and digitalization.

Demonetization influenced the performance of the group of companies across various sectors, which in-turn led to a sharp reversal in the performance of the stock markets. The markets witnessed large capital gains neutralized within a span of four to six months following the announcement, although they redeemed quickly once liquidity returned to normal.

Tiny, mini, micro, small & medium scale industries had been working on narrow margins and had no cushion or shield to withstand this effect and many of companies could not sustain operation and suffer badly. On the other hand, large multinational companies (MNC) and large Indians companies had attained critical mass before this unforeseen event, which helped them to survive somehow in the market, but not with a pleasant report.

LITERATURE REVIEW

Rohit Bansal and Vipan Bansal (2012) has undertaken a study to identify the determinants of liquidity. The study uses data pertaining only to two sectors, i.e., the textile and chemical sector, over the period of 1999-2008 for a sample of 100 firms in the Indian market. The results indicate that the variables like cash flow, debt ratio, and free cash flow are significant determinants of corporate liquidity for all the sectors under consideration. The study concludes that FCF, debt ratio, cash flow, return spread, VARCF, C and CF have an impact on the corporate liquidity of Indian firms and the size of the firm did not impact on corporate liquidity. The gap analyzed in this paper is that it focuses mainly on the two sectors and these results may not be applicable to the other industries. **Shweta Mehrotra (2013)** has made an attempt to examine the working capital trends and practices,particularlyy in the FMCGs sector in India by selecting five FMCGs companies (named as Hindustan Unilever Limited, Nestle India Limited, Britannia Industries, Procter & Gamble and ITC). The main objective of this paper is to analyze the working capital trends in FMCG sector and also to discover the relative importance of various current assets components. Finally is to draw conclusion on the effectiveness of working capital management. The study is based on secondary data and they used ratio analysis as a tool of financial statement analysis to examine the degree of efficiency of working capital management in companies. The study concludes that unlike most other industries, the turnover of an FMCG company is not limited by its ability to produce, but its ability to sell. They can generate cash so quickly, this happens because customers pay upfront and so rapidly. This paper failed to analyze the trends and practices in-depth, used only the liquidity ratio to analysis the financial statement and affirmed the results and also they have chosen only the top 5 companies for study, the sample size is too small and thus the results cannot be passed on to the whole population. **Nimalathasan and Priya (2013)** has aimed at discovering the specific factors that are useful in enhancing the profitability and liquidity position of the companies. There is a negative relationship between profitability and liquidity and thus it is essential for every firm to maintain equilibrium between profitability and liquidity. The main objective of the study is to find out the impact of liquidity management and profitability and identify the factors contributing the liquidity management and profitability and also the relationship between them. The sample of the study is taken from the listed manufacturing companies from the Manufacturing Sector of Colombo Stock Exchange (CSE) for the period of 2008-2012. The author uses multiple regression analysis to investigate the impact of liquidity management on profitability. It is important to note that the financial profitability (ROA and ROE) depend upon the liquidity ratios like debtors collection period (DCP), creditor payment period (CPP), inventory sales period(ISP), operating cash flow ratio(OCFR), and current ratio(CR). **Monika Bolek and Bartosz Grosicki (2015)** proposed a practical solution and present the model based on discriminant analysis to indicate the liquidity as bad or good by linking it to the profitability which is measured by Return on Assets (ROA) less Weighted Average Cost of Capital. If a company generates ROA higher than the Weighted Average Cost of Capital, then it indicates that liquidity management based on chosen ratios is good and the company is able to cover costs of capital. The main objective of this paper is to evaluate the financial liquidity of a company using discriminant analysis. The authors of this paper use the Altman's methodology to assess the

liquidity of companies and also to build the liquidity measure. To assess the liquidity in a complex manner, the authors of this paper have proposed one model that may be called L-score to evaluate the liquidity situation in a company. **Vimala and J.P.Kumar (2016)** has analyzed the liquidity of the select units by computing current ratio, quick ratio, liquid funds to current assets ratio, networking capital to current assets ratio and finally, a comparative liquidity study has been undertaken among selected units by allotting ranks to them as per the Motaal's Ultimate Rank Test. The main objective of this paper is to study the liquidity position of the selected pharmaceutical company by applying Motaal's Comprehensive Test of Liquidity. The author has selected the top five pharmaceutical companies in India based on the sales and the study covers a period of ten years from 2005-06 to 2014-15. The results state that in the pharmaceutical ssector the growth of current liabilities is higher than the growth of current asassetshich adversely affects the liquidity position of the companies. The major limitation in this study that they had chosen the top 5 companies for analysis, thus these results may not be applicable for the micro, small, medium enterprises. **Tamragundi and Purushottam (2016)** has attempted the study to find out the relationship between the liquidity and the profitability in the FMCG sector in India. The study was descriptive in nature and they have chosen the leading top 10 FMCG companies for analysis. The financial reports of the ten leading FMCG companies were studied for the period of 2005-06 to 2014-15 and relevant liquidity and profitability ratios were computed. The tools used for the study are Spearman's Rank correlation and t-tests. The results of this study revealed that there is a positive correlation exists between profitability and liquidity for ten leading FMCG companies in India. But these results are limited only the large FMCG companies and it may not hold true for other sectors. **Nomita Sharma (2017)** has tried to understand the entrepreneurial responses to uncertainty in business environment. The main purpose of the study was to analyze how MSMEs responded to demonetization, in particular. MSMEs have been chosen because they often face a paucity of resources. The study focused on the IT sector as it is a knowledge-intensive sector, responded positively through the introduction of innovative strategies. The questionnaire has been emailed to the MSME and the results were interpreted through statistical techniques, i.e., univariate, bivariate and multivariate methods. Strategies undertook by the companies are mostly process innovation in order to survive in the Indian market. This study is limited by the choice of sector and sample size. The time period of the study taken for analysis is very small. The overall impact of demonetization can be analyzed better in the long-term. **Sutinder (2017)** has conducted a study to analyze the impact of demonetization on the Indian economy's different sectors. Demonetization in the Indian economy had a negative impact on the different sectors of the economy, but the majority of the negative effect is short-run in nature. The main aim of the study is to analyze the impact of demonetization on GDP and also on the different sectors of the Indian economy. The study reveals that the GDP of a country slightly decreases as compared with the previous year but it may not be the same in the future also. In this paper, the author did not attempt to prove the conclusion statement through any research methodology and statistical tools instead, they analyzed the performance of various sectors on a shallow level of information and presented the results. **Charan Singh (2018)** in his paper 'India since Demonetization' has attempted to capture the course of the Indian economy since demonetization of November 2016. An honest approach has been made to understand demonetization in a continuum of other major policy reforms taken in the economy like GST, and Digital India. This paper has been mainly focused on the developments in fiscal and monetary variables since demonetization, the performance of macroeconomic indicators and the overall growth trend in the economy. Statistics show a rapid growth of cashless infrastructure in India i.e., both in the number of ATMs and POS machines. In this paper author tries to prove that the effect of demonetization is only short run and in the long run it benefits the country's economy. But this paper seems to be focusing mainly on the positive side of demonetization and fails to cover its negative impact. **Kontusa and Damir and Mihanovicb (2019)** have conducted a study to analyze the dependence between liquidity level and profitability of surveyed enterprises. The main aim of this paper is to contribute to the debate by empirically investigating the level of liquidity as well as the relationship between the level of liquidity and profitability. The study has been conducted by taka ing sample of 93 S.M.E.s from Croatia over the period 2010–2014 and the methods used for data analysis were descriptive statistics, correlation and regression analysis. This study has provided empirical evidence of a negative relationship between liquidity which is measured in terms of current assets to current liabilities ratio, and S.M.E.s' profitability that is expressed in terms of return on assets.The limitation of this study is that the data collected for research is only the secondary dthathich has been taken from the published annual reports of the selected enterprises and the study is also based on ratio analysis, which has its own limitations.

PROBLEM STATEMENT

Due to the demonetization policy, the liquidity of several companies has been affected critically. Liquiay is the prominent issue that much to be managed; because it has a direct impact on the operations of the business both in short term and long term. The profitability of a company depends on how corporate leverage liquidity risk. Demonetization forced the companies to change its way of business operations in-order to survive, sustain and grow in the market. This paper focuses mainly on the performance of large corporates as it contributes much to the GDP of the country. Thus the study has been performed to analyze the impact of demonetization on liquidity of large corporates in India.

To analyze the above mentioned problem; this study was undertaken to evaluate demonetization policy impact on business operations of large corporates in India. Along study also have the secondary objective to analyze the performance of various sectors in India during pre and post demonetization period. Further study focuses on the management measures taken by large companies to survive, sustain and grow in the market during post demonetization

OBJECTIVES

The main objective of the study is to examine the impact of demonetization policy on liquidity of large corporates in India. The secondary objectives are:

- To analyze the performance of various sectors in India during pre and post demonetization period.
- To examine the performance of top companies under each sector and the time taken for the recovery from the impact of demonetization.
- To study the management measures taken by large companies to survive in the market during the demonetization.

RESEARCH METHODOLOGY

A. Research design

The research will be a longitudinal study under descriptive analysis as the work involves the repeated observations of same variables over a period of time (i.e.) the study uses longitudinal data for analysis.

B. Sampling design

The population or the entire group of units which is drawn to this research is all the companies that are listed in NIFTY 50. Out of 50 companies, the sample chosen is 40 companies that has a characteristics of the population. The sampling technique used for the study is clustered sampling in which the entire population is sub-divided into clusters or group which is homogeneous within the groups and heterogeneous between the groups. The clustering is carried out by grouping the companies based on the industry sector (i.e.) automobile, cement and construction, energy, FMCG, metal, software, pharmaceutical, telecom, pesticide, transportation, media.

C. Analysis tool

In this study, the tool used for analysis is ratio analysis to examine the data. The data collected for the research is a secondary data from the annual reports of the sample companies. The variables considered for the study are Sales, Receivables, Net W.C, Inventory, Liquid asset, Operating profit (EBIT), Net profit, EPS, Borrowings and operating leverage to analyze the performance of the sample. The data is collected over a time horizon of 6 years from 2014-2019 as it covers the pre and post demonetization period for the effectual analysis.

DATA ANALYSIS

I. AUTOMOBILE SECTOR

Bajaj Auto Limited is an Indian global two-wheeler and three-wheeler manufacturing company that is chosen to analyze its performance during pre and post demonetization phase. Ratio analysis has been performed on the secondary data to interpret the results. In Table 1, an attempt has been made to analyze the liquidity of Bajaj Auto Limited, by using some selected ratios and it is shown below.

Table 1: Bajaj Auto Limited Financials

Year / Company	18-19 (%)	17-18 (%)	16-17 (%)	15-16 (%)	14-15 (%)	13-14 (%)
Sales	30,249.96	25,164.92	21,766.68	22,586.52	21,612.01	20,149.51
Sales growth	20.21	15.61	-3.63	4.51	7.26	
Receivables	2,559.69	1,491.87	953.29	717.93	716.96	796.21
Receivables/sales	8.46	5.93	4.38	3.18	3.32	3.95
Net W.C	2,188.98	5,124.34	6,178.79	1,944.26	5,049.48	886.39
Net W.C/sales	7.24	20.36	28.39	8.61	23.36	4.40
Inventory	961.51	742.58	728.38	719.07	814.15	639.72
Inventory/sales	3.18	2.95	3.35	3.18	3.77	3.17
Liquid assets	922.81	778.00	293.68	859.52	586.15	495.48
Operating profit (EBIT)	4,982.02	4,783.43	4,422.35	4,781.94	4,116.55	4,105.74
Operating profit/sales	16.47	19.01	20.32	21.17	19.05	20.38
Net profit	4,675.18	4,068.10	3,827.56	3,929.67	2,813.74	3,243.32
Net profit/sales	15.46	16.17	17.58	17.40	13.02	16.10
EPS	161.57	140.59	132.27	135.80	97.24	112.08
Borrowings	3,786.73	3,244.32	2,235.73	2,027.04	1,799.75	2,111.40
Operating leverage	0.04	0.11	0.44	0.68	0.01	

From the above table it was observed that the sales has been dropped by 3.63% for the company during demonetization (i.e. 16 – 17 financial year). But in the succeeding years the sales has been increased at the rate of 15 to 20% growth. Net working capital has witnessed the growth of more than 200% in 16-17 as the current asset of the company is greater during that period because of the increase in receivables, inventory. Due to liquidity crisis during the demonetization period, there was an acute deficiency in cash and cash equivalent (i.e.) the company encounters 65% decline in liquid assets during that particular period.

During 16-17 from the profit and loss account of the company, it is noted that there was a slight dip in the raw material expenses, power and fuel cost which indicates a sink in the production due to crisis. This ultimately results in the decline of operating profit by 7%, but in the consecutive years the company bounced back to its normal phase.

Due to the confusion prevailed in the market during demonetization the company's share price went down by 2.5% but after the improvement in the sales and profit of the company in the following years, the share price of the company began to climb.

Comparative Analysis within the automobile sector

In comparative analysis, the results of Bajaj Auto is compared and contrasted with the population i.e. all other companies in automobile sector. Year on Year sales growth of the industries under automobile sector which is listed in NIFTY 50 is shown in the below Table 2.

Table 2: Automobile Industries – Sales Growth

Year / Company	18-19 %	17-18 %	16-17 %	15-16 %	14-15 %
Mahindra & Mahindra Ltd	10.12	10.51	7.78	4.95	-3.86
Eicher motors	9.34	27.27	13.77	104.08	78.05
Maruti Suzuki India	7.85	17.24	18.24	15.14	14.35
Hero Motocorp Ltd	4.41	13.09	-0.35	3.68	9.14
Tata Motors	17.63	32.75	3.43	18.05	5.85

Only Hero Motocorp has witnessed the negative sales growth which is in line with the sales of the Bajaj Auto and all other companies except these have achieved the positive sales growth during the demonetization period. From the above data, it is evident that during 17-18 financial year all the large automobile companies have returned to its normal state by achieving the positive sales growth.

Table 3: Automobile Industries – Receivables Growth

Year / Company	18-19 (%)	17-18 (%)	16-17 (%)	15-16 (%)	14-15 (%)
Mahindra & Mahindra Ltd	24.37	7.97	17.01	-1.81	1.92
Eicher motors	44.39	59.42	6.09	331.12	-11.79
Maruti Suzuki India	58.05	21.90	-9.30	23.59	-24.33
Hero Motocorp Ltd	85.61	-2.67	21.75	-7.69	50.95
Tata Motors	-6.59	63.52	4.03	83.55	-8.40

The above Table 3 shows the year on year receivables growth of the automobile industries. When the data is compared with Bajaj Auto Ltd, most of the companies have shown the positive growth on receivables. Only one exception is Maruti Suzuki which reveals the negative growth on that particular year. The data reveals that it doesn't follow a linear fashion i.e. there is no consistent growth or decline pattern exists.

Table 4: Automobile Industries - Net Working Capital growth

Year / Company	18-19 (%)	17-18 (%)	16-17 (%)	15-16 (%)	14-15 (%)
Mahindra & Mahindra Ltd	18.59	5.96	66.02	55.23	-54.24
Eicher motors	628.04	-371.21	-20.08	-151.75	-29.04
Maruti Suzuki India	-76.22	69.00	39.36	410.83	-110.25
Hero Motocorp Ltd	-11.53	34.08	78.12	34.86	23.46
Tata Motors	5.02	5.31	28.38	-42.02	-2.16

From the above table, it is evident that all the companies except Eicher Motors have witnessed the positive growth of Net Working Capital which is same as the Bajaj Auto during the demonetization. As the companies have shown a growth in the current asset (i.e. receivables and inventory) at that particular period which eventually resulted in the growth of the net working capital. Out of 6 companies, only one company showed the negative working capital and the remaining 5 companies have realized the positive working capital growth.

Table 5: Automobile Industries – Liquid Asset Growth

Year / Company	18-19 (%)	17-18 (%)	16-17 (%)	15-16 (%)	14-15 (%)
Mahindra & Mahindra Ltd	28.96	71.48	-26.22	10.76	-30.02
Eicher motors	143.22	5765.21	-53.71	3.41	130.09
Maruti Suzuki India	151.62	415.22	-67.30	130.60	-97.09
Hero Motocorp Ltd	-3.45	3.37	4.09	-17.51	35.53
Tata Motors	64.27	143.54	-58.57	-16.55	317.75

From the above table 5 it is evident that all the companies except Hero Motocorp experiences drastic downfall in liquid assets during demonetization. These data discloses that the automobile sector has faced a severe cash shortage at the period but in the succeeding year these large corporates managed the issue and brought back to its normal pace.

Table 6: Automobile Industries – Net Profit Growth

Year / Company	18-19 (%)	17-18 (%)	16-17 (%)	15-16 (%)	14-15 (%)
Mahindra & Mahindra Ltd	10.10	19.56	13.69	-3.51	-11.63
Eicher motors	19.94	9.80	19.16	134.24	100.60
Maruti Suzuki India	-2.86	5.06	37.02	44.54	33.35
Hero Motocorp Ltd	-8.45	9.48	7.81	31.30	13.11
Tata Motors	21.60	-93.85	-23.6	37.70	-46.0

The above Table 6 represents the % growth of net profits of the automobile companies and from the data it is apparent that during demonetization only Tata Motors shows the negative growth which is in line with the Bajaj Auto and all other companies have experienced the positive profit growth. Only 2 companies have been suffered during demonetization and the remaining companies were able to achieve the positive growth on profits. These above data discloses the fact that the large automobile companies in India have bounced back to its normal state at the earliest.

II. CEMENT AND CONSTRUCTION SECTOR

Three companies were listed under cement and construction sector in NIFTY 50. The parameters considered for the study are Sales, Receivables, Net W.C, Inventory, Liquid asset, Operating profit (EBIT), Net profit, EPS, Borrowings and Operating leverage to analyze the performance of the sample. Out of the three companies, Grasim Industries have realized a remarkable sales growth of 15% during the period of demonetization. Although the company had performed well during demonetization, the data reflects the fact that in the previous year the company has attained the sales growth of 40% and it has been come down to 15%. But still the company has managed to achieve the growth during demonetization and has been performed well in the succeeding years.

The other two companies have experienced a small decline and the profit of the companies has not grown at a normal pace during demonetization. Recovery had happened in the successive years at a slow progress.

III. ENERGY SECTOR

In NIFTY 50 there are about 8 companies were listed under energy sector. Out of which 6 companies have attained the positive sales growth during demonetization and the remaining 2 companies have faced the decline in the sales growth. Liquid asset of all the companies in energy sector have been affected drastically in which only 3 companies were able to bring back to its standard level in the succeeding years, whereas the remaining 5 companies were improving in a slow pace.

The profit of two companies has slowed down during demonetization and all other companies have achieved the positive profit growth. Though they were not able to realize the prior growth rate, still they attained the positive growth. 5 companies under energy sector were performed well and they achieve the consistent parameters growth after the demonetization only the remaining 3 companies were recovering at a slower rate.

IV. FMCG SECTOR

Five companies were listed under FMCG sector in NIFTY 50. Companies like ITC and HUL have performed well by achieving sales and profit growth and even the company's EPS have increased during the period of demonetization. All the 3 other companies were able to realize the positive sales growth at a smaller rate which is

less when compared to previous growth rate. As FMCG sector has an inelastic demand, all the top corporates have survived, sustained during the crisis. FMCG sector is the one that recovered earliest all the 5 listed large companies have attained the growth of the all chosen parameters in the successive years. Thus, currently all the companies were doing well by achieving the consistent growth and demonetization doesn't have much impact on the sector.

V. METAL SECTOR

Hindalco, Vedantu, JSW and Tata Steels were the four companies which have listed in NIFTY 50. Only Tata steels has faced a sales decline during the demonetization, whereas remaining 3 companies have achieved the positive sales growth. During that period all the four company's current assets have been elevated due to the build-up of inventory, liquid assets and receivables. As the sales of the 3 companies have increased, that resulted in the growth of the profits.

The top companies of metal sector have operated well during demonetization, it is evinced by the fact that all these company's EPS have increased at a larger rate when compared to the previous years. During 17-18 financial year financial statements have shown a consistent growth on all the parameters, but it has faced a slight decline in sales and profit in the succeeding year i.e. 18-19.

VI. SOFTWARE SECTOR

In NIFTY 50, there are about 5 companies were listed under software sector. All the five companies have achieved the positive sales growth during the period of demonetization, but out of 5 companies, 3 companies were failed to meet its previous growth rate. It had faced a slight decline in the sales when it is compared with the prior performance and the remaining 2 companies have managed to reach its standard growth rate. These 2 companies were able to achieve the typical profit growth whereas the remaining 3 companies were only able to attain a tiniest growth of the profit i.e. these 3 companies were competent enough to survive during demonetization.

The two companies have marked a consistent growth on all the parameters since the demonetization and the other 3 companies have been taking slower step in recovering and the growth of the parameters has been carried out in a slower pace.

VII. PHARMACEUTICAL SECTOR

3 companies were listed in NIFTY 50 under pharmaceutical sector. Only one company was able to achieve the marginal sales growth at the rate of 0.9% and the remaining 2 companies have obtained the negative sales growth during the demonetization period. From the sales decline it is evident that the demonetization had a serious impact on the pharmaceutical sector. Net working capital of 2 companies has shown negative growth which implies that short term borrowing and trade payables have increased during that period.

Out of 3 companies, only one company has realized positive profit growth whereas the remaining two companies have failed to perform at its standard rate and they have shown a negative profit growth. In the consecutive years, all the 3 companies have managed to escalate the growth of the parameters, but only at a slower rate. These companies were able to achieve the consistent sales growth but they were not able to realize the appropriate profit growth.

VIII. TELECOM SECTOR

Only two companies were listed under telecom sector in NIFTY 50. During demonetization both the companies have achieved a positive sales growth. Although the companies were able to realize the positive growth, one company has faced a consistent decline in the sales growth when compared to its previous year growth rate. Both the companies have shown a negative net working capital that is due to the increase in short term borrowings and decrease in receivables and liquid assets. In the consecutive years, one company has returned back to its usual level of net working capital and the other company has been making a slower progress.

Profits of the companies have been analyzed in which one company has achieved a positive growth during demonetization and it realized a consistent growth in the successive years. The other company had faced a negative profit growth and it was still struggling to get back to its normal pace.

IX. PESTICIDE SECTOR

United Phosphorous Ltd (UPI) is the only company that is listed under pesticide sector in NIFTY 50. The company had achieved a consistent sales growth throughout the period taken for the study. Net working capital has increased only during the demonetization period but in the successive years, the company has tried to reduce and bring back to its usual level. Net profit of the company has faced a decline and marked a negative growth during the period of demonetization. Slowly the company was able to increase the operating and net profit in the subsequent years. The company has been made sufficient efforts to bring the parameters to its standard growth rate but the recovery has happening in the slower pace.

X. TRANSPORTATION SECTOR

Adani Ports and Special Economic Zone Ltd. is the only large corporate which gets listed under transportation sector in NIFTY 50. During demonetization the company was able to realize the sales growth of 5% but in the preceding year the company has been achieved 18% sales growth rate, thus it reflects that there has been a dip in the sales growth. Net working capital has increased during demonetization due to the growth in current assets of the company i.e. receivables, inventory and liquid assets. The company had achieved the positive growth of operating and net profit which is due to the growth of sales during demonetization. But the profit achieved was not consistent with its prior growth rate. In the succeeding years, the company has been trying to improve the profits of the company and the recovery was carried out in a slow progress.

XI. MEDIA SECTOR

Zee Entertainment Enterprises is the only one company which was listed in NIFTY 50 under media sector. Demonetization did not have much impact on the media sector as it witnesses the consistent growth. The company has achieved the sales growth at a rate of 19% during demonetization and it realized an accordant growth in the following years. Short term borrowing of the company has been increased at a rate of 60% in-order to overcome the liquidity issues during demonetization. As the media sector is immune to demonetization, the profits of the company have grown at a usual rate year over year.

CONCLUSION

The project was mainly undertaken to examine the impact of demonetization on liquidity of large corporates in India. Since many large companies have broad margins and had the cushion or shield to withstand this effect, most of the companies have survived and sustained in the market. Only some companies under each sector have faced some slight decline during demonetization but still they have made sufficient efforts to bring back to its standard level in the consecutive years. There are short term implications for the cash intensive sectors but in the long run it helps in the growth of economy which in-turn will have a positive correlation with the growth of companies.

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The Impact of Psychological Factors on Consumer Green Purchase Behaviour: A Study of #NoStrawMovement Campaign in KFC Greater Jakarta

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Abstract
Plastic pollution is one of the most concerning issues presently and Indonesia is the second largest plastic waste producer in the world. A substantial part of the plastic waste comes from non-degradable plastic straws. This research intends to seek whether consumers' psychological factors have an impact on their green purchasing behavior with a case study of #NoStrawMovement in KFC Indonesia. The research has been carried out on 153 consumers. The outcome signified that all indicators of psychological factors do have an impact on consumers' green purchasing behavior. Perceived knowledge about sustainability issues, spirituality, drive for environmental responsibility and perceived marketplace influence are the decisive factors affecting consumers' green purchase behavior. It is revealed that psychological factors impact consumers' green purchase behavior by 51.6%. The result of the research will be worthwhile for KFC Indonesia to further revamp the effectiveness of the movement and for the government to establish a policy that supports green purchasing behavior. Advocating green purchasing behavior within society could aid in alleviating the damage that has been previously caused to the environment.

Keywords: Psychological Factors, Perceived Knowledge about Sustainability Issues, Spirituality, Drive for Environmental Responsibility, Perceived Marketplace Influence, Perceived Consumer Effectiveness, Attitude towards Sustainability Purchasing, Consumers' Green Purchase Behavior

1. Introduction

Currently the earth faces incoming danger from various environmental issues. These issues are caused by the actions of humans. These deeds in the end produce pollutions that endangered the world we live in. Plastic pollution is one of the major concerns that exist presently. Globally, around 1.3 billion tons of trash have dumped the ocean annually and the majority of it is plastics that will take decades, centuries or even a millennium to be degraded (Lehnardt, 2017). The examples previously stated are only the tip of the iceberg and the rest of it are more or at the least as horrifying as these ones. Indonesia is the second biggest producer of plastic trash in the

world with a total of 3.2 million tons out of 64 million tons of total trash per year and Indonesians use about 93 million plastic straws per day (Puspita, 2018; Arifah, 2018). These horrendous facts and news related to these, encourage an individual named Swietenia Puspa Lestari, leader of Yayasan Penyelam Lestari Indonesia, to initiate an organization named Divers Clean Action (DCA) in 2015 that focuses on marine debris issues (Divers Clean Action, 2018). She then started the #NoStrawMovement back in May 2017 hand in hand with PT. Fast Food Indonesia that operates KFC marine Indonesia, a franchised fast-food chain restaurant from the United States of America (Broekema, 2018). KFC Indonesia became the first multinational company in Indonesia that started implementing this movement in just several stores then from there they implement it in all their available stores across Indonesia. The movement was intended to avoid the usage of plastic straws and to get the consumers to be involved in this green practice whilst attempting to convert their usual purchase behavior to green purchase behavior. In spite of this, KFC Indonesia still provides plastic straws if their consumers ask for it (Alicia, 2018). This has already been a case for several previous studies regarding green purchase behavior, essentially there is a gap between an individual's attitude and behavior labelled as green attitude- behavior gap or green purchasing inconsistency (Joshi & Rahman, 2015). In a nutshell, this research will analyze the impact of psychological factors towards consumers' green purchase behavior.

2. Literature Review

2.1 Psychological Factors (PF)

As asserted by (Dima, 2013), PF are factors concerning psychology that is related to how it motivates one's actions. The factors in this case are: Drive for Environmental Responsibility (DER): This is related to the dedication an individual has to protect and improve the environment (Ekasari, 2018; Kumar & Ghodeswar, 2015). When an individual chooses to participate in #NoStrawMovement, this action is also a part of being responsible to the environment.

Spirituality (S): A process of seeking things that an individual holds sacred in their life as well as holding on to their beliefs and principles (Okpalaenwe, 2016; Nelson, 2009). There are different beliefs and philosophies for each individual. Partaking in #NoStrawMovement for some may bring them joy and for others, it may seem as a selfless act that eventually will lead the individual to the belief that this little act of protecting the environment could change a person to be a better version of themselves.

Perceived Consumer Effectiveness (PCE): The perceived impact by an individual to the environment through a particular action (Hanss & Doran, 2019; Yahya, et al., 2013). Part of the society views the deed of not using plastic straws as something that is a step towards the ultimate goal of eventually discarding any plastic made products although for some, this feat may just be some futile movement considering the fact that #NoStrawMovement is an act that can only be fully accomplished if the society participates as a whole.

Attitude towards Sustainable Purchasing (ASP): The cognitive appraisal of an individual towards the act of green purchasing (Joshi & Rahman, 2019; Lee, et al., 2014). For a fact, #NoStrawMovement in reality is very beneficial to the environment and it is not hard to do. However, not all individuals think alike.

Perceived Marketplace Influence (PMI): The impact on other consumers from the perspective of an individual through participating in #NoStrawMovement (Gani, et al., 2017; Leary & Vann, 2016).

Perceived Knowledge about Sustainability Issues (PKSI): The knowledge comprehended by an individual in relation to environmental problems (Vicente-Molina, et al., 2013; Joshi & Rahman, 2017; (Wang, et al., 2014). Environmental related problems have been increasing as days go by, society knows about these problems but some just do not know how immenent the danger really is. **H1**: Psychological Factors impact consumers' green purchase behavior.

2.2 Consumers' Green Purchase Behavior (CGPB)

GCPB is the act of buying and consuming products that have slight to zero impact to the environment (Onel, 2016). In other words, the behavior of consumers to purchase green products. According to D'ames, (2014) and Yan & Y azdanifard (2014) these green products are the products that do not pollute the earth and leave negligible carbon foot prints such as stainless- steel drink bottles, reusable coffee cups, biodegradable waste bags and many more. CGPB generally can be referred to as green buying behavior, environmentally responsible purchase behavior, and pro-environmental purchase behavior (Tan & Lau, 2011). As previously stated in chapter 1, there is a gap found in most studies related to green purchase behavior labelled as green attitude-behaviour gap or green purchasing inconsistency. This particular gap is caused by the weak relationship between the attitude of a consumer and their behavior. This happens when a consumer has a positive attitude towards buying green products however the reality says otherwise (Joshi & Rahman, 2015).

3. Research Method

This research implements a causal study. The targeted sample is the consumers of KFC Greater Jakarta (Jabodetabek) within the past year (2018 - 2019). A survey through online questionnaires with a total of 23 questions were distributed to 189 respondents. 153 out of 189 are accepted and the rest got filtered out as they did not meet the desired requirements. The questionnaire uses a five-point Likert scale from 'Strongly Agree' to 'Strongly Disagree.' This type of scale is termed as a psychometric scale that was used to assess the impact of consumers' psychological factors on their green purchase behaviour. The data can be used after passing validity, reliability, and single linear regression analysis.

3.1 Research Model

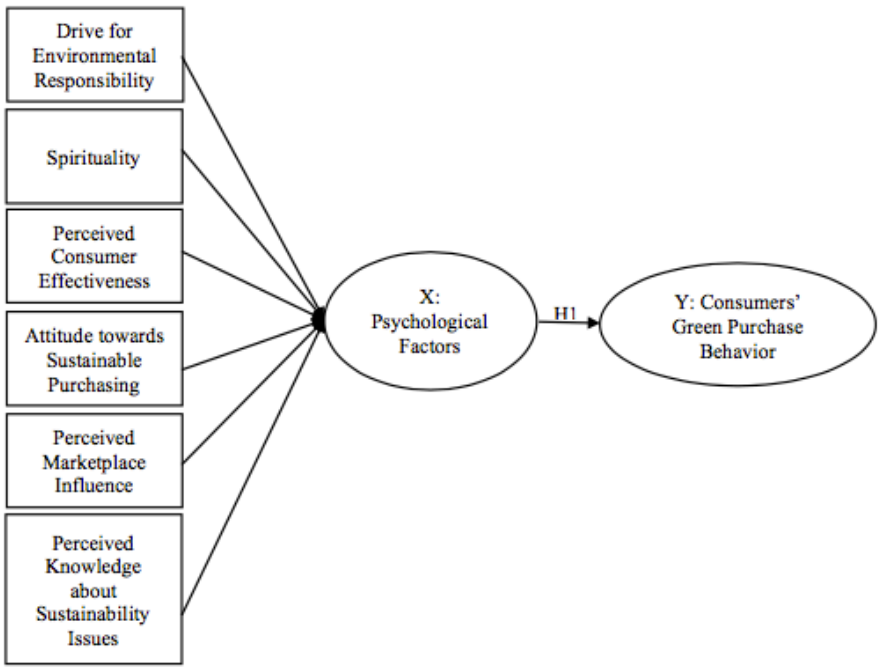

Figure 1: Research Model

4. Discussion

Characteristics		Frequency	%
Gender	Male	78	51
	Female	75	49
Age	< 17	13	8
	17-24	61	40
	25-34	30	20
	35-44	18	12
	≥ 45	31	20
Occupation	Student	62	41
	Entrepreneur	39	25
	Employee	31	20
	Professional	15	10
	Others	6	4
Monthly Income (IDR)	<3.900.000	44	29
	3.900.000 - 5.000.000	30	20
	5.000.001 - 10.000.000	34	22
	> 10.000.001	45	29

Table 1: Demographic Profile

Table 1 above shows the overall demographic respondents. It shows that there were 78 males and 75 females that participated in this study. Most of them (40%) were from 17 to 24 years old. The majority of the respondents (41%) had an occupation as student and most of them have a monthly income under IDR 3.900.000 or above IDR 10.000.001.

4.1 Validity and Reliability Analysis

The validity test goes through Pearson correlation coefficient. After testing, all items are found valid since r-count is bigger than r-table 0.1587 (df=151, n=153), with a significance level of 0.05. While the reliability test goes through Cronbach's Alpha was used to examine the reliability of the study to make sure that it is consistent.

Variables	Cronbach's Alpha	Total Items
Psychological Factors (PF)	0.948	20
Consumers' Green Purchase Behavior (CGPB)	0.861	3

Table 2: Reliability Test Result

As shown in Table 2, the reliability coefficients of all items were above 0.80 and considered good.

4.2 Single Linear Regression Analysis

Based on the regression analysis results, the regression model of this study is as follows:
Y (CGPB)= -2.042 + 0.160 (PF)

4.5 Findings

The study is revolved around how PF may have an impact on CGPB. Through several tests, it is proven that PF does have an impact on CGPB by 51.6%. Thus, approving $H1_1$ and the findings of this study is fundamentally in accordance with Joshi & Rahman (2019) although, not particularly with the exact same results.

Surprisingly, PKSI is the most significant determinant of CGPB in contrast to the other five. This may have been a result of how limited knowledge regarding sustainability issues affects consumers buying green products. Consumers are prone to consume more environmentally harmful products when they are unaware of the consequences of how their buying behavior may impact the environment. This implies that when consumers do know the impact of plastic straws on the environment, they will be more likely to support and participate in #NoStrawMovement while in the process, altering their purchase behavior into green purchase behavior.

Additionally, S also plays a strong role in affecting CGPB only second to PKSI. This finding corresponds to the study by Chairy (2012), indicating that when consumers believe in an eco-friendly lifestyle, they will act accordingly to the belief. Consumers with this belief will support and participate in #NoStrawMovement.

This study emphasizes that DER is one of the most critical predictors, supporting Kumar & Ghodeswar (2015). Supposedly, the commitment to be responsible to the environment will lead consumers to support and participate in #NoStrawMovement and eventually encourage CGPB.

The study further revealed that PMI impacts CGPB significantly supplementing the research done by Leary & Vann (2016). Most respondents believe that one's conviction towards how an individual endeavor could impact another's behavior. In regards to participating in #NoStrawMovement, the act of participating could encourage others to do the same and more.

5. Conclusion

In short, the severity of plastic pollution in Indonesia has been magnified over the past few years. Indonesia became the biggest producer of plastic waste in the world by 2018. One of the biggest contributors to that is the usage of non- degradable plastic straws which has reached 93 million straws per day by 2018. Thus, to lessen the usage, DCA and KFC Indonesia start the #NoStrawMovement in 2017. Since then, it has been a policy at KFC Indonesia to not give straws to consumers even though some still criticize and still ask for straws. This problem is also supported by previous studies that found an attitude-behavior gap while investigating CGPB. Essentially, there is a discrepancy between consumers' positive attitudes towards buying green products and the actual purchasing decision. Therefore, this research is focused on finding the impact of PF on CGPB by using #NoStrawMovement in KFC Greater Jakarta as a case study.

From a total of 189 respondents, only 153 have consumed KFC Greater Jakarta's products over the past year and are aware of or have experienced #NoStrawMovement. After numerous tests, these are the results:

- PF is approved to have an impact on CGPB by 51.6%.
- 4 out of 6 indicators (PKSI, S, DER, and PMI) have strong impact and the remaining have moderate impact.

5.1 Managerial & Jurisdictional Implications

As previously stated, PF has an impact on CGPB. This indicates that teaching consumers regarding the issues revolving around the environment could be very beneficial for the consumers. As they start to learn and understand, consumers will be more drawn to change their purchasing behavior into green purchasing behavior. KFC Indonesia could teach more than just their present consumers, but also the younger generations by directly going to schools, as a part of CSR, as instilling knowledge and principle into kids is easier than changing the perspective or mindset of adults (Santi, 2016). Hence, younger generations can grow with the bbeliefthat using non-degradable plastics harms the environment and to restore it, starts from one's initiative to take action. The moment that this becomes

a habit for them, it will develop a sense of sustainable responsibility internally. Furthermore, the actions of those who are taught to be environmentally responsible may affect those who are not to act accordingly.

Aside from directly approaching consumers, indirectly reaching to consumers through social media proactively could be a great idea due to technological advancement. For instance, KFC Indonesia could post an advertisement on YouTube highlighting #NoStrawMovement. Additionally, KFC Indonesia should keep on posting updates concerning the movement hence, this may help bring more attention to its existence.

Lastly, making #NoStrawMovement installations in KFC's outlets at least once a month. These visually attracting installations made for consumers are made to educate them on why such a simple action of not using plastic straws can make such a vast difference on plastic pollution and to inform them on the current situation of the deteriorating environment.

KFC Indonesia has already reduced plastic straw waste by 45% in each outlet by the implementation of #NoStrawMovement. This result is already evident enough for the Indonesian government to create a policy similar or identical to the #NoStrawMovement for every F&B business in Indonesia. By applying this policy, Indonesia could decrease its plastic waste to a great extent. This change in society, if applied, will subtlety force consumers to adapt to the change thus, altering their purchasing behavior into CGPB.

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Modelling & Forecasting Volatility of Daily Stock Returns Using GARCH Models: Evidence from Dhaka Stock Exchange

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Abstract
Modelling volatility has become increasingly important in recent times for its diverse implications. The main purpose of this paper is to examine the performance of volatility modelling using different models and their forecasting accuracy for the returns of Dhaka Stock Exchange (DSE) under different error distribution assumptions. Using the daily closing price of DSE from the period 27 January 2013 to 06 November 2017, this analysis has been done using Generalized Autoregressive Conditional Heteroscedastic (GARCH), Asymmetric Power Autoregressive Conditional Heteroscedastic (APARCH), Exponential Generalized Autoregressive Conditional Heteroscedastic (EGARCH), Threshold Generalized Autoregressive Conditional Heteroscedastic (TGARCH) and Integrated Generalized Autoregressive Conditional Heteroscedastic (IGARCH) models under both normal and student's t error distribution. The study finds that ARMA (1,1)- TGARCH (1,1) is the most appropriate model for in-sample estimation accuracy under student's t error distribution. The asymmetric effect captured by the parameter of ARMA (1,1) with TGARCH (1,1), APARCH (1,1) and EGARCH (1,1) models shows that negative shocks or bad news create more volatility than positive shocks or good news. The study also provides evidence that student's t distribution for errors improves forecasting accuracy. With such an error distribution assumption, ARMA (1,1)-IGARCH (1,1) is considered the best for out-of-sample volatility forecasting.

Keywords: ARCH, GARCH, Volatility, Forecasting, DSE

1. Introduction

Over the past decades, modelling and forecasting volatility of financial time series has become a fertile area for research (Zakaria & Winker, 2012). Many models in the field of academic finance use variance (or standard deviation) as a measure of uncertainty (Niyitegeka & Tewari, 2013). "In most of these models' variance is assumed to be constant through time; this is known as homoscedasticity" (Brooks, 2002, p. 386). Financial time series such as stock prices often exhibit volatility clustering. The time series are found to depend on their own past values and

exhibit non-constant variance or heteroscedasticity. A time series with some periods of low volatility and some periods of high volatility is said to be "volatility clustering" (Banumathy & Azhagaiah, 2013). It has been found that the stock market volatility changes with time and exhibits "volatility clustering."

The knowledge of volatility is of crucial importance for many economic and financial applications like portfolio management, risk management, asset pricing and investment in general (Floros, 2008; Niyitegeka & Tewari, 2013, Zakaria & Winker, 2012; Parvaresh & Bavaghar, 2012). Volatility is the most important variable in evaluating derivative instruments. Volatility is closely related to risk. Investors in the stock market are obviously interested in analysing and learning about the nature of the stock market volatility of stock prices, for high volatility could mean huge losses or gains and hence greater uncertainty (Parvaresh & Bavaghar, 2012).

Several models have been developed since the 1980s that are especially suited to estimate the conditional volatility of financial assets (Zakaria & Winker, 2012). Frequently applied models of this type are the generalized conditional heteroscedastic models (Zakaria & Winker, 2012). Engle (1982) introduced Autoregressive Conditional Heteroscedasticity (ARCH) to the world to model financial time series that exhibit time-varying conditional variance. A generalized ARCH model (GARCH) was extended by Bollerslev (1986). These are popular models for estimating stochastic volatility. These models are widely used in time series econometrics, especially in financial time series analysis. With the introduction of models of ARCH and GARCH, there have been wide empirical applications of modelling volatility of financial time series. However, the GARCH cannot account for leverage and to account for that effect, APARCH, E-GARCH and T-GARCH models have been developed over time.

However, it is widely recognized among researchers that for excess kurtosis along with an increase in data frequency, the rate of return in financial variables might have a levy distribution or a fat-tailed (Mandelbrot, 1963). Under normality assumption for errors, the volatility modelling and forecasting based on such modes will be misleading. The main objective of this paper is to model stock returns volatility in Dhaka Stock Exchange (DSE) by employing different GARCH family type models for daily observations on the index returns series over the period of 27 January 2013 to 06 November 2017. The volatility models employed in this paper include both symmetric and asymmetric GARCH models. Moreover, student's t distribution is used to correctly model and forecast the volatility of stock return and normal distribution for errors is used to compare with student's t distribution for errors. The rest of the paper organized as follows: Section 2 provides the relevant literature review. Section 3 describes data and potential methodology. Section 4 provides estimation results and their discussion respectively. Section 5 provides the results of volatility forecasting both in-sample estimation and out-of-sample forecasting accuracy. Finally, the paper concludes and suggests some policy implications.

2. Literature Review

GARCH family models have been used in scholarships by authors from different corners of the world for the modelling and forecasting of daily stock returns (Floros, 2008; Niyitegeka & Tewari, 2013; Peters, 2001; Karmakar, 2005; Banumathy & Azhagaiah, 2013; Zakaria & Winker, 2002; Abd El Aal, 2011; Parvaresh & Bavaghar, 2012; Qamruzzaman, 2015; Huq, Rahman, Rahman, Shahin, & Ali, 2013). The most used models are GARCH(1,1), GARCH-M(1,1), exponential GARCH(1,1), threshold GARCH(1,1) and power GARCH(1,1). The first two models imply the symmetric effect of past shocks whereas the second group of models allows capturing asymmetric effects. Stock market volatility is widely studied both in developed markets like Israel (Floros 2008), South Africa (Niyitegeka & Tewari, 2013), Europe (Peters, 2001) and emerging markets like India (Karmakar, 2005; Banumathy and Azhagaiah, 2013), Egypt (Zakaria & Winker, 2002; Floros, 2008; Abd El Aal 2011), Iran (Parvaresh & Bavaghar, 2012), Sudan (Zakaria & Winker, 2002). However, studies in the context of Bangladesh are almost non-existent since two scholarships are found only regarding the analysis of Dhaka and Chittagong stock market (Qamruzzaman, 2015; Huq et al., 2013).

In the middle eastern stock markets, EGARCH models are seen to be dominant in determining the leverage effect of daily stock prices (Floros, 2008; Parvaresh & Bavaghar, 2012). Floros (2008) examined the volatility in

Egyptian and Israeli stock indices and found coefficients of the EGARCH model showed a negative and significant value for both indices, indicating the existence of the leverage effect. Parvaresh and Bavaghar (2012) have examined GARCH models in forecasting volatility for Tehran Stock Market and the study suggested that GARCH models used in this paper have the same forecasting power while evaluating forecasting with MSE criteria, while CGARCH has the best forecasting power given the log-likelihood is evaluation criteria. Abd El Aal (2011) examined five models for forecasting volatility of the Egyptian stock market index and employed different statistical metrics. After using usual statistical metrics, they found that the EGARCH model beat the other volatility forecasting models for the Egyptian stock market. However, after using DM statistics they found no significant differences between the forecasting volatility models performance.

However, the scholarships relating to African stock markets employed symmetric and asymmetric GARCH models to model volatility that capture the most common stylized facts about index returns such as volatility clustering and leverage effects (Zakaria & Winker, 2002; Niyitegeka & Tewari 2013; Abd El Aal 2011). Zakaria and Winker (2002) examined the return volatility using daily prices of Khartoum Stock Exchange (KSE) and Cairo and Alexandria Stock Exchange (CASE) where the results showed significant evidence for the existence of the leverage effects in the two markets, based on asymmetrical EGARCH (1,1) and TGARCH (1,1) estimation. However, the result of EGARCH and GJR-GARCH (1,1) failed to indicate the existence of leverage effects in South African stock returns (Niyitegeka & Tewari, 2013). In terms of volatility in African stock markets, results indicate the mixed outcome. GARCH-M (1,1) described statistically significant conditional variance for Egyptian and Sudanese stock markets with a positive sign (Zakaria & Winker, 2002). On the other hand, the results from the GARCH (1,1) model show that volatility of stock returns is persistent in South Africa (Niyitegeka & Tewari, 2013). However, some studies are limited as they did not test to what extent volatility forecasts based on the present models are useful in the context of risk management for the stock markets considered (Zakaria & Winker 2002).

Meanwhile, the only western stock markets literature reviewed in this paper, studied two major European stock exchanges using daily data over a 15-years period (Peters, 2001). Study results revealed that overall estimation is improved when fat-tailed densities are considered in the conditional variance and when asymmetric GARCH is used. In addition to that, GJR and APARCH models are found to be giving better forecasts than symmetric GARCH.

South Asian stock markets studied the heteroscedasticity behaviour of the stock markets making use of several GARCH models (Karmakar, 2005; Banumathy & Azhagaiah 2013; Qamruzzaman, 2015). Banumathy and Azhagaiah (2013) showed that bad news or negative shocks create more volatility than positive shocks or good news by giving negative and positive significant coefficients for EGARCH (1,1) and TGARCH (1,1) models respectively. Karmaker (2005) showed the suitability of the GARCH (1,1) model that gave remarkably good forecasts of market volatility. The scholarships again produced mixed results in the South Asian stock market in terms of capturing symmetric and asymmetric volatility. Some studies examined whether there is asymmetric volatility by using the E-GARCH models and observed that volatility is an asymmetric function of past innovation that increases at a higher rate during market decline (Karmakar, 2005). However, GARCH (1,1) and TGARCH (1,1) estimators are found to be the most suitable models to capture the symmetric and asymmetric volatility respectively in some other studies (Banumathy & Azhagaiah, 2013). Qamruzzaman (2015) examined a wide variety of popular volatility models for Chittagong Stock Exchange (CSE) and the results indicated that GARCH-z, EGARCH-z, IGARCH-z, GJR-GARCH-z and EGARCH-t are suitable for that specific stock exchange with the volatility of the return being significantly higher after 2009. An important limitation of some studies being their suffering from the constraint of non-calculation of intraday volatility and only used a short period of time-series data (Banumathy & Azhagaiah, 2013).

In a different study, Abdullah, Siddiqua, Siddiquee, and Hossain (2017) tried to model and forecast exchange rate volatility by addressing the issue of error distributional assumption between the Bangladeshi taka and the US dollar. This study attempted to model the dynamics by using five different models from January 1, 2008, to April 30, 2015, under both normal and student's t distribution. The models' findings were compared under the regular normal distribution assumption for the residuals against Student's t-distribution and it was later found that the

application of student's t distribution improved forecasting accuracy more than the normal distribution. Moreover, the findings also indicated that for modelling in-sample volatility dynamics, AR (2)–IGARCH (1, 1) was found to be the most accurate, while AR (2)-GARCH (1,1) gave the best performance under error distribution for the out-of-sample volatility forecasting.

However, there are relatively fewer studies on the stock return volatility of DSE. In one current example, Huq et al. (2013) modelled the stock return volatility using daily closing price data from December 06, 2010, to March 12, 2013. According to them, ARMA (1,1) with GARCH (1,1) and GARCH (2,1) are more appropriate models for the general index of the Dhaka Stock Exchange (DSE). But this study has some limitations. They addressed the lag specification of the mean equation properly, but they did not consider the excess kurtosis and skewness. Hence, their results may be misleading. Besides, the I-GARCH model was not used even though the sum of the persistence parameter exceeds the unitary value of almost all the papers. We were appreciative of the work of Abdullah et al. (2017) on exchange rate volatility and therefore attempted to apply the I-GARCH model in the field of stock return volatility of DSE. However, there is a need to identify the true nature of stock market volatility in an emerging market like Bangladesh. Moreover, selecting proper mean equations, addressing excess kurtosis by using student's t distribution and selecting appropriate models may contribute to the field of stock return volatility of DSE. This paper, therefore, analyses the presence and pattern of the volatility clustering in the Dhaka stock index return series using the GARCH family of models. Additionally, the study examines the presence of leverage effect or asymmetric information effect in the DSE index and thus contributes to the existing literature.

3. Data and Methodology

3.1 Data Sources and Variable Formation

The study is based on the secondary data that was collected from Dhaka Stock Exchange Indices. The daily closing price of the DSE general index namely DSEX over five years from 27 January 2013 to 06 November 2017 were considered for the analysis. The study used 1153 daily observations excluding holidays. Since the daily closing price is normally nonstationary, it is inappropriate for the analysis. However, several studies (Karmakar 2005, Abdullah et al., 2017) suggest estimating the volatility of the return series. The DSE daily stock return series is, therefore, calculated using the following log transformation:

$$r_t = \ln\left(\frac{p_t}{p_{t-1}}\right)$$

$$\text{Or } r_t = \ln(p_t) - \ln(p_{t-1})$$

Where r_t is the logarithmic return on DSE indices for time t, p_t is the closing price at time t, and p_{t-1} is the corresponding price in the period at time t-1. The statistical software EViews 7 was used for the quantitative analysis.

3.2 Methodology

3.2.1 Unit Root Test

In a time series, the stationary check is a must. Unit root test is usually used to test whether the data are stationarity. In this regard, the study performed Augmented Dickey-Fuller Test (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test.

3.2.2 The ARCH Model

It is well known that volatility is commonly modelled by GARCH family models. Usually, one can use the mean equation for the level of the series and then the ARCH model is used for modelling the variance. When data are serially correlated, the misspecification of the mean equation could fail to address the autocorrelation problem that

could arise in the volatility model. Hence, the accurate specification of the mean equation is very important. We, therefore, estimated all the GARCH family models for the following appropriate mean equation:

Mean Equation: ARMA (1,1)

$$r_t = \mu + p_1 r_{t-1} + p_2 \varepsilon_{t-1} + \varepsilon_t$$

We used five different GARCH family models to specify the variance equation to model volatility for different purposes. The sensitivity of the estimation results of the models was checked by changing distributional assumptions. The distributional assumption is changed from normal to student's t distribution. The reason is that in many pieces of literature on financial asset returns, it is established that the return variable is more likely to follow a "levy distribution" with "fat tails" and kurtosis is likely to increase with data frequency (Andersen & Bollerslev, 1998). The useful variance equation is assumed as:

Variance equation:

$$\varepsilon_t = v_t \sqrt{h_t}$$

Where, v_t ~ i.i.d (0,1) and

$$h_t = v_t \sqrt{\alpha_o + \alpha {\varepsilon_{t-1}}^2}$$

3.2.3 The Generalized ARCH (GARCH) Model

The Pioneer of modelling volatility, Engle (1982) used Autoregressive Conditional Heteroscedasticity (ARCH) model to model volatility. But the main problem with the ARCH model is that in practice, a long lag is often required to capture the time-varying volatility. The GARCH model proposed by Bollerslev (1986) allows conditional variance to depend upon its lag which typically reduces the number of ARCH lags required. So, the conditional variance equation should follow as:

$$\text{GARCH (1,1):} \quad h_t = \alpha_0 + \alpha {\varepsilon_{t-1}}^2 + \beta h_{t-1}$$

Here, the GARCH (1,1) model has one ARCH term denoted as ${\varepsilon_{t-1}}^2$ and one GARCH term denoted as h_{t-1} . For the variance to remain well behaved (finite and positive), some restrictions are needed: $\alpha \geq 0,\ \alpha_0 > 0, \beta \geq 0$. The sum of the ARCH and GARCH coefficients leads to the persistency of volatility shocks. To ensure that series ε_t is stationary and the variance is well behaved, it is necessary to assume that $\alpha + \beta < 1$.

3.2.4 The Symmetric Power ARCH or (APARCH) model

Ding, Granger, and Engle (1993) introduced the asymmetric power ARCH or (APARCH) model. The APARCH (1,1) can be expressed as:

$$\text{APARCH (1,1):} \quad {h_t}^d = \alpha_0 + \alpha \left(|\varepsilon_{t-1}| - \gamma \varepsilon_{t-1}\right)^d + \beta {h_{t-1}}^d$$

This model is developed to allow for possible non-linearity in the parameters of the variance equation. Here d donates the power parameter that requires that $d>0$ and γ is the parameter capturing any asymmetric or leverage effect which requires the condition $|\gamma|<1$.

3.2.5 The Exponential GARCH (EGARCH) model

The main drawback of the standard GARCH (1,1) model is that the conditional variance is unable to respond asymmetrically to the rise and fall in the stock returns. This model suggests that the shock in ε_{t-1} has the same effect irrespectively of whether $\varepsilon_{t-1} > 0$ or $\varepsilon_{t-1} < 0$. A typical feature of financial data is that negative shocks or bad news create more volatility than positive shocks or good news. To test the presence of leverage effect in financial data, Nelson (1991) proposed the Exponential Autoregressive Conditional Heteroscedasticity (EGARCH) model. The EGARCH model is given by:

$$\text{EGARCH (1,1): } \ln(h_t) = \alpha_o + \alpha\left|\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}\right| + \gamma\left|\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}\right| + \beta\, lnh_{t-1}$$

Where α is the size parameter measuring the magnitude of shocks, γ is the asymmetric parameter measuring leverage effect, β measures the persistence in conditional volatility irrespectively of shocks to the market. An important feature of the EGARCH model is that there is no need for any non-negativity restrictions.

3.2.6 The Threshold GARCH (TGARCH) model

The threshold Generalized Autoregressive Conditional Heteroscedasticity (TGARCH) model was introduced by Zakoian (1994) and Glosten, Jagannathan, and Runkle (1993). The threshold GARCH (1,1) model specification follows as

$$\text{TGARCH (1,1): } h_t = \alpha_0 + \alpha\varepsilon_{t-1}{}^2 + \gamma d_{t-1}\varepsilon_{t-1}{}^2 + \beta h_{t-1} \qquad d_{t-1} = \begin{cases} 1; if\, \varepsilon t-1 < 0 \\ 0; if\, \varepsilon t-1 \geq 0 \end{cases}$$

Where, $\varepsilon_{t-1} > 0$ (good news) and $\varepsilon_{t-1} < 0$ (bad news) produces a differential effect on conditional variance. Good news has an impact on α while bad news has the impact of ($\alpha+\gamma$). When γ is significant and positive, negative shocks have a larger effect on volatility than positive shocks. Here non-negativity restrictions also need for α, α_0,γ and β like that of standard GARCH (1,1).

3.2.7 The Integrated GARCH (IGARCH) Model

GARCH model with unit root (non-stationary GARCH model) can be regarded as an integrated GARCH or IGARCH model. This model was originally developed by Engel (1982) and Bollerslev (1986). In practice, when the parameters of the GARCH model are restricted to a sum equal to one and ignore the constant term, a standard GARCH model is transformed into an IGARCH model.

$$\text{IGARCH (1,1): } h_t = \alpha\varepsilon_{t-1}{}^2 + (1\text{-}\boldsymbol{\alpha})h_{t-1}$$

Where the additional constraints are $\{\alpha+(1-\alpha)\} = 1$ and $0<\alpha<1$

4. Results and Discussion

The daily closing price of the DSE index is non-stationary. This non-stationary behaviour can be seen from the graph of the daily price which is presented in Figure 1 (Appendix). To make the series stationary, the daily closing price of the DSE index is converted into daily logarithmic return series. This return series is now stationary, which is shown in Figure 2. (Appendix). Descriptive statistics on DSE stock return are summarized in Table 1.

Table 1: Descriptive statistics of the DSE return series

Statistics	Values
Mean	0.000355
Median	0.000215
Maximum	0.036847
Minimum	-0.053585

Standard Deviation	0.008394
Skewness	-0.161429
Kurtosis	6.588151
Jarque – Bera	623.5359
Probability	0.00000
Observations	1153

The mean of the returns is positive, indicating that the price has increased over the period. Statistically, the risk or volatility is the dispersion of the returns. Daily performance (average probability) for the period is 0.000355 and the risk (standard deviation) per day is 0.008394 which reflects the high volatility of the Dhaka Stock Index. The descriptive statistics show that the returns are negatively skewed, indicating that there is a high probability of earning returns that is greater than the mean. The kurtosis of the series is greater than 3 which implies that the return series is fat-tailed and does not follow a normal distribution. The histogram of the return series shown in Figure 3 (Appendix) remains centred at the zero with a slight negative bias (-0.161429) and a kurtosis value of (6.588151) which shows excess kurtosis regarding the standard normal and is further confirmed by the Jarque-Bera test statistics which is significant of 1% level and hence the null hypothesis of normality is rejected.

To detect if the DSE return series is stationary, a unit root test is carried out with the statistical Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test.

Table 2: Stationarity test for the DSE return series

Augmented Dickey-Fuller (ADF) test Ho: Return Series has a unit root		
	Intercept	Trend & Intercept
Test Statistic	-30.50930	-30.51298
Probability	0.0000	0.0000

Kwiatkowsk-Phillips-Schmidt-Shin (KPSS) test Ho: Return Series is stationary		
	Intercept	Trend & Intercept
Test statistic	0.078875	0.047207
1% critical values	0.739000	0.216000

Table 2 shows the presence of unit root in the series tested using ADF and KPSS tests. The p -values of ADF with both “intercept” & “trend and intercept” are less than 0.01 which leads to conclude that the data of the time series for the entire period is stationary. The p-value of the KPSS test with both “intercept” & “trend and intercept” is greater than 0.01 which leads us to conclude that the null hypothesis of “return series is stationary” is accepted at a 1% level. Both the ADF and KPSS test reported in Table 2 confirms that the return series is stationary.

Table 3: Estimation of conditional mean model and testing for ARCH effect

Variables	Coefficients
(Dependent Variable,$\boldsymbol{r_t}$)	
μ	0.000323 (0.000339)
$\boldsymbol{r_{t-1}}$	0.772003*** (0.097197)
$\boldsymbol{\varepsilon_{t-1}}$	-0.685053*** (0.111587)
ARCH Effect (Dependent variable,$\boldsymbol{\varepsilon_t}$)	
Constant	4.55E-05*** (5.00E-06)

ε_{t-1}	0.339794*** (0.339794)
Ho: No ARCH Effect	
F statistic	149.9683***
Probability	0.0000

Standard Errors are in parenthesis. ***,**,* indicates significant at 1%, 5% and 10% level respectively.

The estimation result of the conditional mean model for the logarithmic stock return using the Ordinary Least Squares (OLS) method is presented in Table 3. Since the series was observed to be mean reverting, OLS was applied to estimate the regression. The model was not augmented with further AR and MA terms because they were not significant.

The Heteroscedasticity test is applied to find out the presence of ARCH effect in the residuals of the return series. From Table 3, it is concluded that the F-statistics is highly significant. Since the p-value is less than 0.01, the null hypothesis of "no ARCH effect" is rejected at a 1% level which confirms the presence of ARCH effects in the residuals of time series models in the returns.

The volatility clustering of return series for the study period from 27 January 2013 to 06 November 2017 is also been observed (Figure 4 (Appendix)). It shows that the period of low volatility tends to be followed by a period of low volatility for a prolonged period and the period of high volatility is followed by a period of high volatility for a prolonged period, which means the volatility is clustering and the return series vary around the constant mean, but the variance is changing with time. Hence, these results suggest the estimation of GARCH family models.

Since the ARCH effect is detected in the model, GARCH family model is therefore used for modelling the volatility of return series in the Dhaka Stock Exchange Market.

Table 4: Estimation results of GARCH (1,1) model with normal and student-t distribution

Coefficients	GARCH (1,1) with normal distribution	GARCH (1,1) with student's t distribution
μ	0.000562** (0.000221)	0.000525** (0.000230)
p_1	0.624279*** (0.109187)	0.641317*** (0.104261)
p_2	-0.488288*** (0.130069)	-0.500652*** (0.123571)
α_0	7.04E-07** (3.09E-07)	7.24E-07*** (3.30E-07)
α	0.153107*** (0.020740)	0.152057*** (0.022947)
β	0.844343*** (0.019438)	0.844678*** (0.021246
α + β	0.99745	0.996736
Log-likelihood	4101.584	4102.530
ARCH-LM test for heteroscedasticity		
ARCH-LM test statistics	0.0540	0.0586
Prob, chi-square (1)	0.0540	0.0585

Standard Errors are in parenthesis. ***,**,* indicates significant at 1%, 5% and 10% level respectively.

The GARCH (1,1), model is applied for the purpose of capturing variance dynamics. Table 4 shows the estimation results. Here, it is evident that the autoregressive coefficients of this lagged dependent variable for the mean equation p_1 and MA (1) coefficient p_2 for the mean equation are statistically significant at 1% level.

The coefficients of the GARCH components (α and β) are positive and statistically significant at a 1% level (Table 4). In the conditional variance equation, the estimated β coefficient shows that the volatility is persistent. The sum of these parameters (α and β) is 0.99745, which is close to unity indicating that the stock will persist to many future periods. Further, ARCH-LM test is employed to check ARCH effect in residuals and from the result, it is inferred that the p>0.05, which led to conclude that the null hypothesis of "no ARCH effect" is accepted. In other words, the test statistics do not support any additional ARCH effect remaining in the residuals of the models, which implies that the variance equation is well specified for the market.

Table 5: Estimation results of the APARCH (1,1) model with normal and student t distribution

Coefficients	APARCH (1,1) with normal distribution	APARCH (1,1) with student's t distribution
μ	0.000311 (0.000238)	0.000299 (0.000242)
p_1	0.688410*** (0.093600)	0.692550*** (0.091479)
p_2	-0.553730*** (0.113572)	-0.555000*** (0.111034)
α_0	2.71E-06 (5.94E-06)	2.96E-06 (6.79E-06)
α	0.147482*** (0.020624)	0.148116*** (0.021964)
γ	0.179302*** (063007)	0.178892*** (0.066680)
d̂	1.743423*** (0.425484)	1.732061*** (0.445515)
β	0.855087*** (0.425484)	0.854436*** (0.022750)
α + β	1.002569	1.002552
Log-likelihood	4107.561	4107.990
ARCH-LM test for Heteroscedasticity		
ARCH-LM test statistics	0.0430	0.0425
Prob.chi-square (1)	0.0430	0.0425

Standard Errors are in parenthesis. ***,**,* indicates significant at 1%, 5% and 10% level respectively.

The results from the APARCH model is presented in Table 5, and it is evident that the autoregressive coefficient of the lagged dependent variable ρ_1 for the mean equation and MA (1) coefficient ρ_2 are statistically significant at the 1% level. The coefficients α and β are again found to be positive and statistically significant at 1% level, having a sum greater than 1 for both distributions. The coefficient d̂ is positive and significant and not equal to 2 which implies that it is not a standard GARCH model (Ding et al., 1993). The significance and sign of the coefficient γ determine the leverage effect.

The positive significant value of γ indicates the existence of a leverage effect where negative past values of ε_t increase volatility more than positive past values of the same magnitude. Table 5 also shows, the leverage effect is positive and significant. Thus, an asymmetric volatility effect exists for stock returns. The coefficients of the ARCH & GARCH sum to more than 1 and the constant term in the variance equation of the APARCH model using both normal and student t distribution are not statistically different from 0. Thus, as the necessary non-negativity restrictions have not been satisfied, so the variance equation is not well behaved.

To capture the asymmetric effect in the return series and eliminate the problem of non-negativity restrictions, we estimate an EGARCH model. Table 6 shows the estimation result of the EGARCH (1,1) model using both normal and student t distribution.

Table 6: Estimation results of EGARCH model with normal and student's t distribution

Coefficients	EGARCH with Normal distribution	EGARCH with student's T distribution
μ	0.000232 (0.000229)	0.000225 (0.000233)
p_1	0.701056*** (0.91658)	0.696559*** (0.091011)
p_2	-0.574259*** (0.111412)	0.564811*** (0.110250)
α_0	-0.422221*** (0.079043)	-0.432761*** (0.086100)
α	0.274410*** (0.031330)	0.276309*** (0.034090)
γ	-0.053319*** (0.017888)	-0.053416*** (0.019448)
β	0.979282*** (0.006898)	0.978365*** (0.007527)
α + β	1.253692	1.254674
Log-likelihood	4106.421	4107.027
ARCH-LM test for Heteroscedasticity		
ARCH-LM test statistics	0.0766	0.0740
Prob. Chi-square (1)	0.0765	0.0739

Standard Errors are in parenthesis. ***,**,* indicates significant at 1%, 5% and 10% level respectively.

The sum of ARCH(α) & GARCH (β) is greater than one (Table 6), reporting that the conditional variance is explosive. Here in the variance equation γ is popularly known as the "asymmetry parameter" and a represents the "size parameter". The estimated coefficients are statistically significant at a 1% level. The leverage coefficient, γ is negative and statistically significant at 1% level, exhibiting the leverage effect in return during the study period. The analysis reveals that there is a negative correlation between past return and future return. Hence, EGARCH (1,1) model supports the presence of leverage effect on the DSE return series. Finally, the ARCH-LM test statistics reveals that the null hypothesis of no heteroscedasticity in the residuals is accepted.

An alternative model to test for asymmetric volatility in the DSE return is TGARCH. Table 7 shows the estimation results of TGARCH using both normal and student's t distribution.

Table 7: Estimation results of TGARCH model with normal and student's t distribution

Coefficients	TGARCH with normal distribution	TGARCH with student's t distribution
μ	0.000332 (0.000237)	0.000321 (0.000241)
p_1	0.680906*** (0.093303)	0.686704*** (0.091275)
p_2	-0.544337*** (0.113327)	-0.547455*** (0.110726)
α_0	7.21E-07** (2.86E-07)	7.41E-o7** (3.04E-07)
α	0.099293*** (0.023211)	0.099744*** (0.024485)
γ	0.1000258*** (0.031708	0.100312*** (0.33991)
β	0.848170*** (0.019109	0.847306*** (0.02081

$\alpha + \beta$	0.947463	0.947048
Log-likelihood	4107.347	4107.768
ARCH-LM test for heteroscedasticity		
ARCH-LM test statistics	0.1072	0.1065
Prob. chi-square (1)	0.1072	0.1065

Standard Errors are in parenthesis. ***,**,* indicates significant at 1%, 5% and 10% level respectively.

Table 7 shows that the coefficient of leverage effect is positive and significant at a 1% level, which implies that a negative shock or bad news has greater volatility on the condition variance than the positive shocks or good news. The diagnostic test is performed to test whether there is an ARCH effect. The ARCH-LM test statistics for TARCH (1,1) model show that there are no additional ARCH effects in the residuals of the model.

Since it has been found that the sum of the persistence parameters exceeds 1 for some models, it can be deduced that the variance might not be well behaved in such models. Therefore, it would be interesting to model volatility clustering with such models while imposing restrictions on the persistence parameters. Our popular restriction on the "persistent parameters sum up to unit". Thus, the estimation of GARCH models with this restriction leads to the IGARCH model. Table 8 shows the estimation result of IGARCH (1,1) using both normal and student t distribution.

Table 8: Estimation results of IGARCH (1,1) model with normal and student's t distribution

Coefficients	IGARCH with normal distribution	IGARCH with student's t distribution
μ	0.000540*** (0.000166)	0.000512*** (0.000181)
p_1	0.634229*** (0.095513)	0.652534*** (0.090678)
p_2	-0.502716*** (0.113702)	-0.513506*** (0.107578)
α	0.115773*** (0.010529)	0.114814*** (0.011925)
1-α	0.884227*** (0.010529)	0.885186*** (0.011925)
Log-likelihood	4092.622	4094.235
ARCH-LM test for heteroscedasticity		
ARCH-LM test statistics	0.1362	0.1495
Prob. chi square (1)	0.1360	0.1492

Standard Errors are in parenthesis. ***,**,* indicates significant at 1%, 5% and 10% level respectively.

The IGARCH (1,1) model successfully overcomes all of the diagnostic tests for both normal and student's t distribution, is used as the error distribution (Table 8). There is no additional ARCH effect and no autocorrelation detected in the regular and squared residuals. Finally, the evidence indicates that all of the models (GARCH, EGARCH, TGARCH & IGARCH without APARCH) satisfy the required diagnostic standard under both normal distributions as well as student's t distribution as the assumption for the residuals.

5. Volatility Forecasting

5.1 In-sample estimation performance

To find out whether the accuracy of volatility forecasting among the five models (GARCH, APARCH, EGARCH, TGARCH & IGARCH) varied with distributional assumptions, we compared the log-likelihood, Schwarz Bayesian Information Criterion (BIC), and Akaike Information Criterion (AIC) for all those models, estimating for the whole sample observations under normal and student's t distribution. Table 9 shows the results. The

performance of each model improved under the student's t distribution. The reason behind that log-likelihood increased while both AIC and BIC decreased compared to the normal distributional assumptions applied for the residuals. Considering the student's t distribution for the residuals, a comparison of log-likelihood indicates that among all the models used for in-sample estimation, ARMA (1,1)-APARCH (1,1) is the best since it has maximum likelihood and a comparison of BIC and AIC indicators that among all the models used for in-sample estimation, ARMA (1,1)-TGARCH (1,1) is the best since it has lowered BIC and AIC. However, the ARMA (1,1)-APARCH (1,1) model is more problematic since it can't overcome any of the diagnostic tests, that is, there exist additional ARCH effects and autocorrelation problem in the residuals. Without APARCH (1,1), the other models successfully overcome all the diagnostic tests. Without APARCH (1,1), a comparison of all 3 indicators indicates that ARMA (1,1)-TGARCH (1,1) is the best since it has maximum likelihood and minimum BIC and AIC.

Table 9: Comparisons of models in within-sample estimation performance

Normal Distribution			
Models	Log-likelihood	SBC	AIC
ARMA (1,1)-GARCH (1,1)	4101.584	-7.084090	-7.110389
ARMA (1,1)-APARCH (1,1)	4107.561	-7.082229	-7.117293
ARMA (1,1)-EGARCH (1,1)	4106.421	-7.086368	-7.117050
ARMA (1,1)-TGARCH (1,1)	4107.347	-7.087977	-7.118659
ARMA (1,1)-IGARCH (1,1)	4092.622	-7.080771	-7.098303
Student's t distribution			
ARMA (1,1)-GARCH (1,1)	4102.530	-7.079614	-7.110295
ARMA (1,1)-APARCH (1,1)	4107.990	-7.076855	-7.116303
ARMA (1,1)-EGARCH (1,1)	4107.027	-7.081301	-7.116366
ARMA (1,1)-TGARCH (1,1)	4107.768	-7.082589	-7.117653
ARMA (1,1)-IGARCH (1,1)	4094.235	-7.077451	-7.099367

5.2 Out of sample forecasting performance

The accuracy of a forecasting model is its out-of-sample performance, which measures its performance in "real-time." Out-of-sample forecasting is a stepwise method for stimulating real-time performance. To find the out-of-sample forecasting accuracy of the models, we created a pseudo sample using the period from January 27, 2013, to December 31, 2016. Then we estimated the variance in stock returns for the period January 01, 2017, to November 6, 2017. The forecasting performance of the model was compared based on four different indicators under normal and student t distribution. Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percent Error (MAPE), and Theil inequality (TI).

Table 10: Comparisons of models in out-of-sample forecasting performance

Normal Distribution				
Models	RMSE	MAE	MAPE	TI
ARMA (1,1) GARCH (1,1)	0.005847	0.004473	133.5426	0.806878
ARMA (1,1)-APARCH (1,1)	0.005855	0.004495	137.4733	0.804234
ARMA (1,1)-EGARCH (1,1)	0.005871	0.004509	135.5386	0.817928

ARMA (1,1)-TGARCH (1,1)	0.005855	0.004495	137.5431	0.804392
ARMA (1,1)-IGARCH (1,1)	0.005847	0.004473	133.5818	0.807652
Student's t Distribution				
ARMA (1,1)-GARCH (1,1)	0.005844	0.004474	132.6207	0.802523
ARMA (1,1)-APARCH (1,1)	0.005855	0.004496	139.4704	0.802119
ARMA (1,1)-EGARCH (1,1)	0.005869	0.004508	137.0148	0.814867
ARMA (1,1)-TGARCH (1,1)	0.005855	0.004497	139.5167	0.802257
ARMA (1,1)-IGARCH (1,1)	0.005843	0.004473	133.1608	0.800971

Table 10 shows the comparative forecasting accuracy of the different models. For ARMA (1,1)-GARCH (1,1) model, RMSE, MAPE, and TI decreased while when changing the distributional assumption. Thus, this model's forecasting accuracy was improved under the student's t distribution. Likewise, the forecasting accuracy of ARMA (1,1)-IGARCH (1,1) was improved under student's t distribution since all the four indicators decreased. For ARMA (1,1)-APARCH (1,1) model, MAPE and TI decreased while RMSE remained constant, and MAE increased under student's t distribution. Thus, this model's forecasting accuracy was improved under the student's t distribution.

For the ARMA (1,1)-EGARCH (1,1) model, RMSE, MAE, and TI decreased while MAPE increased when changing distribution assumption. Thus, this model's forecasting accuracy was improved under the student's t distribution. For ARMA (1,1)-TGARCH (1,1) model which had the best in-sample estimation accuracy under student's t distribution showed lower accuracy when such distribution was used for out of sample forecasting since two of the four indicators increased, one (RMSE) constant and another TI decreased. Without ARMA (1,1)-TGARCH (1,1) model, the rest of the model's forecasting accuracy was improved under the student's t distribution assumption. Considering the student's t distribution for residuals, a comparison of RMSE, MAE, MAPE, and TI indicate that ARMA (1,1)-IGARCH (1,1) is the best for out-of-sample forecasting.

6. Conclusion

It is well known that the capital market is the engine of growth for an economy since it contributes to a country's economic growth through the creation of wealth. Since the stock market attracts investment, stock return volatility will have a significant effect on investment and consequently on the whole economy. For this reason, it is very important to properly model and forecast stock return volatility. In this study, the volatility of the Dhaka Stock Exchange (DSE) return is tested using the symmetric and asymmetric GARCH models. The Dhaka Stock Exchange (DSE) is the country's leading stock exchange. The daily closing prices of DSE for five years are collected and modelled using five different GARCH models that capture the volatility clustering and leverage effect for the study period i.e., from 27 January 2013 to 06 November 2017. To estimate volatility models, the leptokurtic fat-tailed nature of the stock return series usually provides a reason for using skewed distribution such as student's t distribution. The main objective was on whether the same result exists in the stock return and whether the results were improved with student's t distribution. In particular, the volatility dynamics of the daily stock return of DSE are modelled using GARCH models such as GARCH, APARCH, EGARCH, TGARCH, and IGARCH. The findings from the models under the normal distribution assumption for residuals were compared to the student's t distribution. All models successfully passed the diagnostic tests under both distribution assumptions for residuals only except APARCH (1,1) model.

In the sample, estimation accuracy was improved when the student's t distribution was used. For modelling in-sample volatility dynamics, ARMA (1,1)-T-GARCH (1,1) was found to be the most accurate model. We further tried to find the appropriate model for out-of-sample forecasting. In the case of out-of-sample forecasting accuracy, ARMA (1,1)-I-GARCH (1,1) is considered the best compared to the other three models since MRSE, MAE, and

TI were lower than the other models under student's t distribution. Since an investor is always interested in making easy and riskless money, he or she should take into consideration all other factors before investing in the stock market. Therefore, valuations in such markets should be dealt with carefully by considering conditional variance. The limitation of the study is that the study used only 5 years' data of DSE. Future researchers might study to what extent volatility forecasts based on the present models are useful in the context of structural break, the causes of it and how it can be considered in the volatility equations.

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Appendix

Figure 1: Daily closing price of DSE

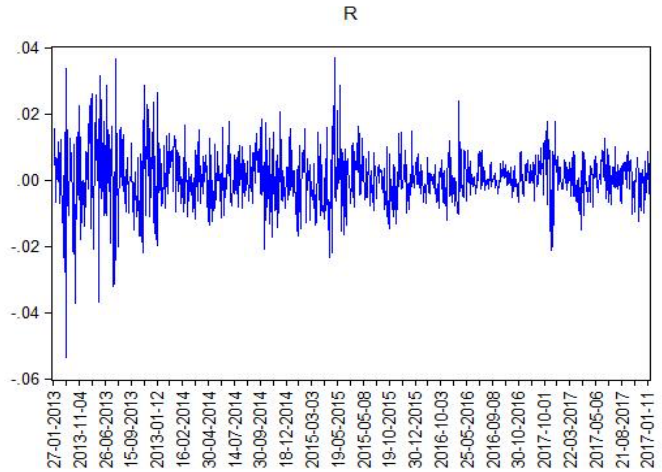

Figure 2: Return series

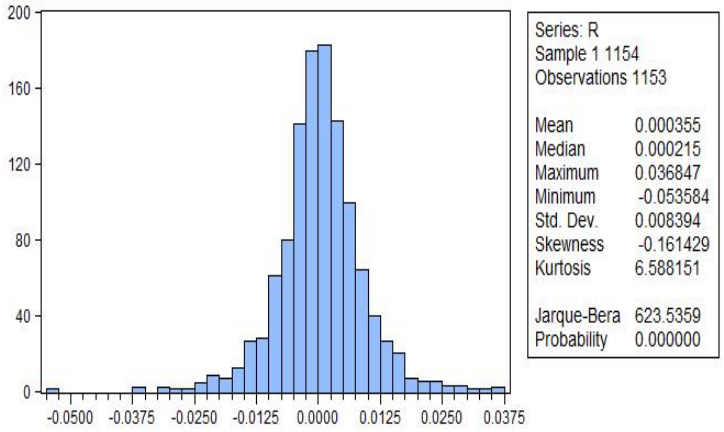

Figure 3: Histogram of return series

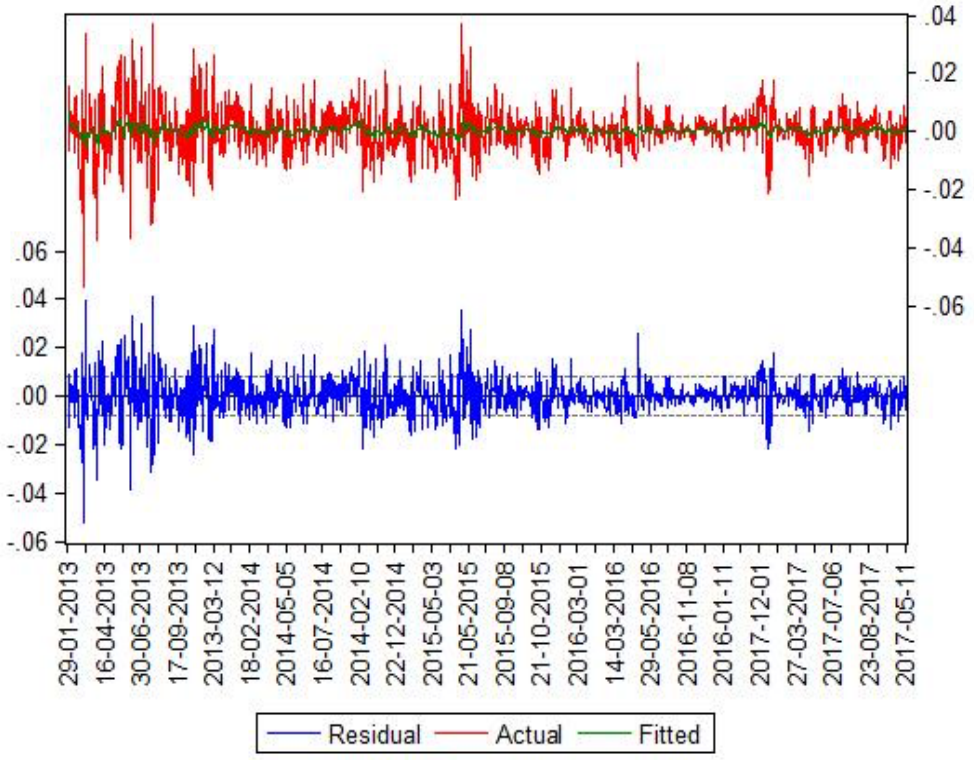

Figure 4: Volatility of return series

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The Relationship Between Foreign Direct Investment Oriented Economic Growth in Uganda: An Empirical Study Based on VAR Model

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Abstract
The purpose of this paper is to investigate the relationship between Foreign Direct Investment (FDI) and Economic growth as measured by Gross Domestic Product (GDP) over Uganda, from 1980-2018. Vector Autoregressive Model (VAR) and Granger Causality test were used. The results show thatlag 1 is the optimal lag hence bivariate VAR (1) model was used. GDP and FDI exhibits long-term equilibrium since the two-time series are cointegrated in long run. The causality test indicates that there exists a unilateral relationship between FDI and GDP, and FDI causes GDP growth and not vice versa. Understanding these causality links can help in future forecasting of Uganda's economic growth.

Keywords: Economic Growth, Foreign Direct Investment, Vector Autoregression Model, Uganda

1. Introduction

According to Organization for Economic Cooperation and Development (OECD, 2011), Foreign Direct Investment is a cross-border investment that is made by a resident in one economy (the direct investor) with the aim of establishing a lasting interest in an enterprise (the direct investment enterprise) that resides in another country other than that of the direct investor. Foreign direct investment has been associated with economic growth in many developing countries by stimulating capital growth (Borgean, 2015). Particularly, this occurs in countries that have high per capita income, high trade openness, developed financial systems, and an educated labor force (OECD, 2002; Alfaro et al., 2004; Busse and Groizard, 2008; Lipsey, 2010). However, some researcher argues that FDI can reduce capital accumulation when foreigner investors claim scarce resources. Additionally, knowledge spillover is falsified as many domestic firms are unable to learn from multinational companies (Herzer, 2012). Due to a lack of consensus on the impacts of FDI on economic growth, there is a need to revisit individual countries. Based on that, this study aims at assessing the link between GDP and inwards inflows of FDI in Uganda.

There are various types of FDI based on; target market, strategic motives, internal structure, industry, way of growth, ownership, and others. The determinant factors are partly overlapping hence reflecting the multidimensional nature of the investment decision. However, on most occasions, investment is not usually made based on one specific motive, but a combination of various motives (Eiteman et al., 1992). Notably, Outwards and Inwards FDI flows are the most prominent types of FDI. Outward FDI refers to the investments made by a certain country into other foreign markets while inward foreign direct investment is the investment made by a foreign company in a specific country (OECD, 2011).

There is a dearth of comprehensive current knowledge about the nexus between FDI, and economic growth in Uganda. The objective of this paper is to assess the trend and stationarity of FDI and GDP over Uganda from 1980-2018, establish the empirical relationship between FDI and Economic growth, then determine the causality link between the two. This paper contributes significantly to the body of literature on FDI and economic growth in one of the developing countries in Africa.

This research work aims at answering the following scientific questions:

- What is the optimal lag length suitable for the bivariate VAR model build between FDI and GDP over Uganda?
- Does the FDI and GDP time series exhibit stationary?
- Does FDI and GDP over Uganda exhibit causality links and in which direction?

The paper is arranged as follows; Section 2 describes the previous studies related to the current topics abroad and at home country. Then section 3 describes the types of the dataset used, their stationarity characteristics, and the Vector autoregressive model. The results together with discussions are shown in section 4. In section 5, the conclusion and recommendations are drawn.

2. Literature Review

There exists a significant body of literature on the relationship between FDI and economic growth. Nevertheless, there is a significant lack of consensus on the relationship between FDI and GDP among countries. Hence the essence of reviewing the existing literature review and identifying the existing literature gaps.

2.1. Impacts of the Inward FDI on Economic growth of the host country

The impacts of FDI on economic growth differ from one country to another and from developed to developing world. Over the European Union countries, FDI is negatively correlated to GDP and the key determinant of the economic growth over EU is caused by the FDI spillover effect (Mencinger, 2003). Over the United Arab countries, for FDI to have significant positive impacts on GDP, there must be an interaction with the financial parameters at a certain threshold and favorable FDI policies (Omran and Bolbol, 2003). Over Sub-Sahara Africa, based on panel data collected over a 24-year cycle (1975-1999), FDI is associated with economic growth over the region. According to Adofu and Ilemona (2009), FDI has a huge effect on the Nigerian economic growth rate.

Kojrajaras, (2010) identified that FDI led to economic growth through technology transfer, which is directly dependent on the recipient countries' economic situation. Further, human resources, trade openness, and infrastructure construction in FDI zones are links to be an economic growth booster. According to Kojrajaras, (2010), FDI can only have a positive effect on economic development if the countries have a favorable political and economic condition. Other studies reinforce the case by preserving the outcomes of an unsuitable condition like political uncertainty, which reduces international companies tendency to invest directly in a specific country. According to Mangir et al. (2012), most developed countries lack sufficient capital to create savings due to low national income. As a result, FDI fills the void between investment needs and domestic capital in host countries (UNCTAD, 2013).

Other economists contest that high FDI'sproductivity on economic growth does not only results from human resources but also from infrastructure improvement. For instance, Hermes and Lensink, (2003), found out that, the documented positive impacts of FDI on economic growth results from the empowerment of the host country's financial system. Additionally, the domestic financial sector enhances the equitable distribution of capital hence attracting FDI. Conclusively, these findings strongly indicate that FDI will help fuel economic growth in the appropriate situations.

2.2. The Causality Links

There exists controversy about the causality link between FDI and GDP. Some of the studies assessing the causality link between FDI and GDP indicate the presence of a unidirectional causality link which is from FDI to GDP (Katircioglu and Naraliyeva, 2006; Tang et al., 2008; Ghazali, 2010; Majagaiya and Qingliang, 2010). Another study by Frimpong and Oteng-Abayie, (2006) showed that there is no causality link between FDI and growth (Frimpong and Oteng-Abayie, 2006). Notably, the causality link is enhanced by the presence of higher trade openness, low acquisition of aids, and low-income level of the host county (Dhakal et al.,2010).

2.3 Cointegration Related studies

The existence of a long-run relationship between FDI and GDP has been investigated by several studies using the Cointegration test. Numerous studies have reported the existence of a *positive long-run relationship between FDI and GDP although this impact is heterogenous(Cuadros et al.,2004; Fedderke and Romm, 2006; Liu et al., 2009). These previous studies, despite exhibiting consensus on the co-integration links, don't provide the determinants of this observed heterogeneity. Using a higher panel cointegration test over 31 developing countries using panel data spanning from 1970-2000, Hansen and Rand (2006), reported the existence of cointegration between FDI and GDP. Additionally, the study also documented differential impacts of FDI on economic growth among the countries investigated. The FDI depicted a positive long-run effect on GDP, however, GDP did not have long-run impacts on FDI (Hansen and Rand, 2006).*

3. Data and Methodology

3.1. Data

The study uses 38 years period of data from 1982-2019 obtained from the World Bank database. The data is archived on; https://data.worldbank.org/country/Uganda. The viability of the data has been checked through the IFS. In this study, Gross domestic product GDP is used as a proxy for economic growth. Basically, GDP reflects the economic size of a country and it's a major factor that foreign investors consider before investing in a certain country (Aseidu, 2006). GDP measures the total value of all goods and services produced in a country over a specific time in dollars. The GDP growth (annual %) was used to show the annual economic growth of Uganda.

FDI refers to the sum of equity capital, reinvestment of earnings, and other long and short-term capital as shown in the balance of payments. The data for FDI net inflows (% GDP) will be used in this category.

3.2. Methodology

3.2.1 Augmented Dickey-Fuller test (ADF)

Augmented Dickey-Fuller (ADF) test is used to assess the stationarity of a time series. It is crucial to test the presence of unit root in a time series since it can lead to biased results when building empirical models. The ADF is based on the following hypothesis;
The null hypothesis (H_0) states there is the presence of unit root hence the time series is non-stationary.
The Alternative hypothesis (H_1) there is no unit root hence the time series is stationary
The ADF test adopted in this study uses three types of models to test unit-roots on time series and on their first differencedseries. The three models adopted can be expressed mathematically as;

a) The model without constant and trend:

$$\Delta y_t = \alpha y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-1} + \varepsilon_t \quad (1)$$

b) The model with constant and no trend

$$\Delta y_t = \gamma_0 + \alpha y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-1} + \varepsilon_t \quad (2)$$

c) The model with constant and trend

$$\Delta y_t = \gamma_0 + \gamma_1 t + \alpha y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-1} + \varepsilon_t \quad (3)$$

$y_t$denote any time series i.e. GDP, and FDI, $\Delta y_t = y_t - y_{t-1}$is the first difference of the series (y_t), γ, α, and β represents the coefficients of the model where else $\varepsilon_t$is the error term in the regression model.

3.2.2 Vector Autoregression Model (VAR)

This type of regression model is used to forecast the current and future value of a variable by using the independent variable and other regressors at different lags. This approach has been used in previous similar studies (York, 2012; Ocaya et al., 2013). The general format of the model with multiple time series is;

$$GDP_t = \delta + \sum_{i=1}^{p} \alpha_{1i}\, GDP_{t-i} + \sum_{j=1}^{p} \beta_{1j}\, FDI_{t-j} + \varepsilon_{1t} \quad (4)$$

$$FDI_t = \theta + \sum_{j=1}^{p} \alpha_{2j}\, GDP_{t-j} + \sum_{i=1}^{p} \beta_{2i}\, FDI_{t-i} + \varepsilon_{2t} \quad (5)$$

where δ and θ *are the* intercepts for the two models whileα_{1i} ,β_1 , α_{2j} and β_{2i} are the coefficients of the regressors at lag 1.

GDP_trepresents the gross domestic product (constant 2010 US$), while FDI_t is the foreign direct investment net inflows expressed as a percentage of GDP_t,t (t =1, 2,38) is the length of the study period and *p* represents equal lags for GDP and FDI. The optimal lag for this dataset was one. Theε_{1t} , ε_{2t} are the white noise/error term in the model at the time (t).

The following assumptions are constructed in building this model;

$$E(\varepsilon_{1t}) = E(\varepsilon_{2t}) = 0 \quad (6)$$

$$E(\varepsilon_{1t}\varepsilon_{2t}) = \sum = \begin{pmatrix} var(\varepsilon_{1t}) & cov(\varepsilon_{1t}\varepsilon_{2t}) \\ cov(\varepsilon_{1t}\varepsilon_{2t}) & var(\varepsilon_{1t}) \end{pmatrix} \quad (7)$$

$$E(\varepsilon_{1t}\varepsilon_{2t}) = {\sigma_i}^2 \; for \; i = 1{,}2 \quad (8)$$

$$E(\varepsilon_{1t}\varepsilon_{2t}) = 0 \; for \; t \neq \tau \quad (9)$$

3.2.3 Granger Causality test

The statistical Granger causality test (Granger, 1969) that is based on prediction was utilized to establish the direction of causation between the time series of the two parameters investigated. The relationship is based on the following hypothesis;

The null hypothesis (H_0) states that a variable X_i does not granger-cause a variable Y_i.

The Alternative hypothesis (H_1) states that a variable X_i granger-cause a variable Y_i

The alternative hypothesis signifies that X_i contains past information of Y_i hence can be skillfully to predict the future variation of Y_i and not vise versa.

3.2.4 Engle-Granger tests and Johansen cointegration test

These above-mentioned two statistical methods were used to test the presence of cointegration in the time series. This step is crucial to test because if two or more non-stationary time series are integrated, it means they cannot diverge in long run. Thus, if used together in the empirical model, they bring spurious casualties. The variance inflation factor (*vif*) test is used to test the autocorrelation among the regressors (Multicollinearity) effect. The results show that none of the variables exhibited a significant correlation with each other as depicted by *vif*<1.5.

4. Results and Discussion

4.1. Time series analysis

To capture the variability of GDP annual growth and FDI inflow as a percentage of GDP over Uganda, time series analysis was used. Results show that the Gross domestic product of Uganda has been increasing at a rate of 0.06% despite fluctuating from one year to another (Fig.1). Uganda experienced an economic recession in 1985 as witnessed a documented negative GDP growth (Fig.1). This can be attributed to unfavorable government policy and the previous expropriations of foreign investors in Uganda.

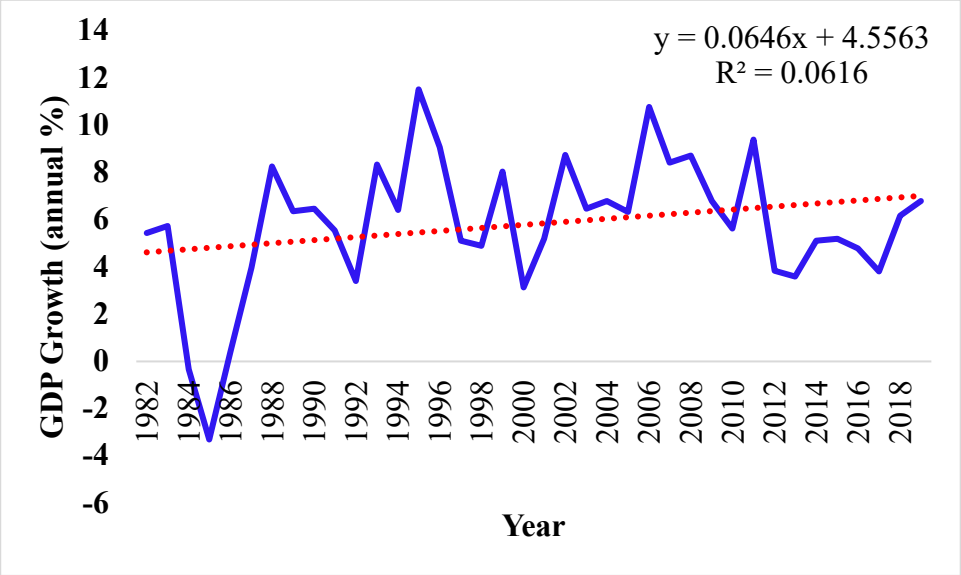

Figure 1:The trend of GDP over Uganda

The FDI inflows over Uganda have been expressed as the percentage of GDP has been fluctuating through the study period. Notably, some years like 1983, and 1984 documented the negative contribution of FDI to GDP over Uganda. This can be attributed to unfavorable government conditions that did not favor FDI. For instance, the bad governance of Iddi Amin that expelled the British-Asians from Uganda and expropriation of their assets and businesses hence crumbling industries. The post impacts of these events are evidenced in Uganda and it has taken time to rejuvenate the FDI inflows. Nevertheless, the FDI inflows over Uganda have been increasing at a rate of 0.07% every year.

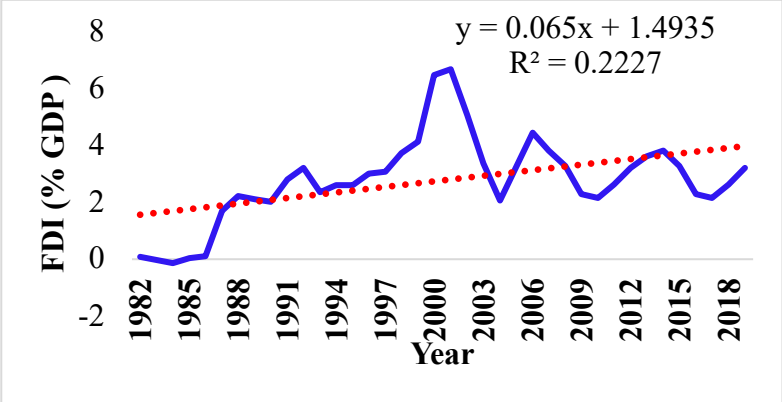

Figure 2: The trend of FDI (as % of GDI) over Uganda

After 1992, the FDI inflows contribution to UgandanGDP has increased although fluctuating from one year to another. This increase has been linked to government reforms and policies aiming at attracting FDI inflows in Uganda. They include; foreign exchange rates reform, liberalization of the existing legal framework like naturalization, simplified administrative procedures, investment promotion policies that enhance macroeconomics stability, and formation of the Investment Code 1991 that controls investment in Uganda (UNCTAD, 1998). Additionally, the discovery of oil and minerals like cobalt, gold, and the insertion of numerous tax incentives in the 2008/2009 budget has led to a tremendous increase in the current uptrend contribution of FDI t the economic growth of Uganda.

4.2. Stationarity test

Before building the VAR model, it is important to make sure the time series are stationary. In this case, Augmented Dickey-Fuller (ADF) (1979) test was used to evaluate the unit root in the time series. The results show that GDP exhibited unit root, but upon first difference, the time series became stationary (Table 1). The FDI time series was stationary even before differencing but all the time series had to be first differenced before proceeding to the subsequent analysis.

Table 1:Stationarity test results

Variables	***No Constant & no trend***	**Constant & no trend**	**Constant & trend**	**Conclusion**
FDI	0.465	-2.18	-2.0	Non-Stationary
GDP	2.66	0.99	-2.54	Non-Stationary
First Difference				
FDI	-4.13*	-4.11*	-4.11*	Stationary
GDP	-5.11*	-6.4*	-6.35	Stationary

Notably: ** signifies significance level at 95%.

4.3 Selection of Optimal Lag to be used in the modeling

Different statistical model selection; Akaike Information Criterion (AIC) (Akaike,1970), Hannan-Quinn information criterion(HQ), and Schwarz information criterion (SC) were used in assessing the optimal lag to be used in the construction of the VAR model. The selected lag is supposed to be the one that accounts for serial correlation in the residuals and reduces the loss of degrees of freedom. The lower the value of the criteria, the better the performance of the model at that lag. The results show thatall the models consensually agree that lag one is the optimal lag (Table 2). Therefore, the VAR model built is of the form VAR (1).

Table 2: Identification of the optimal lag

Lag	1	2	3	4
AIC(n)	39.3*	39.3	39.44	39.63
HQ(n)	39.4*	39.5	39.70	39.96
SC(n)	39.8*	40.0	40.34	0.68

* Selected lag according to AIC, HQ, and SB criteria.

The abbreviations in Table 2 indicate;
AIC: Akaike information criterion
HQ: Hannan-Quinn information criterion
SC: Schwarz information criterion

4.4 Model Estimation

Based on the optimal lag, the researcher built the Vector autoregressive model. The results show that lag of GDP by one year is significant in forecasting future trends in GDP.

Table 3: VAR model results

	Dependent variable:	
	y	
	(1)	(2)
GDP.l1	0.885***	117,262,352.000***
	(0.091)	(40,765,897.000)
FDI.l1	0.000	1.044***
	(0.000)	(0.006)
Observations	37	37
R2	0.929	1.000
Adjusted R2	0.925	1.000
Residual Std. Error (df = 35)	0.792	354,639,050.000
F Statistic (df = 2; 35)	230.352***	65,587.280***
Note:	*p<0.1; **p<0.05; ***p<0.01	

4.5 Granger Causality test

To discern the existence of a relationship between GDP and FDI and its direction, the Granger causality test is used. The results show that there exists a statistically significant unidirectional relationship between FDI and GDP. This guided the researcher in accepting the alternative hypothesis and reject the null hypothesis that FDI does not granger-cause GDP. This unilateral relation runs from FDI to GDP and not vice versa (Table 4). Further analysis shows that GDP does not granger cause FDI as the p-value is 0.7 hence the researcher is not able to reject the null hypothesis even at a 90% significance level (Table 4). Conclusively, the positive one-direction causation effects from FDI to GDP depict that an increase in FDI inflows increases the economic growth of Uganda.

Table 4: The Granger causality test results

Statement	F	Pr(>F)	Decision
GDP do not Granger-cause FDI	0.1438	0.7069	Accept the null hypothesis
FDI do not Granger-cause GDP	7.7086	0.008873 **	Reject the null hypothesis and accept the alternative hypothesis

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

5. Conclusion and Recommendations

This paper aims at discerning the links between economic growth as determined by gross Domestic Products and Foreign Direct Investment (FDI) over Uganda from 1982-2019. Several statistical measures were used, and they include, time series analysis, VAR, Cointegration test, and Granger causality test.The results show that the FDI and GDP exhibit non-stationary at lag zero, but the time series become stationary at lag 1 which was identified as the optimal lag. Future analysis shows that the previous GDP has a significant influence in determining the next year's GDP. The causality links show that there exists a unilateral relationship between FDI and GDP and FDI granger-cause GDP and not vice versa.

The results of this study are crucial to policymakers and they contribute significantly to the body of literature review on the links between GDP and FDI.

Conflict of interest

The authors wish to declare that there is no conflict of interest whosever.

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Theoretical Framework for Research on the Factors Affecting the Moral Hazard in Banking Operation

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Abstract
There are many types of risks related to banking operations such as credit risk, interest risk, operational risk. Problems related to moral hazard have led to considerable setbacks for the economy in general and banking system in particular. Besides, moral hazard is an economic and financial terminology and is used to denote the risk generated from the deterioration in ethical conduct. Hence, authors aim at reviewing theoretical framework for determinants impacting moral hazard in banks.

Keywords: Moral Hazard, Banking Operation, Theory of Planned Behaviour, Agency Theory, Attribution Theory, Theory of Reasoned Action

1. Introduction

In Vietnam as well as around the globe, many issues related to moral hazard have led to considerable setbacks for the economy. There are many types of risks related to banking operations such as credit risk, interest risk, operational risk. Besides, moral hazard is an economic and financial terminology and is used to denote the risk generated from the deterioration in ethical conduct. In 1995, Nick Leeson, 28 years old, a staff member in Singapore generated a loss of 1.4 billion USD because of his speculative investment in futures contracts. In September 2016, Wells Fargo bank in the US discovered more than 1.5 million unauthentic bank accounts created by its staff members in the period between 2011 and 2015 to illegitimately earn millions of USD of fees from customers. In Vietnam, in recent years, the authorities have unveiled wrongdoings of bankers, leading to losses that amount to billions of VND, such as lending without collaterals that are registered for secured transactions, lending customers who do not meet standards of borrowing, lenient supervision of covenants for loaning, inappropriate categorization of debt, lending customers with unjustified use of loan, lack of provisioning or illegitimate provisioning, lending customers with credit rationing,... It is very difficult to discern moral hazards in banking operations. However, moral hazard may entail serious consequences such as: reducing the effectiveness

of banking operations, generating considerable losses in assets, which may result in bankruptcy, customers suffering from considerable financial losses resulting from the downfall of a bank… Therefore, many factors affect moral hazard in banking operations such as: banking staff members receive bribery from customers when completing transactions and issue refinancing; providing loans for risky projects; some even attempt to hinder customers in order to receive compensation. On the other hand, on the customer's side, moral hazard is reflected in the fraudulent behaviours such as creating unauthentic profiles. Therefore, to minimize moral hazard in banking operations, important theoretical frameworks should be built as a premise for appropriate policies and risk management models.

2. The theoretical framework for research on factors affecting moral hazard in banking operations

The theory of reasoned action

The foundation of the theory of reasoned action was first developed in 1967 by Fishbein and was further amended and developed by Ajzen and Fishbein (1975). According to the theory, a hypothetical behaviour can be predicted or explained by the propensity to perform the behaviour (Ajzen I, 1975). The hypothesized propensities include the factors and incentives that affect the behaviour and these are defined as the level of effort that human beings exert to perform the behaviour (Ajzen I, 1991). According to this theory, individuals have an incentive in the process of decision-making and choosing the best decision among the posible options to carry out the behaviour. Ajzen & Fishbein (1975) stated that behaviour is subject to the attitude towards the behaviour and the subjective standards of the behaviour (Ajzen I,1975). This theory can be applied to the analysis of moral hazard in banking operations, and indicates that the behaviours that result in moral hazard are greatly influenced by demand and motivation of humans. An unjustified behaviour stems from the demand of the individual performing that behaviour. The demand results in the incentive to perform the behaviour. In other words, this behaviour is intentional, and the vehicle and objective of the action are compatible with each other. However, the behaviour that causes the risk should be viewed on both a subjective and an objective basis. Because, in reality, a behaviour is not only subject to attitude and awareness but also external factors. The positive aspect of behaviour is that it urges the subject to work toward the goals. For example, a bank teller forges customers' profiles and seals in order to appropriate customers' assets. The tools, vehicle and objective of this behaviour are all compatible with each other. The consequence of this behaviour can be predicted. However, in some cases, this behaviour might not be performed since the subject is confined by many factors such as environment, conditions for performance, banking administration system or legislation. Therefore, this theory is used to explain intentions of wrongdoings such as criminal actions, violation of ethical standards or moral hazard. However, a shortcoming of this theory is that it proposes that behaviour is controlled by determination. Therefore, this theory can only be applied to rational and purposeful behaviour that is planned by a subject. On the other hand, it is clear that behaviour is also subject to external factors, which means that a subject may not perform the behaviour. For example, a bank may have a rigorous administrative system, which reduces moral hazard. On the contrary, a lack of control or improper control system might be an opportunity for subjects to perform wrongdoings. In addition, if a subject performs the behaviour out of habit, then the behaviour is not rendered intentional. Therefore, this theory cannot explain these behaviours.

The theory of planned behaviour (Ajzen, 1991)

The theory of planned behaviour is developed on the basis of the theory of reasoned action. According to Ajzen, the advent of the theory of planned behaviour originates from the limitation on the behaviours that human beings have little control of, albeit the fact that they are highly motivated by attitude and subjective norm. However, in some cases, they do not perform the behaviour because of the external effect on their intention. Ajzen further complemented the theory by adding the factor of perceived behavioural control. Perceived behavioural control reflects the ease with which the behaviour can be performed and whether there is any limitation on the behaviour (Ajzen. I, 1991).

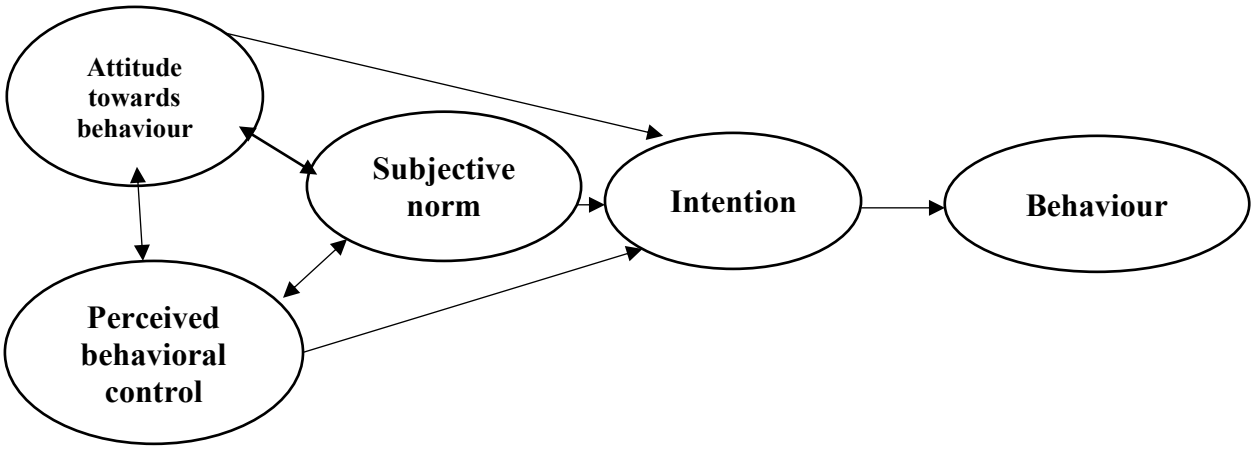

Figure 1: The model of the theory of planned behaviour (TPB) (Ajzen,1991)

According to the model, motivation and intention are the fundamental factors leading to consumer's behaviour. Therefore, motivation is affected by 3 fundamental premises: (i) the personal factor or the attitude towards intention, which is the positive or negative attitude towards performing the behaviour; (ii) subjective norm and (iii) the decisive factor of self-perception and ability to perform the behaviour, which is called perceived behavioural control (Ajzen. I, 1991).

From the aforementioned theories, it can be seen that moral hazard has a close relationship with the factors in the model. The attitude of the subject can be positive or negative. The positive attitude indicates the concurrence and approval of positive viewpoints such as honesty in banking transactions. On the other hand, the negative attitude is indicative of the greed and dissatisfaction that might lead to negative behaviours in banking operations.

The subjective norm can be described as the awareness of an individual of the society's pressure on whether to perform a behaviour or not. Preceding studies also proposes that subjective norm and intention are directly proportional. Therefore, the subjective norm can be measured via people who affect the subject of moral hazard such as friends, colleagues. This reflects the fact that moral hazard in banking operations can result from the encouragement and approval of individuals and groups whose behaviours are deviated from the normal standard. In fact, the types of moral hazard in banking operations are interrelated. Therefore, moral hazard is more likely to happen in the presence of advocacy from a group of people, which motivates the unethical behaviour of the subject.

Perceived behavioural control is defined as the personal feeling of whether performing the behaviour is easy or difficult. This reflects the level of control on behaviour performance but not the result of the behaviour. In this sense, moral hazard in banking operations can originate from individual behaviour, awareness and the control that a subject exerts on his or her behaviour greatly affects the decisions. Additionally, the lenient controlling system of banks may be an opportunity for fraudulent actions, and vice versa.

The theory can be applied to research on factors affecting moral hazard in banking operations and can be used to predict and explain people's behaviour in causing moral hazard. Thus, the relationship between attitude and behaviour can be clarified. The subjective norms investigate the intra-group relationship leading to the subject's decision of whether to perform the behaviour or not. If the violation of ethics is accepted, then moral hazard becomes more likely. In addition, perceived behavioural control is important in controlling moral hazard in banks. This implies that managers of moral hazard must propose mechanisms to control moral hazard in banks.

However, the demerits of this theory are unveiled when it comes to the explanation of moral hazard in banks. Apart from factors such as attitude, subjective norm, perceived behavioural control, there are many other factors leading to moral hazard. In fact, the intention to perform a behaviour does not guarantee the actual performance of the behaviour. Human beings can alter their perception, awareness or behaviour because of many factors. Individual

attributes, intra-group conflicts can increase the probability of moral hazard, while the theory does not mention these factors.

Agency Theory

Jensen (1976), in the publication "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure" introduced his viewpoint of agency theory. Economists, financiers pay special attention and use many quotations from this publication, which indicates its importance as a theoretical framework in studying agency costs. The theory originates from a psychological basis. In theory, human beings are predisposed to individual benefits. Then how can individuals strike a balance between their own benefits and mutual benefits to facilitate mutual development? The conflict of benefits between the owner and the agency was first highlighted in the XVIII century by Adam Smith in his studies and was further developed by Jensen and Meckling (1976), Myers (1977), Ross (1973), Leland-Pyle (1977). The theory focuses on the following issues:

First, there is always an opposition of benefits between the capital's owner and the agency. The capital's owner concerns are the benefits of the firm and themselves, while the agency cares about their benefits pertaining to the position they are holding such as salaries and bonuses. Second, the inconsistency in the benefits of the owner and the agency increases the cost of firm administration and results in financial losses. Third, the agency cost becomes higher when the agency holds a small number of stocks of the firm or does not hold any stock.

Therefore, the theory believes that there are two types of moral hazards in the firm's operation. The first type happens when the owner, in pursuit of individual benefits, invests in risky projects, leading to the failure of the firm to repay debts. The second type happens when there is conflict of interest between stockholders and the agency. In addition, moral hazard is a consequence of the conflict of interest between customers and service providers when asymmetric information is in place (Keil, 2005). Jensen and Meckling (1976) proposed that the main reason leading to the moral hazard between the owner and the agency is asymmetric information. Asymmetric information is related to the fact that the owner cannot be assured by the behaviours and cannot control the behaviours of the agency. On the other hand, the agency is also affected by the asymmetric information if the owner conceals the necessary information (Jensen, 1976). The asymmetric information causes the parties involved to work in uncertainty, which is not desirable for any party (Mahshid, Shirin, Mahdieh, 2014).

The agency theory can be applied to studies of the factors affecting moral hazard in banking operations. Moral hazard may stem from the people in charge of the banking system and the administrators. The main business of banks is money, therefore, the circulation of money is considerable. As a result, the Board of Directors may be involved in risky investments to generate profit, which affects the long-term benefits of banks. In fact, individual benefits, or the benefits from the remuneration policies may cause administrators to become accomplices with other individuals or firms in forging profiles or debt certificates. This may lead to risks, financial losses or bad debts from firms, and thus, leading to considerable losses for the banking system. The banking industry undergoes rigorous control and has few investment opportunities, therefore, compensation in the form of stocks or rights to stock ownership is less common than other industries. This creates little motivation to accept risks for the Board. The banking business is accompanied with a high rate of bad debts. The asset size is large, therefore, it is hard to control credit investments and loans. If the benefits of the owner and the agency are closely tied, other creditors such as depositors may be at higher risks. On the other hand, the conflict of interest between the stockholders and the agencies causes possible financial costs. The firm's objective is also not taken into consideration, and the pursuit of individual benefits may lead to violation of ethics in banks. Besides, the information asymmetry between the customers and the service providers leads to a lack of necessary information: customers may not understand or not fully understand the bank's principles. This may lead to conflicts or even obtaining the customers' property by fraud from the banking staff members.

Attribution theory

Attribution theory is proposed to account for the way we evaluate a person; the different ways in which we rely on the significance assigned to a particular behaviour. Basically, this theory proposes that upon observation of an

individual's behaviour, we attempt to identify whether the behaviour stems from subjective or objective factors. Subjective behaviours are the behaviours controlled by an individual. Objective behaviours are the result of an external factor, in other words, the performance of that behaviour is mandatory, considering the situation. Three factors must be identified in order to identify the reasons for a behaviour (McShane & Von Glinow, 2005):

Distinctiveness: Distinctiveness refers to whether an individual performs the same behaviour in different situations and whether the behaviour occurs on a regular basis. If an individual's behaviour is not the same in situations, the observer can ascribe the behaviour to external reasons. If the behaviour occurs more than once, it is possible that there are internal reasons. These arguments can be applied to the analysis of factors affecting moral hazard in banks and indicate that violation of ethics can be explained by human beings' behaviour in subjective and objective contexts. Violation of ethics may reflect the subjectiveness of the individual when the violating behaviour frequently occurs in different contexts. For instance, a banking staff member already performs violating behaviours in different contexts. Therefore, violation has become systematic and loses its distinctiveness. On the other hand, violating behaviours can occur in different contexts when the conditions are conducive to the performance of these behaviours. This can explain the distinctive behaviours.

Persistence: This refers to a person with the same behaviours at different timing. According to the theory: if a behaviour is the same in many situations, then the causes are external reasons. On the contrary, if a behaviour is not the same in many situations, then the reasons for the behaviour are internal reasons. This can explain the fact that moral hazard in banking operations may stem from internal and external reasons. If the violation of ethics occurs in many situations, then the reasons might stem from the the bank's controling system. As a matter of fact, if the bank has a lenient system of control, then violation of ethics may occur more frequently, and vice versa.

The consistency of behaviour: This considers whether others' behaviour is the same as the one we are evaluating. If others behave in the same way, then consistency of behaviour in this case is high, and vice versa. This can be applied to research on moral hazard and indicates that if the consistency of behaviour is high, then the reasons are internal reasons. This points out that personal virtues and education play an important part in controlling moral hazard. In other words, moral hazard in banks stems from individual behaviours, greedy behaviours of banking staff members and customers. On the other hand, if the consistency of behaviour is low, then the reasons are external reasons. This points out that if the level of control in the banking system is high, then moral hazard can be reduced.

The application of this theory in studying about moral hazard in banks suggests managerial implications. When violation of ethics occurs, we are inclined to ascribe an individual's behaviour to the nature of the person, that is, intrinsic factors. For instance, there are 2 banking staff members, one violates ethical standards while the other does not. Usually, we hastily conclude that the violating staff member is lacking in integrity, discipline and ethics, while the other receives opposite evaluation. However, the violating member is inclined to attribute the violating behaviours to external factors such as work pressure, low income or lack of management. Therefore, violating people usually lay the blame on external factors, while moral hazard in banks can occur if there is no rigid system of control. Therefore, the application of this theory can explain how similar violations of ethics cannot be understood similarly. From the factors ascribed to individual behaviours, risk managers will have different reactions to different individuals with the same violation of ethics.

Banking is a special business - money business. Therefore, moral hazard is not only commonplace but also occurs in many forms. Moral hazard can originate from any position in a bank, from administrators to staff members, from credit officers, supporting credit officers to bank tellers. Moral hazard in banks does not only result in financial losses for the bank itself and its customers, but also results in an explosion of risks and the collapse of the banking system as a whole. Therefore, studies about the basic theories of factors affecting moral hazard in banking operations are of paramount importance. However, each theory points out different aspects and different explanations of the reasons as well as the factors affecting moral hazard in banks.

3. Conclusion

To conclude, the majority of theories focus on factors such as behaviours, ethical standards, incentives, or other factors related to individual benefits. These theories have pointed out the important basis that lays the foundation for research on moral hazard. In addition, the theories have shed light on the formation and conditions for moral hazard in banks. The application of these theories in research on factors affecting moral hazard should be customized to each country with particular conditions for development. This helps managers establish appropriate risk management models, thus, promulgate and build policies and procedures that are suitable to practical conditions. In order to minimize risks, managers need to establish departments that specialize in risk management and build a rigorous procedure for controlling customers' cash flows, and scrutinize the procedures, the stages in the approval of profiles, all transactions must be completed in supervision. In order to predict moral hazard, customers' information must be compiled sufficiently and accurately, especially the appraisal of collaterals, interbank connections should be established to retain customers' information to predict risks and thus propose timely prevention. Banking is a field that requires a high level of clarity and professionalism. Therefore, the enhancement of staff members' competence is of great importance. Personal virtues and ethical conducts should be incorporated in the recruitment and training of staff members. Professional ethics should be prioritized in recruitment and should be regarded as a fundamentally strategic mission in the process of restructuring, and thus lay the foundation for sustainable development in the banking system.

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Study on the Usability of Online Test Websites

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Abstract
Online test websites can provide a more convenient and efficient dynamic learning approach and personalized learning services, which is one of the important approaches to digital learning. However, the usability of online test websites affects users' learning efficacy. This study explored the impact of the usability of online test websites on users, and the results can help website operators seeking to improve the websites' usability. Based on the relevant literature, this study synthesized three major metrics of the usability of online test websites and summarized typical work priorities of such websites to design usability test items. The study considered one online test website: A Remedial Education Institution for Learners to Take Civil Service Examination. The results show that, with respect to usability, the website still has quite a few deficiencies that affect users' effectiveness and efficiency when using the website and cause users to be less satisfied with the website. Based on these results, this study offered four specific recommendations for improving effectiveness, efficiency, and satisfaction in terms of the usability of the online test website: enhancing interaction and instructions, following the inertia of interface use, simplifying information organization, and diversifying information content.

Keywords: Online Test Website, Usability, Digital Learning

1. Introduction

The online learning channel for digital learning styles has become a learning tool frequently used by the public. With the help of network technology, evaluations and tests, which play an important part in learning activities, can also be remotely conducted through computerized tests. Computerized tests have become a trend in modern examinations because they can improve the efficiency of the examination process and save labor costs.

Online tests are also a component of distance education. The online test system can help test takers obtain immediate evaluation and feedback through functions such as the personal file, data statistics, diagnosis, and other recordings and analyses, thereby providing the opportunity to understand their own learning efficacy and engaging them in further thinking about deficiencies in learning (Li, 2001). Many online test websites currently include the functional features of random questions and instant test/evaluation. Users can experience non-linear learning

through the test model of random questions. Meanwhile, instant test/evaluation enables users to review and reflect on their own learning, including blind spots and deficiencies, immediately following the test, thereby achieving better learning efficacy. Online test websites make full use of the great strength of computerized tests combined with the Internet and provides an online platform for instant evaluation on learning. It enables the test takers to think deeply about their deficiencies in learning immediately after the test and achieve learning efficacy, not just test results (Chen, 2007). Therefore, online test websites not only provide test and evaluation results, but are also another type of digital learning style.

Internet resources for diversified learning styles are constantly being searched for and used. However, if the design of an online test website fails to take into account the website's usability, users will be unable to achieve the expected effectiveness even if the website includes a wealth of question bank resources or detailed data analyses. As a result, users cannot achieve learning efficacy due to the complex steps in using the website, the interference of additional business processes and other factors, or too many errors on the website, which result in negative experiences, causing users to reduce their use intention. An indirect result is that the online test website cannot fulfill its role as a learning resource, and the enterprise that set up the website cannot serve its corporate clients. Therefore, the purpose of this study is to identify and discuss the usability problems of a website by assessing the usability of Company A's online test website and, based on the results, provide suggestions to the website designers for improving the website's usability. By improving the website's usability, its utilization rate can increase and its learning resources can be more easily used.

2. Literature Discussion

2.1 Online Test System

Online testing has been widely used. It can be used as a tool to assist traditional teaching, as an evaluation method for distance education, as a tool for classwork exercises or evaluation, and as an aptitude test for career development. Online tests combine the effectiveness of computerized records, statistics, and analyses with the convenience of network information communication, enabling the test taker to get feedback quickly and understand dynamic learning efficacy from the feedback data (Li, 2001). When using an online test system, students can receive scores, notification of incorrectly answered questions, and answers and explanations immediately after completing the test, thereby ensuring the effectiveness of teaching and review (Lee, Li, & Kuo, 2014). Jan, Lu, and Chou (2012) asserted that the learning model provided by the online test could help students improve their learning efficacy. Teaching supplemented by the online test focuses on individualized learning, developing students' abilities to think, observe, understand, analyze, and reflect independently while learning the content.

Online tests incorporate both the effectiveness of computerized tests and the convenience of network communications, but they also must deal with deficiencies inherent in these two characteristics. An online test must rely on (1) the stability of software and hardware of computer equipment and (2) the stability of online network communications. Without stability in these two areas, the effect of the online test will certainly not achieve the expected results. However, these two problems are also common problems in general information and electronic communication products. Online test systems face another common problem: web server effectiveness. If too many users are using the system at the same time, the server's feedback effectiveness may be impaired, which will also cause adverse effects for the online test system (Liao, Pan, & Tsai, 2013). Therefore, great importance must be attached to the effectiveness of usability in the system design.

Online test websites are an application of online test systems. The online test uses a modular independent system, which can provide online users with a website platform for individualized learning at different times and places. Most current online test websites are individualized learning systems that provide test exercises. Their ultimate goal is to provide mock test exercises. Thus, different test methods are presented according to different test types. Therefore, online users have specific and clear learning goals when performing test exercises, conforming to the concept of online learner-centered design. Ma (2016) asserted that online learners are users of information, so their needs are closely related to users' satisfaction with the information. User satisfaction is mostly derived from the

correction of user information satisfaction. According to Ma, the priorities for meeting online learners' learning goals include clear learning goals, reviewable course content, multivariate types of test questions, and an easy-to-operate interface. Therefore, a good online test website must have a simple, clear, and easy-to-operate method and clear test simulation goals. Only in this way can it conform to the individualized and learner-centered learning style.

2.2 Usability

Usability is mainly derived from the concept of user-centered design (UCD). As proposed by Gould and Lewis (1985), in the case of a program or system, usability refers to the extent to which it is easy to learn, the extent to which its design contains the functions necessary to enable the user to perform the task, and the extent to which it is easy and enjoyable to use. Preece (1998) pointed out the concept of usability as helping users perform their tasks on the system quickly, practically, efficiently, and enjoyably. International Standards Organization (ISO) defined *usability* in ISO 9241-11 (1998) as follows: "Helping specified users to achieve operational goals with effectiveness, efficiency and satisfaction in a specified context of use." *Effectiveness* refers to the accuracy and completeness with which users achieve their goals. *Efficiency* refers to the resources expended in relation to the accuracy and completeness with which users achieve goals. *Satisfaction* refers to the extent of subjective satisfaction and acceptance experienced by users during the use of the product.

Usability is a quality attribute that assesses how easy user interfaces are to use. Usability also refers to methods for improving ease-of-use during the design process (Nielsen, 1993). Nielsen (2012) concluded that usability is composed of the following five characteristics:

- Learnability: When users visit the website for the first time, can they quickly get started with the basic functions of the website?
- Efficiency: After users have a better understanding of the design of the website, will they be able to use the functions in the website quickly and smoothly?
- Memorability: When users visit the website for the second time, can they immediately recall how to operate on the website?
- Errors: How many errors do users make? How severe are these errors? Can users resolve these errors?
- Satisfaction: After use, how satisfied are users with the website as a whole?

According to Rubin & Chisnell (2008), under the interface environment of the Internet, a website's usability enables users to make efficient and easy use of the functions provided by the computer system and has the auxiliary design that enables users to read, input, and search information easily as well as achieve the purpose of use quickly.

2.3 Metrics for Usability Evaluation

Scholars do not have a unified standard for the attributes of usability metrics. Different users, task objectives, and website attributes will have different target attributes, which will in turn produce different usability evaluation metrics. In addition, due to their respective characteristics, websites are divided into different types, so the usability metrics used also differ. According to Pant (2015), usability is multifaceted and interpreted from different perspectives depending on the assigned task, user, product, and environment. Nielsen (2000) noted that usability evaluation is a method to observe the actual use of a product or service by individuals to record the user experience and, through surveys, determine whether the use of the system is successful or not. In order to determine the positioning of usability in a system, we must start from the acceptability of the system (Nielsen, 2000).

In this study, the usability metrics of ISO 9241-11 (1998) are combined with the insights of various scholars, three major orientations—effectiveness, efficiency, and satisfaction—are used as the usability evaluation metrics, as discussed next.

2.3.1 Effectiveness

Effectiveness is used to evaluate the main items of usability, the capability of the online test website to function effectively, and the extent to which the digital content resources meet users' information needs. The corresponding sub-metrics include:

- Ease of use
  - Whether the provided website browsing generatrix and functional operations conform to the using habits and cognitive abilities of most users
  - Whether multiple browsing methods are provided to facilitate the user's choice
- Organization of information
  - The extent to which the language of the interface is easy to understand—namely, whether the website interface is friendly to the language that is easy to be understood by the website user group
  - How easy it is for users to obtain website information, which mainly refers to whether the interface design of the website and the screens presented by the web page data are concise and clear, so that users can find information easily
- Visual appearance
  - The appearance of the website interface can focus on the user's vision, and the locations of function buttons or link paths adopt the operating modes familiar and intuitive to the user, reducing the load of short-term memory
- Error correction
  - Whether clear and easy-to-understand instructions are provided
  - Whether the guidance for error correction is provided
- Learnability
  - When a user visits the website for the first time, can he/she quickly get started with the basic functions of the website? Therefore, whether the user can quickly learn to use website functions is a metric for learnability.

2.3.2 Efficiency

- The website enables users to easily complete predetermined goals and tasks.
- The learning efficacy of the test exercises can be quickly achieved.

2.3.3 Satisfaction

- Will the user intend to use the website in the future?
- Does the website meet users' information needs for online tests?
- Will the user recommend the website to other people?

The purpose of usability evaluation is to identify the usability problems of the website and then, based on the results of the usability evaluation, to improve the usability of the website and enhance the effectiveness of the website. Therefore, the selection of effective methods and techniques for usability evaluation is the key to the success or failure of the evaluation. The usability evaluation is usually carried out in combination with different methods to explore the symptoms of usability problems from multiple perspectives in order to increase the validity of the evaluation results.

3. Research Design

This study invited five candidates who were preparing for a civil service examination to complete a one-to-one usability test with seven questions as well as a questionnaire survey. Nielsen (2000) concluded that the most cost-effective number of test takers for user testing is five. If the number of test takers exceeds five, fewer and fewer usability problems will be identified, which is a waste of research resources. While "thinking aloud" was used to

test the usability of the website, computer software was also used to record the process of the test taker's operation of the website interface. "Thinking aloud" is used to test people's problem-solving strategies (Erikson & Simon, 1985). During the test task, the application of this method is to ask the test taker to speak out loud what they think and what they are going to do. The researchers can understand the thinking process of the test takers by observing this process and can further analyze and identify usability problems. Finally, the System Usability Scale (SUS) was used to conduct the satisfaction survey. SUS is a widely used, freely distributed, and reliable measurement tool (Finstad, 2006).

Currently, in the structure of candidates applying for the national civil service examination, the female-to-male ratio is about 80:20, and the age of candidates is mainly between 26 and 35 years old. Therefore, in this study, the gender and age sampling of the test takers is inevitably affected by the structure of candidates. All five test takers were between 26 and 35 years old.

The five test takers had never used Company A's online test website. Although they used the Internet for a different number of hours each day, they all had experience using and operating other online test sites. In terms of their information literacy, they generally had web page operation and use ability at a basic level. They had plans to take the national civil service examination in the near future. Thus, they were considered appropriate as a target user group for the online test website.

4. Results

One of the most important typical functions of the online test website is to record the history of users using the test function. Only after a user correctly and quickly accesses his/her member account and password to log into the website can the work of recording all the tests be started. Task I was designed to test whether the user can quickly find the member login function when visiting the website for the first time, correctly complete the member login work, and register a username or nickname for use during website activities. Users' nicknames are used to distinguish users' identities when they enter the website to conduct individualized learning activities, such as displaying the identities of mock test rankings. Because it is not appropriate to display the real name of a member, it is necessary to use a nickname to record and display the score ranking identity. According to observations of test takers' performance on Task I–member login, most test takers successfully completed the member login. Each test taker would naturally look to the upper left corner of the web page after receiving the instructions. Based on people's experience using the website, most users were used to the member login function being placed in the upper left corner of the web page, so the design of member login is in line with the efficiency of this function. However, some test takers were somewhat hesitant in the registration of nicknames. Test taker 2 could not figure out what text to use for a while, so she hesitated for some time. Test taker 3 could not immediately find the input location of the nickname to be registered. Although the text box for the nickname was directly in front of her, she still searched the left and top menus. After test taker 5 entered her nickname, there was no obvious feedback screen in the system, which made her wonder whether the registration had been completed correctly. To resolve these problems, this study suggests that the design should be improved in the future. When the user logs in for the first time, there should be obvious welcome words and nickname registration instructions, with simple nickname examples and an obvious feedback screen after completing the registration.

Task II was designed to test whether the user could correctly and quickly find the required test items for test exercises as well as complete the test items correctly. This part was one of the important functions of the website, which involved use effectiveness. Based on observations of test takers' performance on Task II, in terms of selecting the test items for users' personal needs, all test takers could quickly find the correct test items. However, in terms of how to start the test, not all test takers could immediately understand how to start the test (by pressing the start button). They had to rely on the researcher's assistance or read the instruction text on the web page to figure out that they needed to press the web button to start the simulation test. This web page was originally designed to enable the user to understand the rules of use of the test function. Once the users understand the rules of use, they can press the button stating "Agree to the Above Items and Start the Test." After pressing the button, the button will disappear, but at the end of each subject, the "Start Test" button will be displayed. However, this method seems to have hindered users' use effectiveness.

Test taker 1 thought that the countdown timer took up too much of the screen, resulting in a sense of pressure. In addition, for some test questions with a group of sub-questions, there was no obvious connection between the text of the test question and its sub-questions, so it was easy for the test taker to ignore the fact that the questions were in same group, resulting in a misunderstanding of the question's meaning. Test taker 3 and test taker 5 thought the button to answer the question (i.e., radio button) on the test question web page was too small, so it was not easy for them to click.

To resolve these issues, design should be reconsidered. (1) The countdown timer was originally designed in a simulated test situation, but if it significantly affects the mental state of the user when using it, it may affect the use effectiveness. It is suggested that the proportion of the countdown timer to the entire screen be reduced. (2) A test question with a group of sub-questions should have the same background color as its sub-questions. (3) The button for answer options should be enlarged.

Task III was designed to observe test takers' performance on test question reviews. A typical online test website should have the function of test question review. According to the observation of the test takers' performance on Task III, test taker 2 and test taker 5 thought that the entrance to the test record was not easy to find. This observation also led to the discovery that test taker 2 and test taker 5 mistakenly thought that the function menu at the top of the website was a background pattern rather than a function button, causing difficulty in finding the function menu of the test record item. The design of the path link button was not obvious. In addition, all the test takers believed that, before finding the final test question review web page, they had to go through too many layers of web pages, starting from the test record homepage to the test subject score record (second layer) and the subject test question review (third layer), which caused low efficiency in accessing test records.

Several suggestions are made for solving these problems. (1) Although the art design on the function menu requires ingenuity to make some aesthetic designs, it also needs to take into account users' use habits. A function button must still be designed to look like a button so that users do not mistake it for a background pattern. (2) From the test record web page to the test question review web page, the first and second layers should be integrated to shorten the access process and thereby increase use efficiency.

Task IV was designed to test users' memorability when using the website—namely, whether users can still remember how to use previously used functions after leaving the website and returning once again. According to the observations of the test takers' performance on Task IV, all test takers could quickly complete this task. Thus, the website had obvious and easy-to-remember advantages in terms of the options for test classification items. After logging in once again, the test classification items were displayed after the subjects tested when the user performed Task II, and the text "completed test" was displayed.

Task V tested whether the user, when using the functions of different test modes, could deduce the use method based on the previously used functions (i.e., learnability of the website). On this task, all test takers could successfully complete the exercise test of a single subject. At the same time, test taker 1 also suggested adding anchors to the web page displaying the test questions. An anchor is web page design term referring to the location points of different vertical coordinates in a single web page to facilitate moving up and down the web page quickly. The evaluation metrics for Task VI are the same as those for Task V. Task VI tested whether the user, after using review functions of a certain category of test questions, can use the question review functions of different projects based on his/her previous experience. According to the observations of test takers' performance on Task VI, only test taker 5 could not correctly click to enter the test question review of a single subject immediately. One possible reason is that the domain names of the entrance link texts of the test question reviews did not adopt unified wording, meaning the user could more easily select the incorrect entrance link. The domain names of correct entrances of test question reviews of a single subject were not unified with those of other types of test question reviews in textual terms. Therefore, in the future, unified textual terms should be adopted after conducting a comprehensive review of the terms for the same functions of the website in order to increase the effectiveness of the website.

Task VII is the last action of the user when ending the operation on the website and fully record the time history of personal use of the website. Task VII tested memorability, an evaluation metric of the typical function for the member. The results indicated that all test takers could immediately use the website logout function without hesitation.

After completing the test on usability, all test takers were invited to fill out the SUS satisfaction questionnaire. In terms of overall satisfaction with the website, the above average score was 67, which is close to the average score of 68 in foreign SUS research, but it is still insufficient. Thus, there is still much room for improvement, although there are no major defects in the usability of the website.

In terms of website recommendations, Sauro (2013) discussed the SUS results for 10 events. According to Sauro, the average SUS score of promoters is 82, while the average SUS score of detractors is 67. Three of the test takers scored above 67, which lagged far behind the average SUS score of 82 for promoters. Even worse, two of the test takers scored less than the average SUS score of 67 for detractors. Therefore, in terms of satisfaction for recommendation, Company A's online test website did not receive potential praise from the test takers.

5. Conclusion and Recommendations

According to the problems identified in the test of the usability of the online test website and the analysis of test takers' satisfaction questionnaire responses, deficiencies exist in the design of the usability of the online test website of Company A. In particular, the test takers' evaluation of the website was also close to the detractors' impressions. This indicates that the usability of the online test website does have an impact on the users' status of using the website and their intention to use the website. The metrics for the evaluation on the usability of the online test website are summarized and explained from three orientations, as follows.

5.1 Impact of Effectiveness

Four website effectiveness problems were identified from the test on usability that caused test takers distress.

- The interactivity of the website is relatively insufficient (the screen or message on the web page for feedback is not clear enough). For example, after completing the registration of the member's nickname, there is no obvious feedback screen, which makes the test taker uncertain about whether he/she has completed the registration function.
- The organization of information is not clear enough.
    - Member's nickname registration input location is not obvious.
    - The way to "Start a Mock Test" fails to enable users to get started quickly.
    - There are no unified path link terms.
    - The countdown timer takes up too much of the screen, which affects test takers' the psychology, thereby impeding their effectiveness when answering questions.
    - There is no obvious connection between the text of a test question with a group of sub-questions and its sub-questions, which makes it easy for the test taker to ignore the fact that they are questions in the same group, thereby affecting the effectiveness of answering the questions.
- There is a lack of guidance for correcting errors. For example, there is no sample explanation for member's nickname registration, and the instructions for how to start the test are not simple or clear enough.
- There is a lack of visual appearance. For example, it is difficult to find the link entrance to the member's test record because the function menu is not made like a button, and it is not designed according to users' habits and cognition.

5.2 Impact of Efficiency

Three problems were identified in the test of usability that caused test takers distress in terms of efficiency.

- The button for the answer to the question (radio button) on the test question web page is too small, making

it more difficult for the test taker to click through, thereby affecting the efficiency of answering the questions.

- To find the test question review web page, the test taker has to go through three layers of web pages, which affects the learning efficacy of quickly accessing the test question review.
- When answering the questions on the web page of test questions, the test taker can only use the browser scrollbar to move up and down. The lack of web anchors creates inefficiency for the test taker when browsing the test questions.

5.3 Impact of Satisfaction

Finally, three items were identified in terms of the manifestation of satisfaction—namely, information satisfaction, overall satisfaction, and satisfaction to make a recommendation.

- Information satisfaction: The test takers believed that the basic exercises and test records of the test questions on the website can meet part of the use needs for the online test, but deficiencies remain in the information provision, such as the lack of statistics and exercises for the questions that the test taker frequently gets wrong.
- Overall satisfaction: All test takers believed that the website is still easy to use, and they are confident that they have the ability to use this online test website; they also have expectations in terms of their intention to use the website in the future. However, they also believe that there are some troubles in the use of the website, and the systematic integration of functions is also insufficient.
- Satisfaction to make a recommendation: The average SUS score of the test takers indicated that the website was not well received by the test takers, so they would not recommend it to other people.

To address the problems identified in the test of the usability of Company A's online test website, this study makes four recommendations. First, in terms of the member's nickname registration, when the user logs in for the first time, a clear welcome screen and simple nickname registration instructions should be presented, a simple nickname example description should be added, and an obvious feedback screen should be displayed after the registration is completed.

Second, in terms of interface design, the function menus and buttons should be best designed in a shape or display mode that conforms to the user's cognition and use habits, such as three-dimensional and interactive shape or display modes. The proportion of the countdown timer to the screen should be reduced, adhering to the principle of not preventing the user from answering the questions. Test questions with a group of sub-questions should have the same background color as their sub-questions. Finally, the answer radio button on the question answering web page should be enlarged.

Third, the web page use processes should be simplified and integrated, and the functional text terms should be unified. The website should provide concise and easy-to-understand text so that users can immediately figure out how to use the test functions. From the test record web page to the test question review web page, the first and second layers should be integrated to shorten the access process for increasing use efficiency. On the web page displaying the test questions, anchors should be added to the inner web page link positions to facilitate users' ability to quickly move the web page up and down to read the test questions. Unified textual terms should be adopted for the same functions of the website to increase its effectiveness.

Finally, the website should incorporate different types of test modes. For example, a test mode should be added for the questions that the test taker frequently gets wrong in order to meet the information needs of the individualized test.

A website inevitably includes many design deficiencies when it is initially designed, and these must be identified and corrected through continuous testing. This study evaluated the early usability of an online test website and identified usability problems by testing the website's usability in order to enhance its usability. Once the website design is improved, its usability should be tested again. By repeatedly testing usability, the design of the website

can be continuously improved, gradually reaching the best state until this online learning resource is favored and fully used by users.

5.4 Future Research Directions

Future research should develop an in-depth understanding of the impact of a website's usability on test takers' use of the online test website, focusing on test takers with different learning styles or different identity backgrounds. This study of website usability included students participating in face-to-face classes in a remedial education institution. However, users have many different learning styles, such as non-traditional face-to-face class students who use digital teaching materials or self-study at home or individuals from different backgrounds (e.g., gender, industry, and age). This study did not consider these differences, so future research can include more test takers with different learning styles or identities in order to understanding the impact of these differences while expanding the scope of research on the usability of online test websites. Finally, future researchers can use different evaluation methods to evaluate the usability of online test websites, such as a questionnaire survey method in quantitative research and in-depth interviews, in order to carry out extensive and in-depth evaluation research.

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The Impact of COVID – 19 on Pakistan's Export Oriented Economic Growth

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Abstract
This study focuses on the Impact of COVID-19 on export-oriented economic growths of countries. We had tried to get the adjacent picture of the main affected areas of the world and their effects on economic growth. Pakistan also faced the harmful effects of this pandemic. The situation got worst when it was controlled with lockdown policies. It destabilized the vulnerable economy and economy shrinks down due to COVID-19. A mixed approach was conducted for this research study. As I have to see that to what degree the pandemic has affected the Pakistan's economy and economic growth. The research aims to discover the impacts of COVID-19 on the export-oriented economic growth of Pakistan. The research methodology is based on a descriptive approach and a quantitative data analysis technique will be used to analyze the data. Other than human tragedy, the COVID – 19 has been an unpredicted shock for world economy Global Output estimated by IMF fallen by 3.5% in 2020 and all developed, undeveloped and under developing countries are hit by this wave hardly.

Keywords: COVID – 19, Economy, Economic Growth, Financial Crises, Global Recession, Public Health, House Hold Income, Global Economy, Exports

1. INTRODUCTION

This study discusses about the impacts that COVID-19 has caused over the exports and economic growth of Pakistan. The countries all over the globe are imposing strict laws regarding the safety and controlling the spread of coronavirus. Due to this every economy shuts down by lockdowns, closed borders and zero trades, leading to a great negative impact on economic growth.

We are witnessing our world passing through a critical situation of its history by an invisible enemy in shape of COVID-19 pandemic (Novel. Coronavirus) has wreaked havoc in almost 218 countries, killing around +1.6 Million people and affecting over 72 million people and this figure is increasing day by day and now the second

wave of this virus is also expecting to be more disastrous then previous. Due to the severity of this disease on March 11, 2020, the World Health Organization (WHO) announced that COVID-19 as a global pandemic, indicating consequential global spread of an infectious disease. Pakistan's already fragile economy had only just been moving towards stability when the health crisis struck it in the middle. Experts fear that the pandemic's economic fallout will considerably derail the country's recovery process.

The public health system of Pakistan is already under pressure with a ratio of only 1 doctor to 963 people and one hospital bed to 1,608 people. The country is facing a dreadful shortage of more than 200,000 doctors and 1.4 million nurses. The absence of Universal Health Coverage (UHC) further heightens the risk of the country's population to the health, economic and social fallouts of this pandemic.

Pakistan, the 6th most populous country in the world, ranks amongst the medium human development countries on the 2019 Human Development Index (HDI), at 152 out of 189 countries. Gender disparities continue, and female labor force participation was only 26.5 percent in 2018. Nationwide, 78 percent of non-agricultural jobs are in the informal economy. Approximately 22 million people occupy these roles, with most of them being women. The majority of an estimated 8.5 million domestic workers are also women. Real gross domestic product (RGDP) growth slowdown from 5.5% in FY18 to 3.3% in FY19 as measures were executed to address unsustainable fiscal and external imbalances, with support from a $6 billion IMF (International Monetary Fund) Extended Fund Facility arrangement. Prior to the pandemic outbreak of COVID-19, the economy was expected to increase slowly, on the back of structural reforms. Over the medium to long term, in order to recover from the impacts of COVID-19 and continue its route towards an upper-middle-income country, Pakistan needs to dual increase its private investment rate and investment in human capital, raise more revenue, simplify the business regulatory system, integrate with global value chains, and sustainably manage its natural funding.

In response to COVID-19 outbreaks, all major global economies have executed precautionary measures like flight abrogation, online purchasing, and social distancing to control and prevent the local public from coronavirus. However, the execution of these policies has directly affected the restaurants and cafe businesses. A negative supply stun incurred because of interruption in flexible chains universally. However, this flexibly stun is of a unique sort as it influenced various areas lopsidedly. In the perspective of buying behavior, customers have shifted their purchasing attitude towards the substitutes of the products and ventures. In every situation, it is affirmed that, purchasing power of the customers is rapidly decreasing due to the expansion of COVID-19 at large extents. Therefore, due to the widespread of pandemic people are losing their interest towards shopping and trying to maintain social distance to avoid any misfortune (khan, 2020). Another major reason in low purchasing is low income, as every sector is affected with this pandemic situation so people's earning is almost zero as compared to the previous income before this situation. As people do not have much income so they try not to spend too much on the unnecessary things instead they prefer to save to spend in coming months.

There are some great impacts on Pakistan's economy due to the pandemic situation. The trade deficit expanded marginally by US$ 115 million to US$ 5.8 Billion during the 1st quarter of the current FY. During this period imports grew from US$ 11.2 Billion last FY to US$ 11.2 Billion during the current FY 1st quarter. On the other hand, exports declined from US$ 5.51 Billion to US$ 5.46 Billion.

1.1. Research Gap

Pakistan's external balance has been significantly affected by COVID-19 in five different ways such as, decreasing exports, foreign investment and remittances, reducing import duties and expanding external liabilities. All these consequences are the results of slow economic growth due to the outbreak of the pandemic COVID-19. A decrease in global demand and supply has strongly affected the global endeavoring economies. The export performance of every economy depends upon the foreign demand, because it is the major determinant of international export. Due to large contraction of export from the largest export market is devastatingly affecting the economic growth of the Pakistan. Generally, international trade orders are booked in advance; therefore, the actual impact of COVID-19 will be determined in next up coming months. However, due to heavy disruption in local supply chains, the export

growth was declined in April 2020. Moreover, economy of Pakistan has been anticipated to decrease by 1.5% in the Fiscal year 2020, the small size of export surplus will affect the export's capability of Pakistan (Barro, 2020)

1.2. Research Problem

As foreign demand is a major determinant of a country's export performance, a deceleration in economic growth in Pakistan's top export destinations is likely to cast its shadow on the export revenue.

1.3. Research Objectives

Generally, the objectives of this study are to examine the impact of COVID – 19 on Pakistan's export-oriented growth by comparing the relationship of dependent and independent variables. The contribution of this study is: i) to analyze the significant impacts caused by COVID – 19 on Pakistan's exports ii) impacts of COVID – 19 on export trade business in economic growth of Pakistan iii) determining the shock volume of the COVID-19 impact on the international exports that, how it stops the country from increasing its economic growth iv) to determine the level of household income that is being affected by the economy due to COVID-19. The situation of the world prior to COVID – 19 is much more different than now. Economies around the globe were affected in shocking manner. The pandemic is not over yet and economies are still struggling with this.

1.4. Research Questions

This research is conducted to search out the answers to the several questions which may arise for the role of COVID – 19 over the economies such as: how much COVID-19 has affected the exports rate of Pakistan? To what extent, exports play its role in the economic development of the Pakistan? How much exports play its role in the economic development of the Pakistan? To what extent, international exports help to increase the gross development product of the economy? How much household income of the Pakistani society is affected by COVID–19? This research studies the consequences of COVID – 19 pandemics not only in Pakistan but to the other countries of the world also. The research describes the long-run and short-run estimated effects regarding economic growth, exports, imports etc. The effect is negative in nature due to the vast sectors of life effected b this pandemic. The process of recovery in every field will not be completed and there will be need to do something more. The favorable impact of pandemic was observed in every study.

1.5. Methodology Used

In this study I will use a mix approach of qualitative and quantitative methods for data analysis. As I have to see that to what degree the pandemic has affected the Pakistan's economy and economic growth.

Foreign direct investment is a major source of financing country's current account deficit (CAD). Pakistan is receiving very slow cash inflows from FDI for the last few years. Almost half of the finances are generated from China under China-Pakistan Economic Corridor (CPEC). However, a surge in FDI inflows has been seen in the current fiscal year. Last year, USD 905 million were received in the half year of 2019, and USD 1.66 billion were received in full. In contrast, around USD 2.14 billion were received in FDI during the current fiscal year of 2020.

The vast majority of analysis will encounter a drop in the GDP and losses in work and income resulting in high level of poverty, food uncertainty and healthiness. Simultaneously, limits and assets shift over the world to control this pandemic and its interlaced wellbeing, social and financial effects.

1.6. Structure of Remaining Paper

The first chapter of the research will provide introductory details of the study, the second chapter will be based on detailed literature review and relative theoretical studies, the third chapter would be the most significant part of the study that consists of methodology, data analysis and results will be provided. The fourth chapter, which is last

chapter would contain detailed discussions based on deduced results, and at the end of the study, conclusion with adequate recommendations will be provided for improvement and betterment of the economic growth.

2. LITERATURE REVIEW & RELATIVE THEORIES

(Noreen, 2020) explains that, irrespective of significant proportions of legislative duty by the government, the continuous COVID-19 plagues have revealed significant obstructions and discoloration in the crisis and welfare structure of Pakistan, with respect to the control of chronic viruses. Three regions need quick actions, coordinated responses among government and regions, brought together acquirement of Personal Protective Equipment (PPE) and clinical gear like ventilators, respirators and so on., it is responsibility of the media to avoid spread of outbreak and shielding of our forefront laborers and medical practitioners, and proficient execution of information development for contact following. A response to COVID-19 can deplete country's medical care framework with a devastating impact on economy. Various investigations attempted to envision the monetary losses from a pandemic.

For instance, (Jonung & Roeger, 2006) gauged that, a hypothetical global outbreak would prompt 1.6 percent drop in GDP for the European Union (EU) because of two major facts including demand and supply. Various other researches have recognized the affects with a chronicled correlation. For instance, 'how the death rate might during the 1918 Spanish Influenza pandemic transpires at the current stage.

(Barro, 2020) describes that, holding everything else steady, the 2.1 percent demise rate during the Spanish Influenza pandemic in 1918-1920 would mean approximately 150 million casualties around the world (contrasted with the total populace of 7.5 billion out of 2020) during COVID-19 pandemic. On average the 2.1 percent passing rate leads to 6 percent decrease in GDP and 8 percent fall in private utilization.

(Boissay & Rungcharoenkitkul, 2020) States that, as compared to past pandemics, COVID19 disproportionately affects the old from a well-being point of view. The lockdown measures, nevertheless, are more global in growth and size than their archetypes, and they have upset global flexibility chains along with total demand and utilization manners. This thusly has prompted elevated monetary market choppiness and intensified the financial stun. Also, more high lending and higher borrowing levels among firms and families during this time make the momentary stun more intense as compared with past pandemics.

(Carlsson-Szlezak, et al., 2020) and (Carlsson-Szlezak, et al., 2020) describes that, there are three fundamental transmission channels. The first is the immediate effect, which is identified with the decreased utilization of products and ventures. Drawn out lengths of the pandemic and the social dissociation measures may decrease buyer's certainty by keeping customers at home, careful about optional spending and negative about the expected monetary possibilities. The subsequent one is the aberrant effect working through monetary market stuns and their impacts on the economy. Household income will probably fall, reserve funds will increase, and utilization expenditures will diminish further. The third comprises of flexibly side interruptions; as COVID-19 keeps decreasing the economic development, it will contrarily affect supply chains, work requests, and business, driving to prolonged times of layoffs and increasing joblessness.

COVID-19 is one of several emerging infectious disease outbreaks in recent decades with significant public health and economic impacts. The last of these was the influenza pandemics in 1957 and 1968, each killing more than a million people around the world. The current epidemic of coronavirus (COVID-19) continues to have an influence on the lives of the people in Pakistan. The country has observed a significant rise in its confirmed cases from the initial two cases on 26th February 2020 to approximately 458,968 as of 22nd December 2020. In addition to the risk imposed by the virus on human lives, there is a risk approaching to the social and economic lives of Pakistanis. The COVID-19 pandemic is expected to revert some of the gains Pakistan has made in poverty reduction and towards social indicators. The poverty rate declined during the last two decades by 40% to 24.3 percent in 2015, helping more than 23 million people to come out of poverty. However, current estimates by IMF suggest a visible rise in poverty rates, i.e., up to 40%. The real GDP growth is also likely to slow down by around 3% for FY 2019-20, primarily through the decrease in the services and manufacturing sectors. The agriculture sector will also be

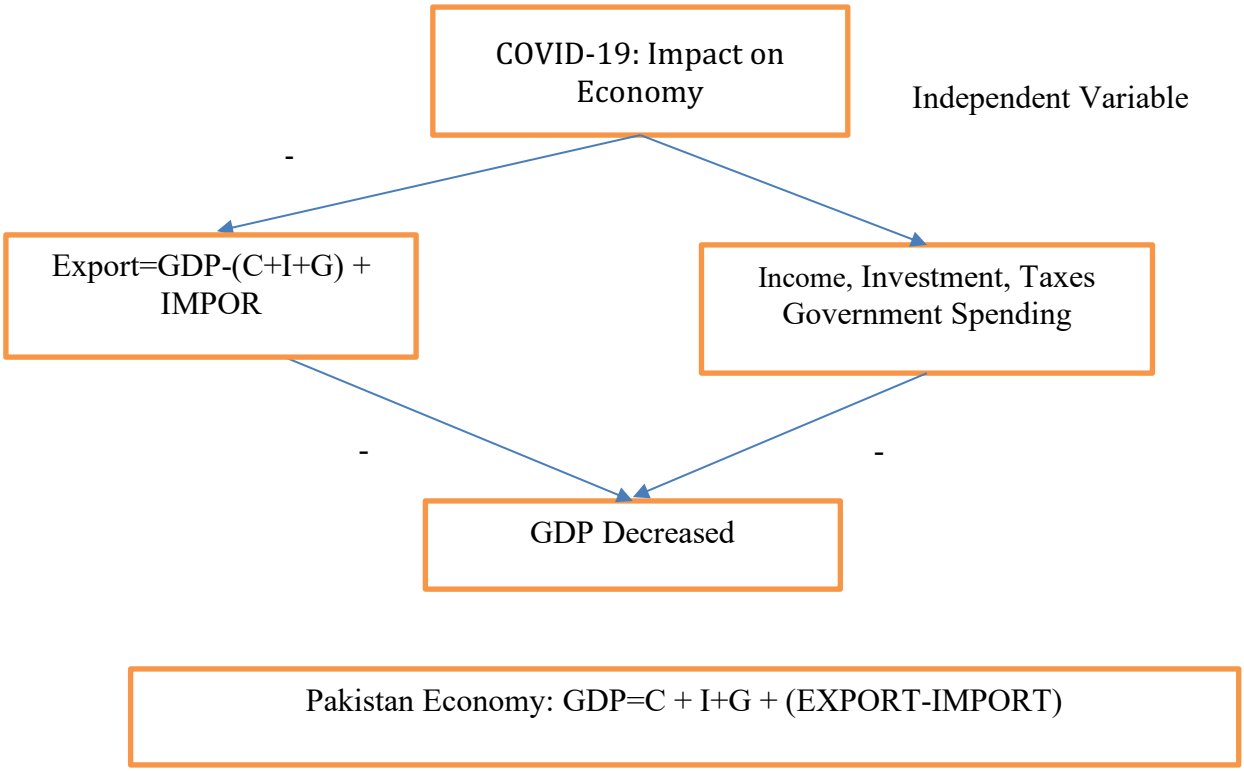
impacted in case the lockdown continues and disrupts the transportation, logistical support, labor for harvest and transport, and access to inputs for the next planting season. As the country is emerging from a macroeconomic crisis, the government has limited fiscal buffers to actively respond to the pandemic.

2.1. Theoretical Framework

While some countries are treating the reported cases effectively but still world is clueless about when and how new cases will emerge. Everyday new cases are being reported and almost 213 countries are facing this issue. Initially, cases were filed and got high up in China, but now are falling in China and increasing and spreading in all other countries. World Health Organization (WHO) hase already declared an emergency around the world. The pandemic not only cause fear, anxiety, stress and depression for people along with spread of disease and deaths, but it also played important role in economic disturbance. As China is one of the major supplier's countries around, and due to the situation China faced severe lockdowns which results in decreased manufacturing of almost all types of products ranging from agriculture to heavy industries. Due to this millions of people lost their jobs, face financial problems resulting in negative growth rate for the year 2020.

There are some great impacts on Pakistan's economy due to the pandemic situation. The trade deficit expanded marginally by US$ 115 million to US$ 5.8 Billion during the 1st quarter of the current FY. During this period imports grew from US$ 11.2 Billion last FY to US$ 11.2 Billion during the current FY 1st quarter. On the other hand, exports declined from US$ 5.51 Billion to US$ 5.46 Billion.

The theoretical framework of this study will explain the COVID-19 as an independent variable as it does affect every other aspect of economy. While exports, GDP, Income and the overall economy of Pakistan become dependent variables. Due to partial or full lockdown situation in this pandemic era it causes a panic situation and drops down in almost every sector of life including agricultural, industrial sector and mostly common life.



2.2. Hypothesis

In this research we have anticipated three hypotheses on the basis of literature review: The first hypothesis is, **"Covid-19 has strongly affected the Exports of Pakistan."** The second hypothesis of this study is, **"There is a positive relationship between exports and economic development."** The third hypothesis of this research is, **"GDP growth depends upon the growth of international exports."** The fourth hypothesis states as, **"A large proportion of Pakistan's household income has been decreased due to Covid-19."**

3. METHODOLOGY & DATA ANALYSIS

This is a quantitative study because, the key purpose of the study is to analyze the relationship between independent variables with dependent variables exports, household, economy, and economic growth of Pakistan. The research aims to discover the impacts of COVID-19 on the export-oriented economic growth of Pakistan. The research methodology is based on descriptive approach and a quantitative data analysis technique will be used to analyze the data. I will use secondary data for analysis on the basis of data availability. The source of data will be taken from Pakistan Bureau of Statistics, Ministry of Economic Affairs, Economic Affairs Division, the World Development Indicators of the World Bank, States Bank of Pakistan, World Health Organization (WHO).

Different data generating techniques will be used to get the final data analysis methods. Some methods used will be as follow: population, sapling, sampling design, sampling size, Instrument of Measurement (Questionnaire), Data collection method, Technique of Data Analysis, Justification of methodology.

3.1. Empirical Studies

As mixed method approach has been used in the present study where qualitative and quantitative analysis has been conducted to get the results. For analysis purposes, Pakistan's data and financial records 2019, 2020 and 2021 have been used. The statistical data of the economy of Pakistan has been taken from the previous sources and GDP reports of 2019 and 2020.

3.2. Qualitative Analysis

According to the State Bank of Pakistan, the government raised PKR 74.89 billion through the auction of 5-Year Ijara Sukuk (Islamic Bonds). During the week ending Sep 11, the reserves held by the SBP increased by US$ 12.6 million to reach US$ 12.82 Billion. Foreign exchange reserves held by the State Bank of Pakistan declined 1.7% on a weekly basis from US$ 12.35 Billion to US$ 12.15 Billion, a downward slide of US$ 205 million. This net decrease comes following external debt repayments of US$ 580 million and official inflows including US$ 300 million from the Asian Development Bank. Looking at Pakistan's limited financial capacity to bear the costs of the pandemic, experts warn that the country may in the future require assistance from not only the IMF and the World Bank but also from strategic allies like China and Saudi Arabia.

Around, the Pakistan's exports dropped out by 4% in 2019 and the 2019 exports ratio only had 105 of total GDP of Pakistan. In the middle of 2020, the exports rate was 13.67% and in the last, due to complete lockdown and less international trade, the exports rate decreased by 2%. Similarly, the growth rate was calculated at the rate of 0.13% and 1.68% during March-July 2020 Fiscal year. Therefore, a major drop down in the exports has been recognized in the month of March that is the starting point when exports rate declined and even the domestic trade got slowed down. The manufacture, textile and agriculture infrastructure got affected which caused a decline in annual GDP. In contrast, 64% drop down was recorded in the export's development during the end of 2020 (Bethune & Korinek, 2020)

3.3. Quantitative Analysis

Table 1: Proportion of C+G+I+X+M in GDP of Pakistan

Expenditure Category	Proportions	Components	Proportions	Direction	Reason
Consumption (C)	82%	**Food and Beverages**	40%	Decrease	lockdown offset by stimulus
		Housing / Utilities	20%	Constant	continued use
		Transport	8%	Decrease	Lockdown
		Health	4%	Increase	Sickness
% Impacted with a		**Communication**	2%	Increase	Use in confinement
Decrease = 74%		**Recreation & Culture**	2%	Decrease	Facilities Closed
		Education	4%	Decrease	Schools Closed
		Restaurants & Hotels	6%	Decrease	Shuttered Business
		Other Discretionary	14%	Decrease	Lockdown
		**Unemployment*		Increase	Job losses / lockdown
		Subtotal (C)	100%	**Decrease**	**Lockdown**
Government (G)	14%	**Debt Servicing**	33%	Decrease	Renegotiation / Clemency
		Corona Stimulus	15%	Increase	Government initiatiative
% Impacted with a		**Others**	52%	Increase	Development expenses
Decrease = 33%		**Revenue Collection*		Decrease	Falling consumption
		Subtotal (G)	100%	**increase**	**Corona Stimulus**
Investment (I)	14%	**Private Investment**	71%	Decrease	falling demand / uncertainty
% Impacted with a		**Public Investment**	29%	Increase	stimulus measures
Decrease = 71%		**Subtotal (I)**	100%	**Decrease**	**falling demand / uncertainty**
Exports (X)	10%	**Textiles**	55%	Decrease	order cancellations / falling demand
% Impacted with a		**Food Group**	18%	Constant	continued use
Decrease = 82%		**Other**	27%	Decrease	order cancellations / falling demand
		**Remittance*		Decrease	Job losses overseas
		Subtotal (X)	100%	**Decrease**	**order cancellations / falling demand**
Imports (M)	-20%	**Machinery Group**	13%	Decrease	decreasing capex
		Petroleum Group	27%	Decrease	price collapse
% Impacted with a		**Textile Group**	7%	Decrease	falling end user demand
Decrease = 91%		**Food Group**	9%	Constant	continued use
		Other Imports	44%	Decrease	falling end user demand
		**Currency*		Decrease	flight to USD
		Subtotal (M)	100%	**Decrease**	**commodity prices / falling demand.**
GDP by Expenditure	100%				
**items not included in expenditure models*					

4. DISCUSSION

4.1. Consumption

When COVID-19 lockdown was put in Pakistan in 2019, employment rate dropped down and the consumption of Pakistan's government increased. The above table is showing that ratio of consumption in other divisions of GDP is the highest. There are many areas in consumption category such as food, health, housing, transport, recreation, education and utilities etc. the increase or decrease in the expenditures and consumption in these areas got disrupted during COVID-19 pandemic (Tas, et al., 2021). As above table is showing that consumption of government's finance increased for health and communication due to COVID-19 health-related issues and decreased in food, beverages and transport due to lockdown. Pakistan implemented a complete lockdown in 2019 which caused decreased consumption in education and hotels and restaurants (Nabila, et al., 2020). The prices of goods and services were increasing and the consumption structure got highly disturbed. The 82% proportion of consumption has resulted into unemployment and price inflation.

4.2. Government Expenditures

The pandemic did hit the working and poor class hard as lockdown caused shut down of jobs and businesses. During this time, Pakistan started relief package of 1.2 trillion to manage and compensate the financial loss to the poor economy class of Pakistan. During 2019 and 2020, the transfer payments which include pensions and salaries declined and most of the government expenditures were used for Corona virus treatment and prohibition (Chohan, 2020). To ensure Universal Health Coverage (UHC), the federal and provisional government of Pakistan's expenditures on health and medical treatment increased by 2 billion (41 billion in 2018 and 43 billion by 2019 and 2020). The health expenditures took only 1.2% of GDP due to an already decrease in GDP during pandemic. In 2020, Public Sector Development Program was started by government of Pakistan to improve the sustainable financial and public sector developmental process.

4.3. Expenditure on GDP of Pakistan 2020

EXPENDITURE CATEGORIES	PROPORTIONS
Expenditures of government (Government)	14%
Gross fixed capital formation (Investment)	14%
Household consumption (Consumption)	82%
Imports of services and goods (Imports)	-20%
Exports of services and goods (Exports)	10%
GDP by expenditures	100%

The above table shows the division of government expenditures and their proportion in the GDP of Pakistan. This financial record is showing that during lockdown, Pakistan's imports expenditures increased and exports expenditures decreased. This caused a decrease in the annual GDP of Pakistan in 2019 and 2020. The ratio of household consumption remained on top which affected the economy negatively (Chohan, 2020). According to State Bank of Pakistan, Pakistan paid $11.88 billion during 2019-2020 as external debt (Dawn, 2021), However, the surplus of $425 million in FY21 will help the government to improve foreign exchange reserves. The interest rate and tax on debt and imports also increased which affected the economic infrastructure by 3X as compared to 2017 and 2018 (Chohan, 2020).

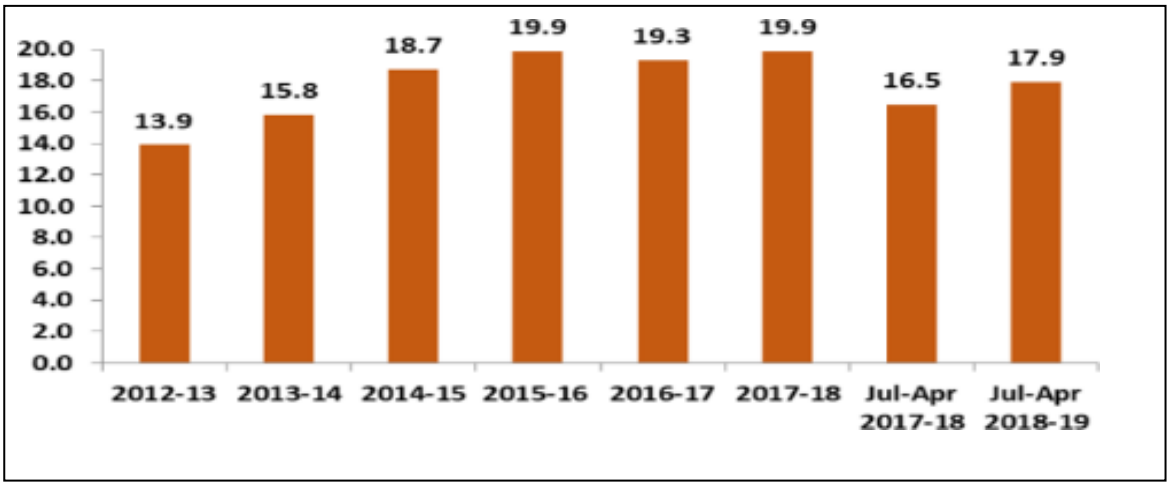
4.4. Investments

The investment in exports also declined the whole 2020, especially from February 2020 to the middle of the year (Sareen, 2020). The lockdown, business shutdown, and death rates have significant negative relationship with Imports of Pakistan during COVID-19. The low investment also caused price inflation and price inflation caused decrease in international trade and exports. The shortage of gas, oil and electricity in Pakistani companies also played significant role in slowing down the process of foreign investment and exports (Sareen, 2020). During COVID-19 period of 2019-2020, the development in machinery and advance production process also fell down. From 14% of investment in exports goods and services, 10% is private investment and 4% is for public investment. The investment in international contracts like CPEC also declined in 2020, as compared to 2017-2018. The industrial sector is the biggest source of exports and it faced immense loss during 2019-2020.

4.5. Exports of Pakistan during COVID-19

There are some great impacts on Pakistani economy due to pandemic situation. Trade deficit expanded marginally by US$ 115 million to US$ 5.8 Billion during the 1st quarter of the current FY. During this period imports grew from US$ 11.2 Billion last FY to US$ 11.2 Billion during the current FY 1st quarter. On the other hand, exports declined from US$ 5.51 Billion to US$ 5.46 Billion. The orders for exports are booked, where a country signs a deal of exports with any other country, but the lockdown and rapid spread of virus cancelled many of the already signed orders (Nabila, et al., 2020). Many countries, including USA, Saudi Arabia and Italy cancelled garments, agriculture and sports related exports from Pakistan due to COVID-19 outbreak. The cancellation of exports orders not only affected the economy of the country but millions of workers also suffered immense economic crisis. Most of the industries didn't pay the workers as the mills were closed and companies were not getting any profit. Around 4 million workers faced unemployment as they were employed in garments industries in Pakistan. The garments industry covers the 13% of total GDP and decreased export directly affected 13% of GDP (Sareen, 2020)
An important mention, about exports of Pakistan during 2019 and 2020, is that the "exports of labor" played an important role to compensate the continuously falling economy of Pakistan. A vast number of overseas Pakistani are working in other countries and Pakistan is roughly getting $1 billion annual remittance from abroad because of exported labor. Many of the overseas Pakistani labor were sent back to country when the COVID-19 outbreak started (Chohan, 2020). The following graph is showing the ratio of "export labor" of Pakistan, from 2012-2019:

4.6. Model of Forecast Decline in GDP of Pakistan during COVID-19



2020 Forecast		2021 Forecast				
Q4	Total	Q1	Q2	Q3	Q4	Total
-7%	-2.5%	-1%	0%	2%	4%	5%
-7%	-2.5%	-3%	-1%	0%	2%	-2%
-7%	-2.5%	-3%	-2%	-2%	0%	-7%

Source: (Chohan, 2020)

5. CONCLUSION

The conclusion of this research article discusses that how COVID – 19 Pandemic has affected the economic growth of whole world including Pakistan. The pandemic situation brings different opportunities in various sectors. Pakistan's economy shrinks down by $15.12 billion. No doubt this situation declines the growth in every sector dropping down the Gross Domestic Product (GDP) and results a negative growth in its initial time period i.e., FY 2019-2020. But then due to smart policies Pakistan's economy starts rising up and stabilized in FY 2020-2021. But as this situation is unpredictable, we still have to face many challenges in order to increase the economic growth. There are some great impacts on Pakistan economy due to pandemic situation. Trade deficit expanded marginally by US$ 115 million to US$ 5.8 Billion during the 1st quarter of the current FY. During this period imports grew from US$ 11.2 Billion last FY to US$ 11.2 Billion during the current FY 1st quarter. On the other hand, exports declined from US$ 5.51 Billion to US$ 5.46 Billion. We can use this study for future analysis of impacts of COVID – 19 on other sectors of life.

Sr No.	Limitations	Future Directions
1	Scope and generalizability of research	Further research can use IRP, ANP, AHP, other MCMD techniques.
2	Limited data and limited scope of analysis	TISM may be used which explains both nodes and links in a digraph or Fuzzy ISM/TISM which has greater interpretability
3	ISM method only identifies but not quantify the relationships	SEM, PCA, AHP, ANP, TOPSIS, GRA or some other weighing method may be used for future research to quantify the relationships
4	Key factors only from experts' judgment/literature hence may be biased/some factors might have been overlooked	Factors may be explored by using other techniques like PCA or rather thorough literature review can be conducted to: 1. Find other relevant factors/variables 2. Further explore the current factors using both inductive and deductive methods 3. Explore other related interesting issues
5	The research was conducted in the context of Pakistan since there are varying cultural, social, technological and political systems therefore generalization of results is limited	The research may be replicated in different contexts/countries/sectors to enhance the frontiers of theoretical contribution
6	The model statistically not tested and validated	Future researches may statistically validate the model using other statistical techniques like SEM (co-variance based or PLS based) which can enhance utility of the model
7	Few stakeholders	Extensive research may be conducted taking inputs from other stakeholders

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A Comparative Study on Turkey's Science and Technology (S&T) Indicators

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Abstract
Science and technology (S&T) indicators are important in evaluating how successful countries are in factors described by endogenous growth models. Accordingly, the aim of this paper is to investigate S&T indicators of Turkey in a comparative and more hitherto comprehensive study and to present a guiding reference for researchers and decision makers working on innovation and technology policies. This study was carried out using online databases such as those of the OECD, World Bank, Eurostat, and TÜİK considering the criteria used in the literature to measure countries' R&D and innovation performances, and Turkey's innovative performance is presented in comparison with the world's by summarizations within the scope of the study. The results demonstrate that Turkey has made significant progress in the last 20 years in terms of R&D and innovation, but it is still far from reaching the indicators of developed countries. In particular, the increase in R&D and innovation performance has decreased due to the economic difficulties experienced in the world and in Turkey after 2012 and 2013. Based on the indicators evaluated in this study, some suggestions are given and prioritized to increase Turkey's innovation performance.

Keywords: Innovation, Science and Technology Indicators, Turkey's Performance, Research and Development

1. Introduction

Since Austrian economist Joseph Schumpeter defined innovation as the key driver behind social and economic development in the 1930s, it has been indisputably accepted by everyone that innovation plays a critical role in the development of industries and, thereby, in the economic growth of countries (Haneda & Ito, 2018). Both the diversification and rapid change of customer preferences and needs as well as the dizzying speed of technological developments and intensifying globalization, investigated in the scope of technological and market turbulence today, force industries to focus intensely on achieving innovation. It is also clearly observed today that advanced countries contribute to the welfare of both their own societies and the world, and that they influence the innovation policies of developing and less developed countries with the technologies they develop. For example, Industry 4.0, which is based on the rationale of integrating digital technologies into production processes, is spreading all over

the world as a strategy of developed economies to regain and maintain their competitive power in manufacturing. This suggests that integrating the workflows of advanced technologies into continuous improvement methodologies will bring higher industrial performance (Dalenogare, Benitez, Ayala, & Frank, 2018). Industry 4.0 is a phenomenon that will influence the future of production. In this sense, it would not be wrong to say that the national innovative capacities of countries are indicators of their economic power in the world (Furman, Porter, & Stern, 2002).

As seen in Figure 1, Turkey is an upper middle-income country according to the classification by gross national income (GNI) per capita, using the purchasing power parity calculation (
Table 1). The literature acknowledges that countries stuck at this income level for more than 15 to 20 years have fallen into the middle-income trap (Bresser-Pereira, Araújo, & Costa Peres, 2020). The term "middle-income trap" indicates a country's inability to join the group of nations with high-income (Abdon, Felipe, & Kumar, 2012). This inability is mostly due to a country's failure to transition from low-value-added to high-value-added sectors. Countries experiencing the middle-income trap are those that have surpassed low-income levels and made substantial social and economic developments but have not yet reached the levels achieved by advanced countries.

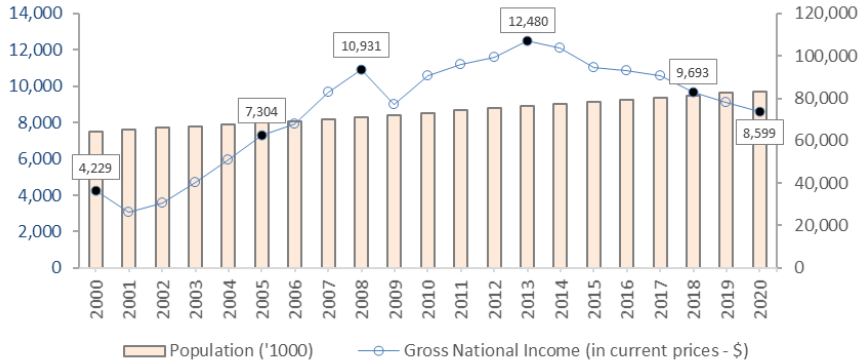


Figure 1: GNI per capita (USD) and total population in Turkey (TÜİK, 2021)

Since these countries do not have enough resources or capabilities to produce knowledge and develop innovative products, processes, and services in order to compete with highly skilled producers in developed economies, their economic growth slows down, and they end up trapped in the middle-income group (Yilmaz, 2014).

With the economic reforms initiated since the early 2000s, Turkey's GNI per capita has increased, and the country is now classified as an upper-middle income country (Figure 1). However, the advantages of having labor-intensive industries and the use of cheap labor, which are benefits while moving up from the lower-middle income level to the upper-middle income level, are gradually being lost. In fact, the relatively low growth rates in Turkey in recent years clearly demonstrate the disappearance of this advantage (1.8% in 2020, 0.9% in 2019, and 2.6% in 2018).

Table 1: World Bank classification of countries based on income (July 2020)
(Classification is updated each year on July 1st)

	Average Income per capita per year
Low-income level	$ 1,035 or less
Middle-income level	$ 1,036 to $ 12,535
– *Lower-middle income level*	$ 1,036 to $ 4,045
– *Upper-middle income level*	$ 4,046 to $ 12,535
High income level	$ 12,536 or more

(Serajuddin & Hamedah, 2021; Worldbank, 2020)

Most economists agree that Turkey has been stuck in the middle-income trap since 2008. Although a positive trend appeared to emerge in 2010 and 2011, it reversed in 2012 and 2013. However, arguing neither the notion of the

middle-income trap nor whether Turkey is in the middle-income trap is the aim of this study. The main reason for mentioning this is that the steps Turkey must take to get out of the middle-income trap coincide with the steps that Turkey must take to become one of the top ten economies of the world.

Today, technological innovation is a major driver in the development of countries and the sustaining of competitiveness, which requires building powerful technological knowledge, conducting intense research and development (R&D) activities and supporting entrepreneurs and entrepreneurship (Gackstatter, Kotzemir, & Meissner, 2014; Raghupathi & Raghupathi, 2019). Accordingly, being Europe's 6th and the world's 13th largest economy as of 2020, Turkey should take strategic steps with R&D and innovation policies in order to rise to the level of advanced countries by developing its own technologies, allocating more financial and human resources to R&D and innovation, and improving its innovation ecosystem. With that aim, the Turkish government will need to embrace a proactive role in the design of the necessary incentive systems, invest larger volumes of resources in both R&D and education, support those industries that represent comparative advantages for the country, and increase its focus on capability accumulation and advancements in industrial upgrading (Gemici & Öztürk, 2020). In this paper, while investigating the selected science and technology (S&T) indicators of Turkey and other countries through a review of the statistics of the OECD (Organization for Economic Co-operation and Development), World Bank, Eurostat (Statistical Office of the European Union), TÜİK (Turkish Statistical Institute), and TPE (Turkish Patent Institute), we pursue insights that will reveal the matter of the innovativeness of Turkey and accordingly, its growth. Our approach in this article is to discuss the resources seen as inputs and the results seen as outputs, in search of the innovativeness of a country. Innovation inputs are the efforts in R&D, represented by financial resources allocated to R&D and available human resources to conduct R&D and achieve innovation. Innovation outputs, on the other hand, are assessed by patent applications and registrations and scientific publications originating from a country (Raghupathi & Raghupathi, 2019). At the same time, we will argue the role of government policies in innovation as considered as one of the determinants for enhancing the innovation capacity of countries.

2. Endogenous Growth Theory, Technological Innovation and R&D

According to the Oslo Manual published by the OECD, "innovation is defined as the implementation of a new or significantly improved product/service, process, marketing method, or organizational method in business practices, workplace organization, or external relations" (Oslo Manual, 2018). Despite this broad definition of innovation, today it is technological innovation that dominates the world, creates value, and drives economic growth. The process of a novel concept embodied in tools, methods, or procedures that are of practical use to society is referred to as technological innovation (Tornatzky & Fleischer, 1990). These are new products or processes and new technologies that include significant technological changes in products or processes and have profound effects on people's lives as well as contributing to the growth of countries (Carayannis, Samara, & Bakouros, 2015). Technological innovation emerges by matching a novel solution obtained from scientific and technological knowledge with a real or perceived need and makes that solution feasible and producible (Garcia & Calantone, 2002). Through the eyes of economists, technological innovation is considered as one of the main factors that lead to increased productivity and economic growth of countries.

Instead of neo-classical growth models that treat technological progress as an external factor and therefore cannot fully explain economic growth, so-called "endogenous growth models" have been developed in the world since the 1980s. According to endogenous growth theory, the forces that change economic structures and industry landscapes come from within the system. This kind of growth is driven by the internal forces governing the opportunities and incentives to create technological knowledge (Furman et al., 2002). In this regard, endogenous growth models emphasize that human capital, knowledge and technology are the main contributors to a country's innovation and economic growth, which need to be developed in-house (Raghupathi & Raghupathi, 2019). This perspective is also in line with Schumpeter's vision because he focused on endogenous factors to explain the economic system (Shane, 2009). The first economic growth model based on R&D and human capital was proposed by Romer (1990), and then that model was expanded by Grossman and Helpman (1991) and Aghion and Howitt (1992). The rationale behind these models is that every additional resource allocated to R&D and the presence of skilled human resources contribute to the development of new products and manufacturing techniques and the

increase of countries' competitiveness by improving productivity and innovativeness, eventually leading to the economic growth of countries (Aghion & Howitt, 1992; Grossman & Helpman, 1991; Romer, 1990). As a result of this approach, both developed and developing countries allocate more and more resources to R&D and develop a highly skilled workforce today.

Although innovation is acknowledged as "something new", "an invention", "a new idea" in various sources, in fact, it encompasses all processes, involving the effective transformation of ideas into action, including design and evaluation phases (Carayannis et al., 2015). In this sense, R&D activities, which are strong indicators of innovative efforts, constitute an important part of this process (Greenhalg & Rogers, 2010). R&D is described as any creative effort that is done in a methodical way to expand stock and apply knowledge to develop new applications (OECD, 2015). In fact, R&D constitutes a wide range that stretches from basic research targeting only the production of new knowledge without considering its utility to efforts that will enable the improvement of existing products or processes (Forbes & Wield, 2004). As seen in Figure 2, the innovation process comprises R&D, commercialization, and diffusion stages.

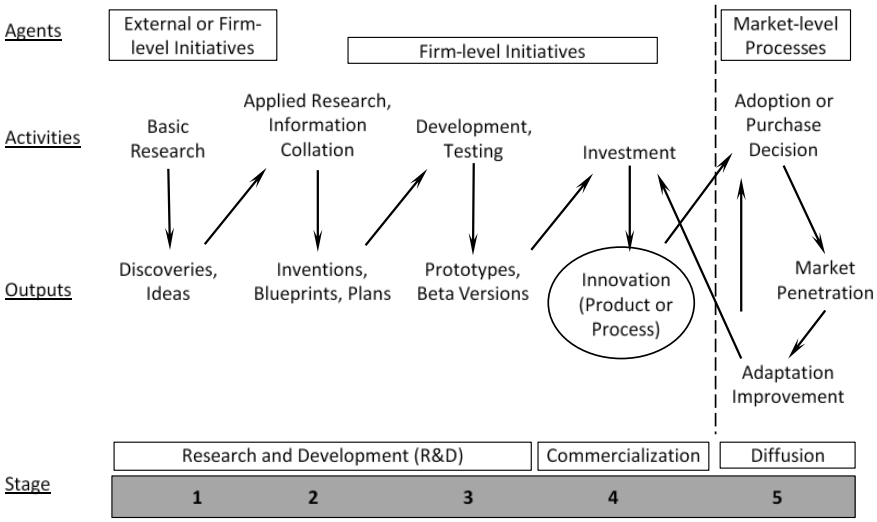


Figure 2: The Innovation Process (Greenhalg & Rogers, 2010)

Because the traditional aim of R&D is the creation of new goods and processes, R&D activities constitute an essential contribution to national innovation (Forbes & Wield, 2004; Raghupathi & Raghupathi, 2019). It is important to note here that, in developed countries, research (R) accounts for roughly half of overall government R&D expenditures, while development (D) accounts for two-thirds of R&D expenditure of industries. At the same time, most of the fundamental research is funded by the government and carried out at universities. In this sense, R&D is considered mostly as development (D) in business enterprises (Forbes & Wield, 2004). In advanced economies with high GNI per capita, it is observed that government incentives for R&D are increasing every year. The fact that high-income countries are ahead in science and technology is a result of this approach. Accordingly, most countries improve various support mechanisms in order to expand R&D activities throughout the country, which are considered strategic in terms of achieving economic growth, and to have R&D-based models of economic development.

3. Brief Historical Background of Strengthening Innovation and R&D in Turkey

As is known, countries that have high R&D expenditures as a percentage of GDP rank higher in the Global Competitiveness Index and this leads to sustainable welfare beyond growth. The post-World War II era saw the most rapid development in industrial R&D and R&D studies became routine in large companies, thus entering the innovation agendas of countries (Drejer, 1997). On the other hand, in developing countries, R&D efforts usually began in state-sponsored laboratories (Forbes & Wield, 2004).

Although Turkey did not follow aggressive policies that would penetrate at grassroots levels in promoting R&D

and innovation until the 2000s, we will review the steps taken in this regard in the history of the Turkish Republic. In Turkey, the Law for the Encouragement of Industries that was enacted in 1927 became the country's first encouragement law, as a result of the Industrial Development Initiative launched by the first Izmir Economic Congress in 1923. Later, the Urgent Industrial Plan in 1946, Economic Development Plan (also known as the Vaner Plan) in 1947, and Law No. 5821 on the Foreign Capital Incentive Law in 1951 were put into action. Up until 1973, some amendments were made to these laws. The Industrial Investment and Credit Bank was also established in 1963 to provide loans to industries (Ahmad, 1993). In addition, the State Planning Organization was established in the early 1960s. A planned development period having been initiated with the First Five-Year Development Plan in Turkey, it was aimed to encourage the private sector to invest in the country and adopt an import substitution strategy. In the same period, in 1963, TÜBİTAK (the Scientific and Technological Research Council of Turkey) was founded, and the first steps were taken toward a transition to a knowledge-based economy. Turkey implemented a mixed economic system until the decisions announced on January 24, 1980. After that, economic liberalism with an export-based growth model was adopted. Until 2009, incentive systems based mostly on investment were maintained to support growth and development. In that year, an incentive system was introduced based on R&D and aimed at narrowing regional disparities (Candan & Yurdadog, 2017).

On the one hand, the growth of the country is encouraged with investment incentive policies, while on the other hand, some steps have been taken in science and industrial policies in order to manage the transition to a knowledge-based economy. Twenty years after the establishment of TÜBİTAK, in 1983, the Supreme Council for Science and Technology was founded for the purpose of assisting the government in determining long-term science and technology policies, setting goals, identifying priority areas, preparing plans and programs, deploying public institutions, cooperating with the private sector, preparing for law-drafting and legislation, helping to train researchers, leading the establishment of research centers, and ensuring coordination between industry and institutions. The reports entitled "1983-2003 Turkish Science Policy" and "1993-2003 Turkish Science and Technology Policy" were the first important steps taken by the Supreme Council for Science and Technology in the efforts of policy development. Since the desired path could not be achieved over time with these steps, a vision and a strategy for science and industry policies was determined with the aim of creating an ever-more innovative society through the "Vision 2023: Science and Technology Strategies" report in 2001 prepared by the Supreme Council for Science and Technology (TÜBİTAK, 2004). From this point on, Turkey has taken important steps in the fields of science and technology, its economy has developed, and it managed to be included among the upper-middle-income countries by exceeding gross national income per capita of $10,000. Indeed, the indicators discussed in this study demonstrate the increased momentum of Turkey in the 2000s. Now, it is necessary to set more result-oriented goals to get out of the middle-income trap and move up into the upper-income group of countries.

In the framework within EU-Turkey Customs Union & Policy Harmonization, the Turkish Patent Institute (TPE) and the Turkish Competition Authority were founded in 1996. In the same year, the Turkish Academy of Sciences (TÜBA), Technology Development Foundation of Turkey (TTGV), and National Metrology Institute (UME) was established (Candan & Yurdadog, 2017). These steps have been the premises of the advances of Turkey in the fields of science and technology in the 2000s.

4. Role of Government Policies in Innovation

The economic function of government appears to be divided between neoliberalism and statism, with the former advocating market-led development and the latter advocating government intervention (Wang, 2018). Although the same is true for innovation policies, the literature emphasizes the active role played by governments in steadily enhancing the national innovation capacities of countries. The argument has been made that by establishing clear standards and policies, governments can facilitate technological transformation and sustainable development (Patanakul & Pinto, 2014). Indeed, governments play a key role in supporting R&D and innovation through making policies, giving targeted incentives, enabling R&D collaboration, and undertaking coordination role (Raghupathi & Raghupathi, 2019). In this sense, most government intervention falls into one of two categories: directive intervention in which arrangements in investment and manufacturing models in certain industries are made with the goal of achieving specified results; and facilitative intervention aimed at providing public services

such as infrastructure investments and education policy development programs in order to create a favorable climate for private firms. The government considers that some sectors and products are more vital than others, thus it uses directive intervention to strategically concentrate capital in certain businesses. On the other hand, the government's facilitative approach aims to encourage innovation by establishing institutions that support a healthy culture and focusing policy on removing barriers to private involvement in innovation (Wang, 2018).

Particularly, diverse needs, technological and market turbulence, and political uncertainties have put governments in the inevitable position of intervening in both social and economic fields. Both developed and developing countries adopt this approach effectively with the implementation of instruments such as direct or indirect and monetary or non-monetary grants provided to public institutions, the private sector, and research institutions for R&D and innovation. These incentives are classified based on their objectives (supporting R&D and innovation, increasing export volume, increasing investment, attracting foreign direct investment, ensuring inter-regional equity, accelerating economic development), their scope (general/special purpose incentives), their awarded time (pre-investment, during the investment, post-investment), and their tool used (in-kind, in-cash, tax incentives) (Candan & Yurdadog, 2017). All these incentives are defined as "grants and government supports" and are used as some of the most effective financial instruments by the government to influence the socio-economic realm in Turkey today.

Directly supporting R&D, offering tax incentives for investments in the field of sustainable technology, and applying further initiatives for technical assistance in the area of industrial policies can certainly help in creating a more fruitful environments for business (Patanakul & Pinto, 2014). Since the early 2000s, Turkey has implemented policies in line with improving the innovation ecosystem and started to give strong incentives for R&D to SMEs, large firms, and universities. In fact, going a step further, investment incentives and strategic investment programs have been created for the commercialization of R&D outputs and inventions, which are the most important part of innovativeness. With the Law on Technology Development Zones enacted in 2001, firms in technology development zones were provided a partial tax exemption for their R&D activities. Although the tax exemption was limited to 40% with Law No. 5228 enacted in 2004, this rate was increased to 100% afterwards. After a while, it was realized that these incentives were insufficient, and Law No. 5746 on supporting R&D activities was enacted in 2008. Also, there have been legislative updates regarding both laws over time. With these laws, strategic policies were determined, and grants were provided through TÜBİTAK to support both the development of human capital and R&D activities of private and public institutions. In addition, through the Small and Medium Industry Development Organization (KOSGEB), grants and credit advantages were made available to SMEs (Candan & Yurdadog, 2017).

5. Science and Technology (S&T) Indicators

S&T indicators are international measure, analysis, and comparison tools to support the awareness and evolution of R&D activities. Governments and researchers have been measuring S&T for more than 50 years in order to determine the strengths and weaknesses to reach national objectives in terms of the national capacity and performance of the countries (Benoît Godin, 2003).

Although S&T indicators are very diverse, in this paper, we will review the main indicators, namely financial resources devoted to R&D, the availability of skilled human resources, and patent and scientific publication statistics (Raghupathi & Raghupathi, 2019).

5.1 R&D expenditure (gross expenditure on R&D GERD)/R&D expenditure as a percentage of GDP

The most important factor for effective and efficient R&D is to allocate sufficient financial resources to this field. For this purpose, one of the most important criteria used to assess the R&D and innovation efficiency of a country is R&D expenditure. R&D expenditure is used to encourage innovation, economic growth and sustainable development and to offer a boost to a country's competitiveness (Benoit Godin, 2003). The changing of R&D expenditures suggests the evolution of long-term policies and strategies associated with innovation for the development of the economy.

In the late 1950s and early 1960s, economists were interested in linking R&D to economic growth. J.D. Bernal measured research budgets as a percentage of national income for the first time, comparing the UK's performance with that of the USA and USSR and he suggested that between one-half percent and one percent of the UK's national income should be spent on research (Benoit Godin, 2003). Later, R&D expenditure as a percentage of GDP started to be measured, which is particularly useful for making international comparisons. As stated in the first edition of the Frascati handbook, the American GERD/GNP ratio of the early 1960s, i.e. 3%, was supported as the percentage that OECD member countries would target. It was emphasized that a high level of R&D expenditure as a percentage of GDP is of great importance in terms of strengthening domestic industries and reducing foreign dependency.

As seen from Figure 3, from the early 2000s onwards, R&D expenditure as a percentage of GDP has been increasing each year in Turkey. However, when compared to other countries, it is clearly observed that Turkey needs to allocate more financial resources to R&D in order to gain a competitive edge in the field of advanced technology. For example, R&D expenditure as a percentage of GDP in Korea is remarkable. While this rate is around 3% in many developed countries, it is 4.64% in Korea. Accordingly, Korea has displayed extraordinary economic growth and global integration to become a high-tech industrialized country over the last years. Also, while many see China as only the world's manufacturing powerhouse, the same figure in China was 2.1% in 2019, which shows the innovative potential of the country. Scientific publications and the number of patent applications in China that we will review in the following figures (see Figure 15 and Figure 17) are also indicators supportive of this.

On the other hand, R&D expenditure as a percentage of GDP in the EU has not significantly increased since 2000. This situation may occur because while the new members of the EU increase the EU's total GDP, the R&D expenditures of those members do not contribute to the total R&D expenditure at the same rate. However, as is known, the EU is making considerable efforts to increase its R&D potential, particularly with the Framework Programmes for Research and Technological Development. The Framework Programmes, which encompass practically all scientific fields, have been the principal funding mechanisms through which the EU has supported research and development activities. Also, the rate of economically active Germany within the EU is similar to that of the USA, which is around 3% since the 2010s. Furthermore, Germany's government has now targeted this figure at 3.5%, which can be achieved by 2025 ("Germany Trade&Invest," 2021).

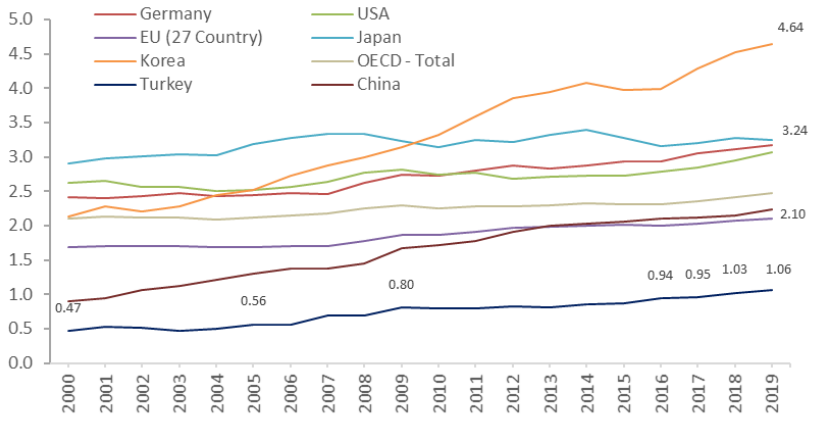


Figure 3: R&D expenditures as percentage of GDP (%) (OECD, 2021)

Turkey's R&D allocations over the years offer significant findings. While R&D expenditures of approximately 800 million Turkish lira (TL) were made as 0.47% of GDP in 2000, this value was approximately 46 billion TL as 1.06% of GDP in 2019 (Figure 4). During this period, R&D expenditures increased about sixty times. Although R&D expenditures have increased considerably, the fact that the share did not increase is due to the concurrent significant increase in GDP. However, these figures are far from the target of 3% R&D expenditure specified in "Vision 2023: Science and Technology Strategies" by TÜBİTAK (TÜBİTAK, 2004). Considering that the GDP

target set for 2023 is 2 trillion USD, the amount of expenditures required for R&D, which is 3%, is 60 billion USD.

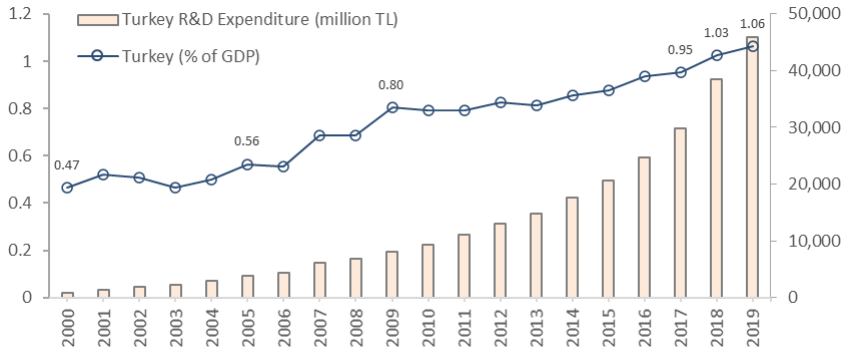


Figure 4: R&D expenditure as a percentage of GDP and total R&D expenditure in Turkey (million TL) (OECD, 2021)

In addition to a steady increase in R&D spending in Turkey over the years, the distribution of R&D expenditure by sectors offers important insights. Gross domestic expenditure on R&D (GERD) is the sum of the R&D expenditures of four sectors: business enterprise, government, higher education, and non-profit (Raghupathi & Raghupathi, 2019). Business enterprise R&D expenditure (BERD) is key in measuring the contribution of businesses to innovation. There is no doubt that business enterprises are important actors in bringing out new products, processes, and services. Although every effort toward R&D does not yield positive results, commercially, the commitment of firms to the generation and implementation of new ideas is an important indicator. At the same time, higher education institutions are also important players in a modern knowledge economy, performing basic and applied research. In this sense, higher education expenditure on R&D (HERD) is the component of GERD that is incurred by entities in the higher education industry. On the other hand, GOVERD stands for government R&D expenditures, which is a component of GERD incurred by government sector (OECD, 2015). For a country to have a say in high technology fields in the world, state R&D expenditures are necessary. This is also important for the R&D transformation of industries. In this way, human resources will develop and the government will act as a role model. In addition, it is important for the government to act as a catalyst by incurring R&D expenses itself, especially in high-risk industries.

In the following figures, we will review the distribution of the three main sectors in GERD. As seen from Figure 5, R&D expenditures in Turkey have been increasingly undertaken by business enterprises over time. This demonstrates that the R&D awareness of business enterprises has increased over time. The share of overall R&D expenditure of business enterprises increased from 0.16% in the 2000s to 0.68% in 2019. Business enterprises increased their R&D expenditures more than four times during this period.

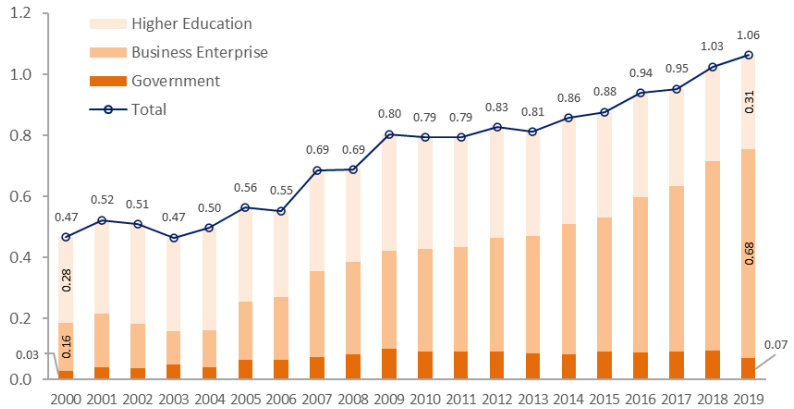


Figure 5: Distribution of R&D expenditure by sectors in Turkey (OECD, 2021)

On the other hand, Figure 6 shows the levels of R&D expenditures for the private sector funded by governments

in selected countries. In Turkey, this rate has increased every year since 2000. As can be seen from Figure 6, unlike other countries, the funding of R&D expenditures for the private sector by the government is in an increasing trend in Turkey, and this rate is almost twice that of other countries. This shows that the state is exerting significant effort to direct business enterprises toward R&D culture.

Also, in order for the private sector to not abandon R&D activities, during the times of crisis in 2008 and 2009, particularly Turkey, Korea, and the USA increased their R&D support for business enterprises.

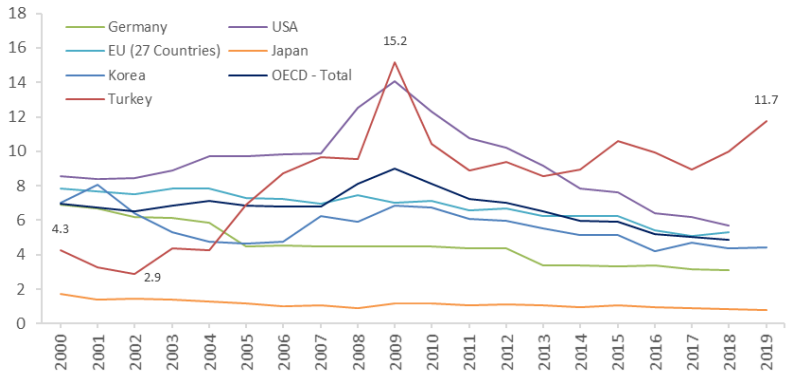


Figure 6: Ratio of Private Sector R&D Expenditures funded by governments (OECD, 2021)

In addition, Figure 6 tells us that as the development levels of countries increase, the support of the state to the private sector in terms of R&D decreases or stays stable. On the other hand, Japan differs from other countries in this regard. Although a decreasing trend has also been observed in Japan, the rate of private sector R&D expenditures funded by the government there has been lower than that of other countries since 2000, which demonstrates the high R&D awareness of the companies themselves. Furthermore, in Korea, which hosts giant technology brands, government funding of R&D expenditures made by the private sector has started to decrease, especially since 2010.

As can be seen from Figure 7, the major contribution to the total R&D expenditures of countries comes from business enterprises. For example, while R&D expenditure as a percentage of GDP was 4.64% in Korea in 2019, a very large part of that rate, 3.73%, was contributed by business enterprises (Figure 7). Meanwhile, only 4.4% of this expenditure was funded by the government (Figure 6).

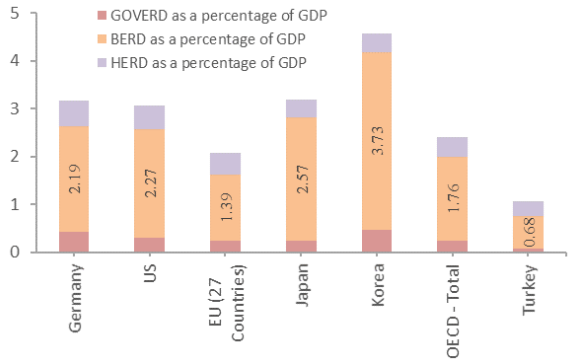


Figure 7: R&D expenditures by sectors (2019) (OECD, 2021)

5.2 Human resources in science and technology

Individuals' knowledge, skills, abilities, and traits that promote the building of personal, societal, and economic well-being are referred to as human capital (Keely, 2007). The degree of human capital in a country has an impact on its national innovation performance (Suseno, Standing, Kiani-Mavi, & Jackson, 2020). Accordingly, skills development is a constant priority for governments in both developed and developing nations in order to promote

the enhancement of human capital for their nations' productivity, economic success, and wealth (Cannon, 2000). HRST are defined according to the Canberra Manual as people with tertiary education or who work in a scientific and technology occupation that requires a high level of qualification and has a high level of innovation potential (OECD, 1995). Human resources in science and technology (HRST) are accepted as major actors in innovation. If a country is lacking in highly skilled scientists or engineers who are able to conduct their work with the newest technologies, that country will probably not be producing significant amounts of innovative output (Furman et al., 2002). The level of national innovation and the potential for scientific and technological advancement is determined by the amount, structure, and efficiency of HRST in a country. Accordingly, when looking at developed countries such as Germany, the USA, and North European countries, it is seen that there is a large volume of educated and skilled human resources in the innovation ecosystem.

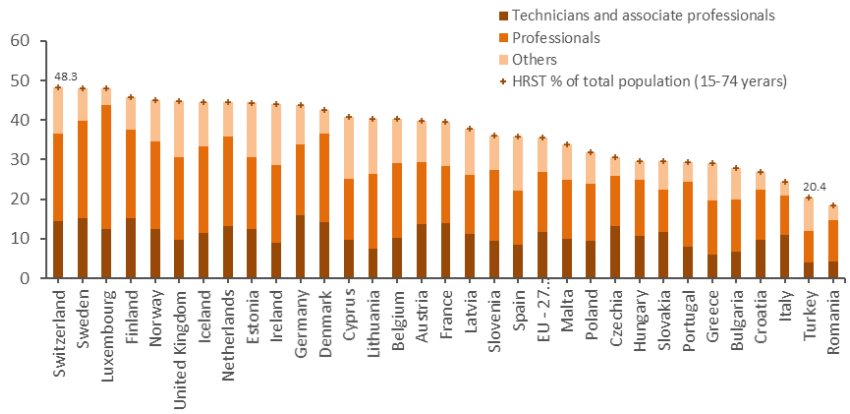


Figure 8: Share of persons with tertiary education and/or employed in science and technology (%, 2020) (Eurostat, 2021a)

Figure 8 clearly shows that developed countries have great potential for innovation because almost fifty percent of their total populations have received tertiary education or are already employed in science and technology (Note 1). At the same time, Germany stands out with its rate of technicians and associate professionals, which is a natural consequence of being an advanced industrial country. Considering that Germany is the most populous European country, it can be said that Germany has successfully managed its human resources. On the other hand, unfortunately, both the rate of HRST in the total population and the rate of technicians and associate professionals in HRST are quite low in Turkey compared to other countries. This indicates the difficulty of today's manufacturers in Turkey in finding intermediate-level employees. For Turkey to become a productive industrial country, the number of intermediate-level employees should be increased rapidly. At the same time, it is seen that Turkey aims to increase the rate of tertiary education in HRST by increasing the number of universities. Of course, the quality of education is a separate topic of discussion.

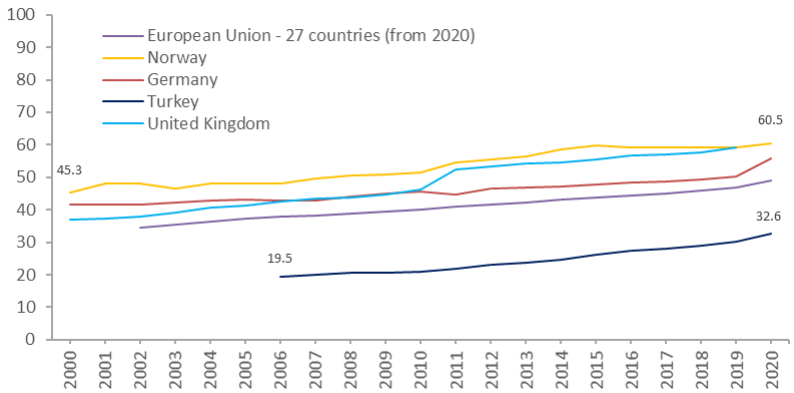


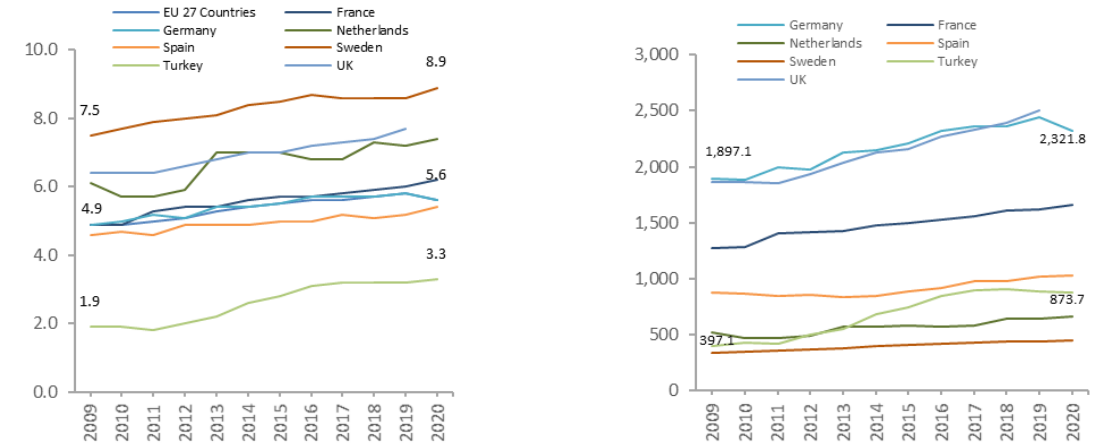
Figure 9: Share of science and technology employment in the active population (25-64 years) (Eurostat, 2021c)

Figure 9 shows the development of the active population in the age group of 25-64 that is classified as HRST (i.e.,

having successfully completed an education at the tertiary level or being employed in the fields of science and technology) as a percentage of the total active population aged 25-64 for some selected countries.

According to the data regarding "HRST" prepared based on the 1995 Canberra Guide by the OECD, the share of the workforce in S&T fields in Turkey (graduates of higher education or those working in the fields of science and technology) in the total active population (population aged 25-64 years old) rose to 32.6% in 2020 from 19.5% in 2006. Although this value is below the European average of 49%, the growth rate over the past decade in Turkey is more than twice the average European growth rate (Figure 9). When compared to Germany, which is an industrial society and has a population size close to that of Turkey, it is seen that it is not sufficient. However, it was stated in the report prepared by the Department of Science, Technology, and Innovation Policy of TÜBİTAK that it is very important to direct young people toward the field of R&D, improve their career opportunities, and accordingly increase their income and train human resources in the fields of science and technology in line with the R&D activities of industries and the country (TÜBİTAK, 2010).

While the graphs above show the potential of a country to realize and contribute to innovation, those below present the statistics regarding the people working in the fields of science and technology.



(a) (b)

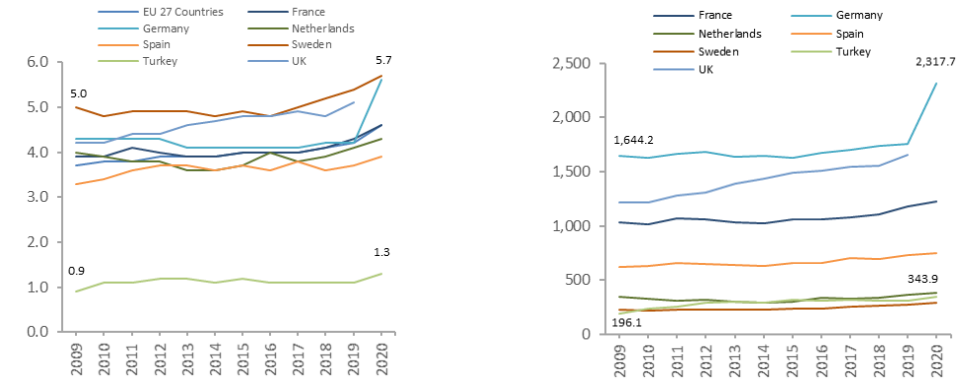
Figure 10: Employment in technology and knowledge-intensive sectors: a) Percentage of total employment (%), b) Number of employees (thousands) (Eurostat, 2021b)

When looking at the employment in technology and knowledge-intensive sectors, there is an increase in all countries, Figure 10. This shows that today's businesses are shifting toward technology-intensive areas. Although a significant increase in the employment in technology and knowledge-intensive sectors has been observed in Turkey since 2010, it is about half of the EU average. It is necessary to draw attention to an important issue here. Although Turkey has a rate half that of the EU average, the country has more human resources employed in technology-intensive sectors than some developed countries. For example, as of 2020, a total of 873,700 people worked in technology and knowledge-intensive sectors in Turkey; this figure is twice that of Sweden and 50% more than that of the Netherlands. This shows that Turkey can close the gap by increasing its technological output rapidly. On the other hand, the number of people working in technology and knowledge-intensive sectors in Turkey is almost one-third of that in Germany, which has a similar population. This shows that more steps need to be taken in this field.

Another indicator concerning technology and knowledge-intensive sectors is the number of employees in the field of advanced technology and their share in total employment. As seen from Figure 11, although it seems that the number of employees in the field of high technology in Turkey has increased over time (from 196,100 to 343,900 people), the share of total employment is well below that of developed countries. An important result emerging from Figure 11 is that there was a significant increase in all countries in 2020, and in Germany this increase was much higher.

Also, the number of employees in the field of high technology in Turkey is at the same level as in Sweden and the Netherlands. This is an important indicator in terms of the extent of employment in the field of high technologies in these countries, which have one-fifth of Turkey's population.

In short, Turkey should create more business volume in the field of high technology.

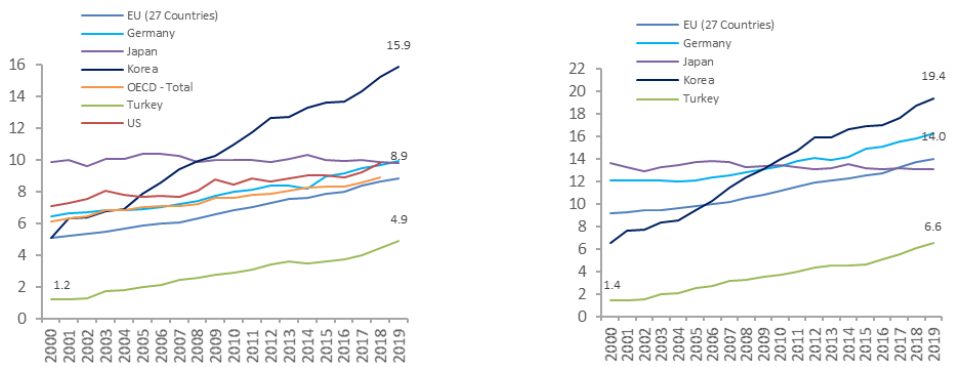


(a) (b)

Figure 11: Employment in high-technology sectors (high-technology manufacturing and knowledge-intensive high-technology services): a) Percentage of total employment (%), b) Number of employees (thousands) (Eurostat, 2021b)

Although the number of employees in the field of high technology in Turkey is more than that in the Netherlands and almost the same as in Sweden, those countries are much more assertive in technological innovativeness and have more GNI per capita, accordingly. This highlights the importance of the innovation ecosystem.

Similarly, the share of R&D employees and researchers in total employment in the fields of science and technology is considered as one of the performance indicators of a country. According to the Frascati Glossary, R&D personnel are defined as all persons directly engaged in R&D, whether employees of this entity or contributors from outside the company who are fully integrated into the R&D operations of the business, as well as those who provide direct support for R&D, such as managers, administrators, technicians, and clerical workers in an R&D function, are included in this entity. Researchers, technicians, and other support employees are all classed as R&D personnel based on their R&D role. Researchers are those who are involved in the development or conceptualization of new knowledge. They conduct research and develop or refine concepts, build theories and models, explore issues, and predict trends. When we look at the number of R&D personnel in total employment, it is seen that all countries except Japan have increased the number of R&D personnel and researchers in recent years, and Korea has far more employment in this area than any other country.



(a) (b)

Figure 12: a) Total researchers per thousand in total employment, b) Total R&D personnel per thousand in total employment (OECD, 2021)

It is further observed that Turkey has also increased its R&D employment in parallel with the increasing trend of the European Union and has been above the EU trend in the last few years in particular (Figure 12). It is understood that the law on technoparks for R&D and the law on R&D centers, implemented in Turkey in the last 15 years, have yielded results. Considering the rates of the EU average, Germany, and Korea, Turkey should employ more researchers.

Figure 13 demonstrates the share of doctorate holders by educational attainment in the years 2009, 2016 and 2019. The rate of those who have a doctorate degree among the educated population is 0.4% in Turkey in 2019, while this rate is around 2% in the US. Particularly, in northern countries, it is observed that the number of doctorate students has increased rapidly over the years, and it is understood that these rates coincide with the employment rates in the field of high technology. There was more than a twofold increase in Turkey between the years of 2009 and 2019. However, when compared to developed industrial countries, more doctoral researchers should be trained, similar to the above inferences.

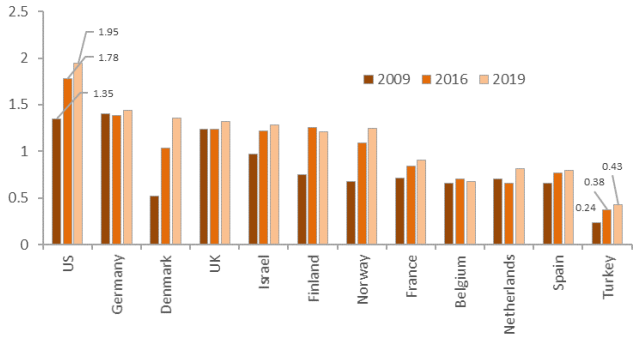


Figure 13: Share of doctorate holders by educational attainment (OECD, 2020b)

This verifies that scientific and technological activities can create more innovative results if they are carried out with competent employees. For example, one in three people with a doctoral degree in Denmark, the USA, and Belgium works in the industry (OECD, 2020a).

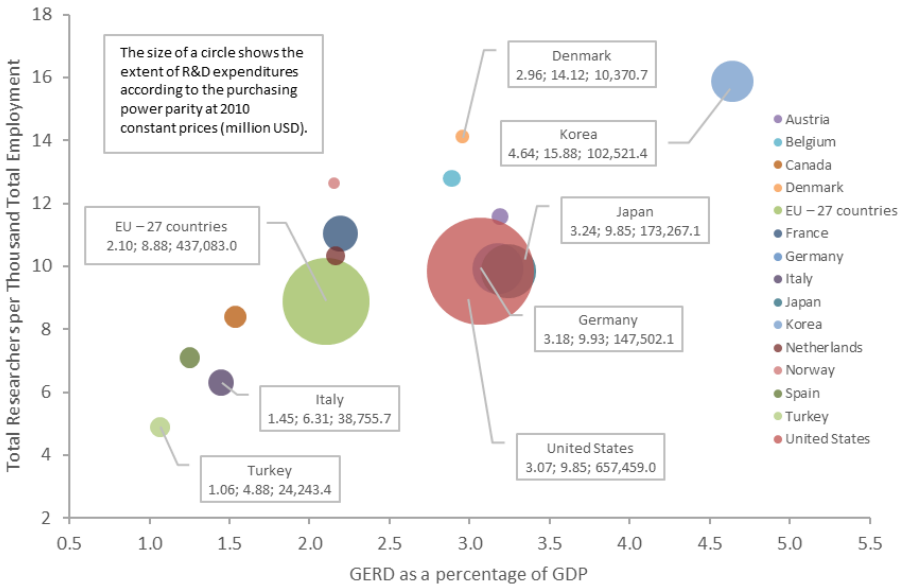


Figure 14: R&D expenditures of countries in 2019 (million USD), share of the number of Researchers in Total Employment (‰), and R&D expenditures as percentage of GDP (%) (OECD, 2021)

Figure 14 shows countries by total R&D expenditure, with the share of the number of researchers in total employment and R&D expenditures as a percentage of GDP in one shot. As can be seen from Figure 14, the USA and Japan are the two countries with the largest R&D expenditures in the world, at 657 billion USD and 173 billion

USD, respectively (R&D expenditures in the chart have been shown according to 2010 constant prices and purchasing power parity). Therefore, these countries are the first countries that come to mind when talking about technology, innovativeness, and, ultimately, social welfare. It is also a remarkable and important fact that the total R&D expenditure of the USA alone is higher than that of the EU (27 countries). Turkey is far behind the developed countries at approximately 25 billion USD of R&D expenditures (adjusted for purchasing power parity), 1.06% R&D expenditure as a percentage of GDP, and 4.9% researcher rate. This graph, which is a summary of the graphs given in detail above, gives an idea at a glance in terms of the R&D and innovation capacities of the countries.

5.3 Patents and scientific publications (outputs)

The financial and human resources mentioned above constitute the basic inputs of R&D and innovation activities. When we look at the outputs produced by these inputs, it is seen that developed countries are far ahead. Patents, which are the products of industrial activities, and scientific articles, which are the products of academic activities, are the main outputs that we will review in this section.

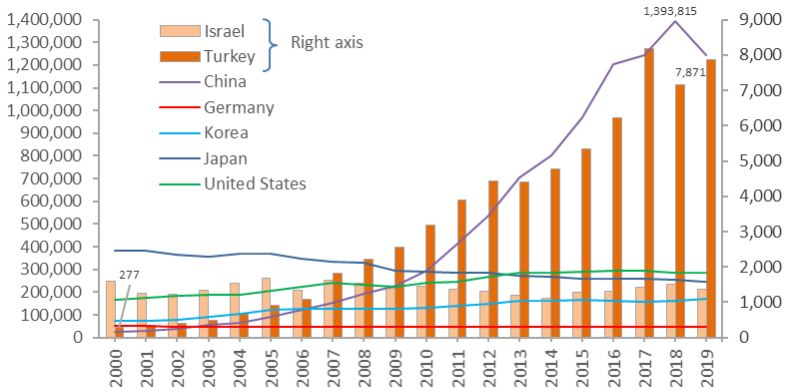


Figure 15: Number of local patent applications by Countries (Worldbank, 2021a)

Figure 15 demonstrates that China is far ahead in the number of patent applications despite a slight decrease in 2019. This figure shows us that China will increasingly have a voice in innovativeness. Although the number of patent applications is still high in the USA and Japan, this trend has been decreasing over the years. Despite a significant increase in the number of patent applications in Turkey, the very low numbers of applications indicate that the output of innovative efforts is not yet enough. For example, in Korea, the number of patent applications was around 170,000 in 2019, whereas it was only about 7,900 in Turkey.

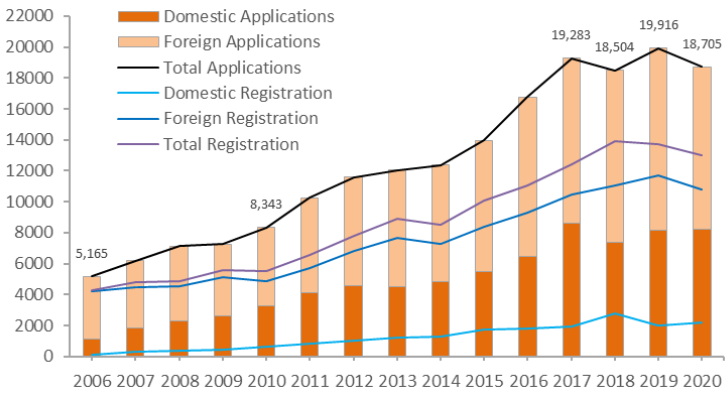


Figure 16: Number of total applications and granted patents in Turkey (TPE, 2021)

Although the significant surge in the number of patent applications in recent years shows that R&D activities have yielded results in Turkey, these are not sufficient when compared to the patent numbers of developed countries. When comparing the applications of developed countries with those of Turkey, local patent application numbers remain low. Also, when considering the number of patents in Turkey, the number of domestic applications must

be evaluated because foreign patent applications are made to protect technology in Turkey that was developed abroad. On the other hand, there is a fourfold difference between the number of local patent registrations and the number of local applications. This difference means that a significant number of applications cannot be patented. Therefore, it is understood that the patent quality should also be increased (Figure 16).

Considering the number of scientific publications, China has shown a great increase (Figure 17). China even surpassed the USA in 2016. The number of publications that originated in China in 2019 was 528,263 and in the USA, it was 422,808. However, according to the last available data for Turkey, it was just 33,536 in 2018. The high number of patents and scientific publications of developed countries can be evaluated as an indicator of their development. However, China stands out with its population; it is an exceptional country that shows high performance in these two areas, but it cannot be considered a fully developed country.

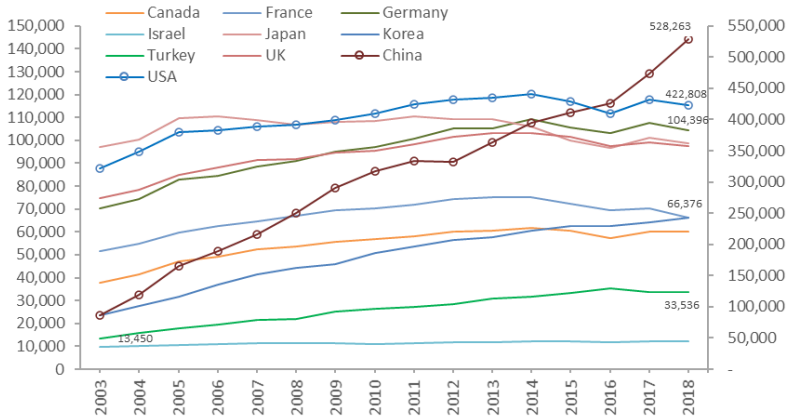


Figure 17: Number of scientific publications by countries (Worldbank, 2021b)

Although the number of scientific publications has continuously increased in Turkey from 2003 to 2016, a decreasing trend has been observed since 2016. This demonstrates that it is possible to increase the number of publications only up to a certain point with publication incentives, but to increase more, there is a need for increasing both the numbers of researchers and the R&D budgets and an ecosystem that will support all these, as seen in developed countries.

6. Conclusion

In this study, reviewing the relevant sources and drawing from related empirical studies in the literature, we have looked at the S&T indicators of Turkey, comparing the country with the world. Although Turkey has covered considerable ground in recent years, its current position is not sufficient for it to move up into the high-income group and increase its social welfare. As clearly stated for all indicators in S&T fields, Turkey has not yet achieved satisfactory performance in its R&D and innovativeness activities.

First, Turkey should focus more on high value-added industries, restructuring its manufacturing. High value-added industries focus on activities that result in large profit margins between the final price of an item or service and the cost of the inputs needed to manufacture it, resulting in larger profits for firms and higher pay for workers. Therefore, it is necessary to prioritize policies for the generation of the research infrastructure, technological infrastructure, and skilled human resources required by high value-added industries.

The growth of Turkey only through service industries, such as software or tourism industries, will not be sufficient for the employment needed and will not contribute enough to the GNP target. The average dollar value per kilogram in exports is an important indicator in this regard. For example, in the last 5 years, the depreciation of average dollar value per kilogram in exports in Turkey decreased from 1.44 dollars to 1.23 dollars. While exports per kilogram are close to 4 dollars in Japan, this figure is 3.7 dollars in Germany, 2.54 dollars in Korea, and 2.53 dollars in the USA. The two industries that saw increased average dollar values per kilogram in exports in Turkey are defense and aerospace. Therefore, it is imperative to invest particularly in advanced technology fields. In

addition, policies should be developed to train intermediate-level employees in Turkey to meet the needs of the industrial sector.

Second, having a say in the field of advanced technology is only possible for countries that develop their technological capabilities in that field. In recent years, incentives have been given for technology-oriented sectors in Turkey and some investments have been made. For example, the state has demonstrated its desire for the development of the defense industry and similarly, incentives and investments have been made available for the automotive sector. Production investments in specific areas such as solar energy were also encouraged. However, these initiatives can only reach a certain stage with the financial incentives of the state. Human resources and, of course, the university ecosystem must be developed in parallel in order to ensure sustainable value creation. For example, many new engineers and technicians were required for the National Combat Aircraft Project of TAI-TUSAŞ in the defense industry, and it was inevitable to establish close cooperation with universities in order to achieve that. Therefore, the state should undertake a catalyst role including universities into the agenda of industries. To do this, universities may be included in the incentives opportunities given to industry. Operating models should be developed that will enable industry to make R&D investments primarily in universities. Training R&D personnel within industry requires much higher costs, while it is possible to generate more economic value by guiding the human resources already trained in universities.

Third, due to the limited resources, it is important to prioritize the areas to be invested in and that the prioritized areas support each other. For example, if investments are made in the field of health, investments should also be made in the creation of competencies in health technologies in universities. Likewise, while investing in the fields of defense and aviation, it is very important that universities also invest in these fields and train human resources in this direction. For example, Korea, whose income level was similar to Turkey's in the early 1990s, outpaced Turkey with heavy investments in S&T and has thus set a good example for Turkey to follow. The government of Korea has been particularly proactive in its efforts to apply sector-specific policies to increase the country's industrial success in interconnected production areas such as metals, machinery, and chemicals.

Fourth, it is important that all postgraduate studies, and especially those of technical universities, work in association with industry and be designed in a way that creates industrial output. As advisors from industry may be assigned to each graduate thesis, it should also be considered that the outputs of these theses can be turned into spin-off companies. It is critical to direct, raise awareness among, and, of course, encourage academic in order to achieve this. Instead of incentive systems that only target output, it is necessary to support methods that will produce these outputs.

Finally, more effective use of the funds given by the state for R&D activities should be ensured. For this, incentives should be given to the institutions that can use the resources correctly, and in order to achieve this, first of all, human resources must be trained to make use of such opportunities. In other words, personnel who know how to work in the fields of R&D should be trained first, and then the relevant resources and infrastructure should be designed. In this sense, R&D and technology management training should be a part of education in universities, and industrialists should be required to take such training programs in order to gain this competence. For example, such training could be made one of the incentive application requirements.

In conclusion, innovation should be a basis of any policy or strategy for Turkey. Just as governments play an active role in the formulation of these policies and strategies, the spread of these policies to the grassroots level and the cooperation of public institutions, firms, and individuals in line with these policies and strategies can only be achieved with government intervention.

The long-term growth of any country is intrinsically linked to that country's levels of innovation and technological advancement. Accordingly, to ensure the growth and development of any country, including Turkey, R&D strategies must be created and implemented, human capital must be fostered, innovation ecosystems must be developed in a way that unites financial and human resources with the national infrastructure, university-industry collaborations must be intensely promoted, key strategic fields must be determined and target-oriented incentives for those fields must be offered, the outcomes of all offered incentives must be tracked, support for this entire

process must be guaranteed with appropriate mechanisms from the first step to the last, and, finally, bureaucratic obstacles must be removed to make these things possible.

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Notes

Note 1. Only professions are covered by the HRST data given in this study. Professionals and technicians, as described by the International Standard Classification of Occupations (ISCO-88) major groups 2 and 3, fall under this category of employees. For more detailed information please see https://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm

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A Study of Chinese Consumers towards Lifestyles of Health and Sustainability

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Abstract
This research explores how Chinese consumers adopted a lifestyle of health and sustainability (LOHAS). To investigate this, a questionnaire survey was conducted examining the impact of LOHAS on consumer decision making styles in Macau SAR, China. After completion, a total of 619 usable questionnaires were collected. The results showed that the two most significant criteria for LOHAS among the Chinese consumers were environmental consciousness and a desire for health and fitness. In turn, the most preferable consumer decision making styles were price consciousness and perfectionism. Moreover, consumer who is environmental consciousness tends to be more quality and price conscious. Consumer who cares about health and fitness tends to look for quality and novelty products. The results also show that Chinese consumers who are the females, older in age or have a higher income tend to be more LOHAS. Therefore, if companies want to expand their business in the LOHAS market in China, they should target these segments when they are developing their marketing strategies.

Keywords: LOHAS, Consumer Decision Making Styles, Sustainability, Sustainable Lifestyle, Demographic Characteristics

Introduction

LOHAS is an acronym for lifestyles of health and sustainability, a market segment focused on health and fitness, environment, personal development, sustainable living and social justice. LOHAS consumers are people who do not only care about their living environment but are also concerned about whether their behavior poses any negative impact on the world. The person who introduced this concept is an American sociologist Paul H. Ray who, in 1998, together with the psychologist Sherry Ruth Anderson (Kimura, 2007). They studied a group of educated consumers whose aim is to engage in conscientious purchasing and investing decisions based on social and cultural values which are the basis of the LOHAS market. Nowadays, concepts of LOHAS have already been applied to different aspects of our life, from the product world (Higchi and Avadi, 2015; Market LOHAS Lifestyle of Health and Sustainability, 2018; Pícha and Navratil, 2019) to that of travel (Urh, 2015), beauty (Kan 2010) and

self-care (Puhakka et al. 2021). The idea of LOHAS was introduced into Mainland China in 2005. This development has been linked to the fact that the LOHAS lifestyles share the same principles as the historical Chinese philosophy of balancing a healthy life with a spiritual and emotional well-being (Kan, 2010). Along with other factors the result has been that the number of LOHAS consumers in China is on the rise. This is partly due to the growth of the Chinese middle class, as a result of higher education and higher salaries.

In fact, Chinese households could become one of the largest consumer markets in the world. According to the findings of the National Geographic's Greendex project 2014, (a global study to measure the consumer's progress towards environmentally sustainable consumption in 18 countries), Chinese consumers tied for the second highest "green score" amongst the countries. To what extent do Chinese consumers adopt the lifestyle of LOHAS? Which aspect(s) of LOHAS are Chinese consumers more concerned about? What are the demographic characteristics of Chinese consumers who are more likely to adopt the lifestyle of LOHAS? How does LOHAS influence the consumer decision making styles of Chinese? This research study will endeavour to answer all these questions.

Literature review

Demographic characteristics and LOHAS Chinese consumers

According to Kotler and Armstrong (2020), demographic segmentation variables include age, family size, family life cycle, gender, annual income, occupation, education, religion, race, nationality and social class. Several studies have shown a significant relationship between certain key demographic variables of consumers and their concern for health and the environment, such key variables include gender, age, education and income (Divine and Lepisto, 2005; Lea and Worsley, 2005; Do Paco and Raposo, 2009; Kassinis et al. 2016).

Dimensions of LOHAS are divided into three categories: health and fitness, environmental consciousness and social justice (Natural Marketing Institute, 2008). Lohasians will buy products or consumer goods that are healthy and environmentally friendly. They will also consider if the product is really necessary to purchase or to have. Moreover, they will purchase products or services from companies that are more socially responsible. With respect to the relationship between demographics and LOHAS, several studies find those demographic characteristics do have an impact on consumers' health or environmental consciousness. According to the study, consumers who pursue a healthy lifestyle tend to be female, older in age and more educated (Divine and Lepisto, 2005). To examine the impact of demographic characteristics on Chinese LOHAS consumers, a hypothesis is offered as follows:

H1: Demographic characteristics have an impact on LOHAS Chinese consumers

LOHAS and Chinese consumer decision making styles

A consumer decision-making style is defined as "a mental orientation characterizing a consumer's approach to making choices" (Sproles and Kendall, 1986). It is a basic consumer personality, similar to the concept of personality in psychology (Sproles and Kendall, 1986). Sproles and Kendall have identified eight different types of decision-making styles which basically illustrate the mental characteristics of these decision-making styles, as shown below in Table 1.

Table 1: Characteristics of eight consumer decision-making styles

Consumer Decision-Making Styles		
1	Perfectionism / high-quality consciousness	Consumers who systematically search for the best quality products possible.
2	Brand consciousness	Consumers who are concerned with getting the most expensive, well-known brands.
3	Novelty-fashion consciousness	Consumers who like new and innovative products and gain excitement from seeking out new things.
4	Recreational, hedonistic shopping consciousness	Consumers who take pleasure in shopping and who shop just for fun of it.

5	Price consciousness / value for the money	Consumers who are concerned with getting the lowest prices.
6	Impulsiveness / careless	Consumers who tend to buy spontaneously and who are unconcerned about how much money they spend.
7	Confusion from overchoice	Consumers who feel that there are too many brands and stores to choose from and who likely experience information overload in the market.
8	Habitual, brand-loyal	Consumers who shop at the same stores and tend to buy the same brands each time.

Source: adapted from Sproles and Kendall (1986)

LOHAS is a kind of lifestyle selected by people. Lifestyle defines a pattern of consumption that reflects a person's choices on how people live and spend their time and money (Wind, 1972). According to the study, it was seen that lifestyle characteristics have an impact on consumer decision-making styles of young consumers in China (Kwan, Yeung and Au, 2008). People's needs and desires are influenced by their chosen lifestyles. Lifestyles also keep influencing people's purchases and usage behavior. Consumers make consumption decisions based on their desired lifestyle, which in turn reinforces or alters their chosen lifestyle. Lifestyle provides the basic motivation and guideline for the consumers' purchases in unconscious situations (Hawkins, Mothersbaug and Best, 2007). It is therefore hypothesized that:

H2: LOHAS has an impact on Chinese consumer decision making styles

Methodology

This study was based on a questionnaire survey. Data was collected through face to face interviews on streets and surveys on internet. Finally, 663 respondents completed the questionnaire but 44 were found to be invalid and therefore only 619 questionnaires were considered to valid for the data analysis. Among the 619 respondents, 272 were males and 342 were females. Almost half of our respondents were aged between 21 and 25. Respondents with a senior secondary, diploma or undergraduate education level accounted for about 28% to 34%. Most of them have a monthly income of MOP 5000 or less (100 MOP =12.53 USD). The descriptive frequencies of our respondents regarding their gender, age, education level and income level are presented in Table 2.

Table 2: Background of the respondents

Background of the respondents	n	%
Gender		
• Male	272	43.94%
• Female	347	56.05%
Age		
• 16-20	78	12.6%
• 21-25	289	46.68%
• 26-30	72	11.63%
• 31-35	57	9.20%
• 36-40	47	7.59%
• 41-45	34	5.49%
• 46-50	27	4.36%
• 51 or above	15	2.42%
Education		
• Primary	14	2.26%
• Junior secondary	68	10.98%
• Senior secondary	173	27.94%
• Diploma	136	21.97%
• Undergraduate	211	34.09%
• Postgraduate	17	2.75%

Income (MOP, Macau Pataca) 100 MOP=12.53 USD		
• 5000 or below	192	31.02%
• 5001-10000	142	22.94%
• 10001-15000	139	22.46%
• 15001-20000	90	14.54%
• 20001 or above	56	9.05%

Findings

LOHAS and Chinese Consumer Decision Making Styles

The aspects of measuring the adoption of LOHAS and the consumer decision making styles were based on a five-point Likert scale (from 5=strongly agreed to 1=strongly disagreed). Table 3 and Table 4 depict the mean scores of the respondents towards LOHAS and consumer decision making styles. In Table 3, the results show that environmental consciousness and health and fitness were the most popular aspects towards LOHAS in the eyes of those interviewed. The mean values were 3.7966 (SD=0.66605) and 3.2972 (SD=0.75871) respectively. Social justice received lowest scores 3.0315 (SD=0.85956), thus indicating that in the adoption of LOHAS, when using animals for product testing and producing products that promote sex or violence, social justice issues may count for less among Chinese consumers.

Table 3: Descriptive statistics of respondents on LOHAS

	Mean	Std. Deviation	Rank
Environmental consciousness	**3.7966**	**.66605**	
I oppose using too much packaging on products	4.11	.984	1
I will take action to support companies that reclaim recyclable goods	3.99	.947	2
When I buy electrical products, I will check if they are labeled with energy saving or environmentally friendly tags	3.86	1.048	3
I will try to use less disposable products (e.g. disposable chopsticks)	3.68	1.087	4
I will still purchase environmentally friendly products even if they are more expensive	3.34	.979	5
Health and Fitness	**3.2972**	**.75871**	
I will try to eat less oily food	3.68	1.038	1
I will try to eat less sweetened food	3.48	1.073	2
I will try to eat less salty food	3.44	1.074	3
When I buy food, I will check if it has a nutrition label	3.22	1.064	4
I will buy health care products (e.g. vitamins)	3.05	1.098	5
I will use fitness products to keep fit	2.94	1.140	6
Social Justice	**3.0315**	**.85956**	
Do they participate in philanthropic events	3.41	1.018	1
Have they produced harmful products in the past for profits (e.g. melamine incident)	3.14	1.577	2
Do they exploit rights of labor in developing countries in return for profits	2.96	1.135	3
Do they produce products that promote sex or violence	2.84	1.293	4
Do they use animals for product testing	2.80	1.193	5
LOHAS	**3.3620**	**0.54416**	

Remarks: (1) mean value is based on 5-point Likert scale (1=strongly disagree 5= strongly disagree)
(2) sample size = 619

Table 4 shows the mean scores of the consumer decision making styles. Of these, price consciousness and perfectionism were the highest scores in measuring the consumer decision making styles. The mean value of price consciousness and perfectionism were 3.4992 (SD=0.71777) and 3.4430 (SD=0.47145). The least consumer decision making styles were impulsiveness and brand consciousness. The mean values of impulsiveness and brand consciousness were 2.7566 (SD=0.62645) and 2.5482 (SD=0.69018).

Table 4: Descriptive statistics of respondents on Chinese consumer decision-making styles

	Mean	Std. Deviation	Rank
Perfectionism / high-quality consciousness	**3.4430**	**.47145**	
When it comes to purchasing products, I try to get the very best or perfect choice	4.09	.837	1
Getting very good quality is very important to me	4.03	.902	2
In general, I usually try to buy the best overall quality	3.84	.902	3
I make a special effort to choose the very best quality products	3.59	.949	4
My standards and expectations for products I buy are very high	3.51	.877	5
** I really give my purchases much thought or care*	*3.27*	*1.154*	*6*
** I do not shop quickly nor buy the first product or brand I find that seems good enough*	*2.86*	*1.093*	*7*
** A product has to be perfect, or the best, to satisfy me*	*2.37*	*.932*	*8*
Brand consciousness	**2.5482**	**.69018**	
I prefer buying the best-selling brands	3.12	.941	1
Shopping malls and counters offer me the best products	2.65	.964	2
The well-known national brands are best for me	2.57	.996	3
The most advertised brands are usually very good choices	2.42	.931	4
The higher the price of a product, the better its quality	2.31	1.072	5
The more expensive brands are usually my choice	2.20	.974	6
Novelty-fashion consciousness	**3.2254**	**.82197**	
It is fun to buy something new and exciting	3.61	.985	1
To get variety, I shop at different stores and choose different brands	3.37	1.045	2
I usually have one or more outfits of the very newest style	3.23	1.079	3
Fashionable, attractive styling is very important to me	2.98	1.025	4
I keep my wardrobe up-to-date with the changing fashions	2.94	1.116	5
Recreational, hedonistic shopping consciousness	**3.3759**	**.71084**	
** Shopping is not a waste of time*	*3.69*	*.970*	*1*
** Shopping is a pleasant activity for me*	*3.57*	*1.097*	*2*
Going shopping is one of the most enjoyable activities of my life	3.41	1.026	3
I enjoy shopping just for the fun of it	3.35	1.018	4
** I do not shop in a hurry*	*2.86*	*1.034*	*5*
Price consciousness / value for the money	**3.4992**	**.71777**	
I look carefully to find the best value for money	3.67	.926	1
I buy as much as possible at sale price	3.53	.900	2
The lower price products are usually my choice	3.29	.894	3
Impulsiveness / careless	**2.7566**	**.62645**	
I should plan my shopping more carefully than I do	3.11	1.042	1
Often I make careless purchases I later wish I had not	3.01	1.072	2
I am impulsive when purchasing	2.88	1.089	3
** I do not carefully watch how much I spend*	*2.39*	*.945*	*4*
** I do not take time to shop carefully for best buys*	*2.38*	*.856*	*5*
Confusion from overchoice	**3.1380**	**.83436**	
Sometimes, it is hard to choose which stores to shop at	3.19	1.017	1
All the information I get on different products confuses me	3.14	1.099	2
There are so many brands to choose from that often I feel confused	3.13	1.036	3
The more I learn about products, the harder it seems to choose the best	3.08	1.063	4
Habitual, brand-loyal	**3.3352**	**.63623**	
I have favorite brands I buy over and over	3.73	.981	1
Once I find a product or brand I like, I stick with it	3.58	.981	2
I go to the same stores each time I shop	3.05	1.028	3
** I do not change the brands I buy regularly*	*2.97*	*.923*	*4*

Remarks: (1) Statements and their respective scores are recoded*
(2) mean value is based on 5-point Likert scale (1=strongly disagree 5= strongly disagree)
(3) sample size = 619

The Impact of Demographic Characteristics on LOHAS Chinese Consumers (H1)

The results showed that Hypothesis One (H1), which argues that demographic characteristics have an influence on LOHAS Chinese consumers, was partially confirmed (see Table 5). The four demographic variables are used as independent variables while LOHAS stands for the dependent variable. The results showed that gender (B=0.215 and p=0.000), age (B=0.047 and p=0.001) and income (B=0.079 and p=0.000) were found to have significant influence on the LOHAS lifestyle of Chinese consumers.

Table 5. The impact of demographic characteristics on LOHAS Chinese consumers

	LOHAS			
	B	Beta	t	Sig.
(constant)	2.571		23.005	.000
Gender	.215	.199	4.947	.000*
Age	.047	.153	3.383	.001*
Education	.034	.072	1.711	.088
Income	.079	.189	4.081	.000*
Model Summary	F = 19.236 Sig = .000 R = .351 R Square = .123			

*Remarks: (1) Significant level *p<0.05; (2) Regression method =enter*

The Impact of LOHAS on Consumer Decision Making Styles in China (H2)

In the analysis of Hypothesis Two (H2), the argument that LOHAS has an influence on consumer decision making styles in China, was partially confirmed (see Table 6). The results showed that only five consumer decision making styles were found to be influenced by the LOHAS aspects. For example, environmental consciousness had a positive impact on perfectionism (B=0.066 and p=0.039) and price consciousness (B=0.190 and p=0.000), and had a negative impact on brand consciousness (B=-0.178 and p=0.000), novelty-fashion consciousness (B=-0.148 and p=0.008) and impulsiveness (B=-0.118 and p=0.006). Furthermore, health and fitness had a positive impact on perfectionism (B=0.106 and p=0.000) and novelty-fashion consciousness (B=-0.189 and p=0.000). The results also showed that social justice had no impact on any of these consumer decision-making styles.

Table 6: The impact of LOHAS on Chinese consumer decision making styles

Model Summary	F = 12.562 Sig = .000 R = .253 R Square = .064				F = 5.115 Sig = .002 R = .162 R Square = .026				F = 5.817 Sig = .001 R = .173 R Square = .030			
	Recreational, hedonistic shopping consciousness				**Price consciousness / value for the money**				**Impulsiveness / careless**			
	B	Beta	t	Sig.	B	Beta	t	Sig.	B	Beta	t	Sig.
(constant)	3.451		17.644	.000	2.735		14.179	.000	3.316		19.489	.000
Environmental consciousness	-.056	-.053	-1.144	.253	.190	.177	3.926	.000*	-.118	-.126	-2.744	.006*
Health and Fitness	.075	.080	1.734	.083	-.007	-.008	-.170	.865	.015	.018	.391	.696
Social Justice	-.035	-.042	-.969	.333	.023	.028	.655	.513	-.054	-.074	-1.721	.086
Model Summary	F = 356 Sig = .256 R = .084 R Square = .007				F = 6.523 Sig = .000 R = .182 R Square = .033				F =4.486 Sig = .004 R = .153 R Square = .023			

	Confusion from overchoice				Habitual, Brand-loyal			
	B	Beta	t	Sig.	B	Beta	t	Sig.
(constant)	3.289		14.190	.000	3.032		17.493	.000
Environmental consciousness	-.071	-.056	-1.221	.223	.007	.007	.160	.873
Health and Fitness	-.003	-.003	-.059	.953	.042	.050	1.081	.280
Social Justice	.044	.045	1.039	.299	.046	.062	1.441	.150
Model Summary	F = .801 Sig = .493 R = .065 R Square = .004				F = 1.540 Sig = .203 R = .090 R Square = .008			

*Remarks: (1) Significant level *p<0.05; (2) Regression method = enter*

Discussions and Implications

To summarize, the two most significant aspects of LOHAS among Chinese consumers were: 1) environmental consciousness and 2) health and fitness. The most preferable consumer decision making styles were: 1) price consciousness and 2) perfectionism.

This research contributes to the existing concepts about the consumer behavior of Chinese. Even so, most previous studies have focused solely on the general consumer decision making styles of Chinese. However, this study further explores how Chinese consumers have adopted LOHAS and just how significant the impact of LOHAS on consumer decision making styles in China has been.

Thus, the findings of this study have several important implications concerning the management of enterprises. First, the result shows that Chinese consumers who are the females, older in age or have a higher income tend to be more LOHAS. Therefore, if companies want to expand their business in the LOHAS market in China, they should target these segments when they are developing their marketing strategies. Second, if companies want to target the environmental consumers, they should aware that these consumers are quality and price conscious. And for those consumers who care about their health and fitness, they are also concerned about the quality of goods and are fond of novelty products. Companies should therefore concentrate on developing innovative products and providing excellence quality for this type of consumers.

This research also raises other implications for the government and associates. The results show that the adoption of LOHAS by Chinese consumers was not comprehensive, especially those regarding the issues of social justice. The Chinese Government and its associates should therefore create more campaigns to educate their citizens about the importance of social justice. This could be done by encouraging consumers to participate of philanthropic events, to refuse to use the products of companies that produced harmful substances, to reject the companies who are exploiting the rights of labor for profits, to disallow products that promote sex and violence and to discard products that used animals for testing. Also, according to the findings of this study, younger consumers tend to be less LOHAS. The Chinese Government is therefore suggested to strengthen the civic education about LOHAS on children and teenagers in school.

This study provides an understanding of Chinese consumers adopted LOHAS and the impact of LOHAS on consumer decision making styles in China, in particular Macao, giving rise to a major limitation. In other words, can its findings and conclusions only be applied to the Chinese consumers in Macao or may the results of adopting LOHAS also apply to consumers provinces of China. For this reason, studies on LOHAS in other geographical regions of China should be conducted to obtain the effect of the generalization of the Chinese adoption of LOHAS across the country.

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Economic Growth, Income Inequality and Poverty Trends in Pasture Area's Householder in Sujanagar Upazila, Pabna, Bangladesh: Implications for Development strategy

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Abstract
The study is based on primary household level data obtained from a survey on income expenditure and poverty measures for 2020-21. The perceptual data were collected through field survey which was based on semi structural questionnaire. Total 162 selected samples were considered and simple random sampling techniques have been adopted during data collection. These factual data were collected from various secondary sources like books, journals, magazines, nationally and internationally published data etc. Human development indicators for 1996 have been compared with the study area (pasture area in SujanagarUpazila, Pabna district, Bangladesh). The empirical result shows the analysis of poverty, income inequality, economic growth & development scenario of pasture area's in Sujanagarupazila, Pabna district, Bangladesh. The research found that 55% respondents live under the poverty line. The study also examines that these householders play an important contribution to the national GDP but their living level is below than standard one. If these areas' householders' development access were more available, they would return a great introduction to the society. This paper advises using anti-poverty policy, the concept of poverty minimizing inequality that the society should be tolerant ofattaining the goal of minimizing poverty. It is useful to differentiate between structural and transient causes of poverty. The provision of public goods plays an imperative role in fighting poverty. The government's proper planning and initiatives, NGOs and Community based organization's collaboration help build the study area as a socio-economic and environmentally friendly area in Bangladesh.

Keywords: Economic Growth, Income Inequality, Poverty, Pasture Area, SujanagarUpazila

1. Introduction

Reduction of poverty and inequality is a fundamental challenge in Bangladesh (Ferdousi and Dehai, 2014). Prioritizing the Millennium Development Goals (MDGs) represents an international commitment to eradicate extreme poverty and hunger and foster global collaboration for development by 2015 (World Bank Report, 2002).

Vision-2021 represents the commitments of the present government to reduce the rate of poverty 25% to 15% by 2013 and 2021 respectively (Economic Survey, 2010). These dates are approaching, and it will soon be clear whether these pledges have been met. In this study, we discuss the condition of poverty, income inequality and development scenario of Pabna district householder which is an old district beside on the Padma River. According to the 2001 Bangladesh Census, 23.39 percent of the population lives in urban areas, while 76.61 percent lives in rural areas (Islam, 2003). Although Bangladesh has huge feasibility for advancement, it is, for a variety of socio-economic reasons, among the poorest countries in the world. About half of the country's population live below the poverty line with 80% in the rural areas (Ahmed, 2004). The burden of poverty sprays disproportionately on women, who represent half of the entire population. As a result, poverty alleviation and rural employment creation are top priorities in Bangladesh's enlargement program, which has taken a broad-based approach to poverty reduction, emphasizing macroeconomic stability, economic liberalization, and support for a variety of government agencies and non-governmental organizations (Ahmed, 2004).

A number of factors have contributed to high incidence of poverty in Bangladesh, especially in rural and pasture areas. About 66.05% of active household members have no education or have attained only primary education. More than 70% of the labor forces are directly or indirectly engaged in the agricultural sector, and majority parts of farmers are landless and engaged in subsistence farming. Only a quarter of paid non-agricultural workers are females, while female wage is half of the male wage in the non-agricultural sector. Meanwhile, there is a large disparity in infrastructure between the rural and urban sectors. Very poor socio-economic conditions in these selected areas seem to have aggravated poverty in Sujanagarupazila, Pabna, Bangladesh. Not only pasture area, Global inequality is rising. Oxfam predicted that in 2016, the richest one percent of the population on a global scale would own more than 50 percent of the global wealth (Oxfam report 2017). As frightening as these figures are, the disparity in the distribution of wealth and income is only one part of the story when it comes to regions where people face discrimination. The consideration of inequalities rooted in structures or capabilities of the individual would be important because no matter how big the effort for poverty reduction and relief, some people’s livelihoods cannot be improved without noticing the underlying inequalities they face directly and indirectly.Even if there is rapid expansion, there are numerous hurdles that must be overcome.With a rapidly growing workforce, there is also a challenge of creating new jobs and educating the workforce to be able to compete in the world economy. And finally, despite progress, there are still about more than 50% people in some special areas of Pabna district who are living below the poverty line and consume less than $1.25 (USA) a-day, (Field survey).

An in-depth review of Bangladesh's poverty reduction progress is required. This study is an attempt to sketch the current development scenario and to make future projections of poverty and inequality in pasture area of Pabna district so that, we have to generate a clear evidence and insights that can be used to feed into poverty reduction of the study area.

2. LiteratureReview

One of the most detailed government publications on Bangladesh’s developmental ambitions is Bangladesh’s Poverty Reduction Strategy Paper (PRSP) of 2011. PRSPs detail a country's macroeconomic, structural, and social policies in support of growth and poverty reduction, as well as the country's external financial needs and main funding sources. Addams conducted a paper with the title “Economic Growth, Inequality and Poverty” which shows economic growth reducing poverty and inequality in the present developing world (Haque, et al. 1994).

Economic growth is defined as an increase or improvement in the inflation-adjusted market value of an economy's goods and services through time.Statisticians commonly use the percent rate of rise in real gross domestic product, or real GDP, to measure such growth (WB, 2000). Intensive growth is defined by economists as an increase in economic growth caused by more efficient use of inputs (increased labor productivity, physical capital productivity, energy productivity, or material productivity). GDP growth created only by increases in the number of inputs available for usage (for example, increasing population or new territory) is considered extensive growth (Bjork, 1999).

Inequality in income is a significant aspect of social stratification and social class. Many other forms of inequality, such as income, political power, and social position, impact and are affected by it. Income is a fundamental predictor

of quality of life, affecting people' and families' health and well-being, and it varies by social factors such as gender, age, and race or ethnicity (Rotman 2014).

Poverty is defined as a state or condition in which an individual or a group lacks the financial means and necessities for a basic level of living. Poverty is defined as a situation in which one's earnings from work are insufficient to meet fundamental human requirements. Poverty-stricken individuals and families may be deprived of adequate housing, safe drinking water, nutritious food, and medical care. Each country may have its own poverty line that determines how many people live in poverty. (Roseret al., 2019). Poverty is defined as a person's inability to meet his or her fundamental necessities due to a lack of material assets or money (Merriam-Webster, 2013). Poverty may include social, economic, and political elements (UN, 2020). Absolute poverty measures compare income against the amount needed to meet basic personal needs, such as food, clothing, and shelter (UNESCO, 2019). When a person cannot satisfy a minimum level of living standards in comparison to others in the same period and area, they are considered to be in relative poverty. As a result, the threshold at which relative poverty is defined differs from one country to the next or even from one community to the next (UNESCO, 2019). As of 2019, most people on the planet live in poverty: (in Purchasing Power Parity dollars) 85% live on less than $30 per day, two-thirds live on less than $10 per day, and 10% live on less than $1.90 per day (extreme poverty) Roseret al. 2019).

A more recent detailed government report is the Bangladesh Progress Report 2012 of the MDGs, which highlights aspects of each of the goals, current trends, challenges in achieving the goals and future policy priorities. Bangladesh has made significant progress in primary schooling, gender parity in primary and secondary education, lowering the under-five mortality rate, reducing the incidence of infectious diseases, and improving environmental indicators, according to the report (Islam, 2013). The report indicates some challenges of achieving MDGs in areas such as maternal health, retaining of students at the primary level to complete primary education, gender parity in tertiary education, quality issues in accessing safe drinking water and improved sanitation, and hunger.

Despite the large number of people living in poverty, the definition of poverty has been the subject of debate. The mainstream emerging sees poverty as generally being characterized by inability of individuals, households, or entire communities, to command sufficient resources to satisfy a socially acceptable minimum standard of living. The alternative view understands poverty as a part of social property relations. Inequality can be defined in terms of being the opposite of ‘equality,’ a state of social organization that enables or gives equal access to resources and opportunities to all members (Beegle, 2003).

Many people lack access to good schools, healthcare, power, safe water, and other essential services, which are often dictated by socioeconomic level, gender, ethnicity, and geography. For those able to move out of poverty, progress is often temporary. Economic shocks, food insecurity, and climate change threaten their gains and may force them back into poverty (Rotman 2014). The poverty situation of pasture area in Bangladesh has seen a little different scenario, as the country had a steady growth since 2000, but the poverty situation has not improved as it should have been. In this region, the number of people living in poverty has increased due to rising disparities in the distribution of resources within the other region. Unequal growth patterns have been demonstrated to have a lower poverty alleviation effect and to be damaging to growth. As a result, reducing poverty without tackling inequality is difficult to do. Here main sources of income Agriculture 61.17%, non-agriculture 2.89%, industry 5.95%, commerce 12.73%, transport and communication 2.71%, service 5.72%, construction 0.95%, religious service 0.17%, rent and remittance o.41% and others 7.3% (BBS, 2013 and District information office, Pabna).

3. Methodology

The study was conducted mainly based on the data of family size, household income-expenditure, occupation, education & others which are collected by the resident of char and Thorpe area of sujanagarupazila, Pabna. The study used Ordinary Equivalent of Child Delta (OECD) and Head Count Index (HCI) for finding poverty status. We also use Lorenz curve for graphical representation of income inequality and Gini coefficient for finding a numerical value of income inequality. These data were used to make some forecasts about future poverty scenarios. Different statistical reports, relevant research papers, books and many national and international journals were also reviewed for

conducting this research. Finally, bi-variation analysis is conducted to determine association of different variables with poverty and inequality which may be defined mathematically as follows:

The Squared Poverty Gap Index: $$P_\alpha = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{Gi}{Z}\right)^{2\alpha}$$

Where, P_α = Poverty Gap Index

N = Number of Households

G_i = Difference between monthly per capita expectation expenditure and their real expenditure.

Z = Value of monthly per capita consumption expenditure

Pasture areas householders possessing low attributes were those who were not so innovative and attentive but just survivors to their occupation. Moderate householders were doing substantial enterprise and they introduce new ideas in their occupation on a calculated basis of success and failure. Householders possessing high attributes were those who were up-to-date to introduce a new idea in their occupation either it is profit or loss-oriented.

3.1. Objectives

The prime objective of this paper is to determine the Economic growth, Income inequality and Poverty trends in pasture area's householders in SujanagarUpazila, Pabna, Bangladesh.

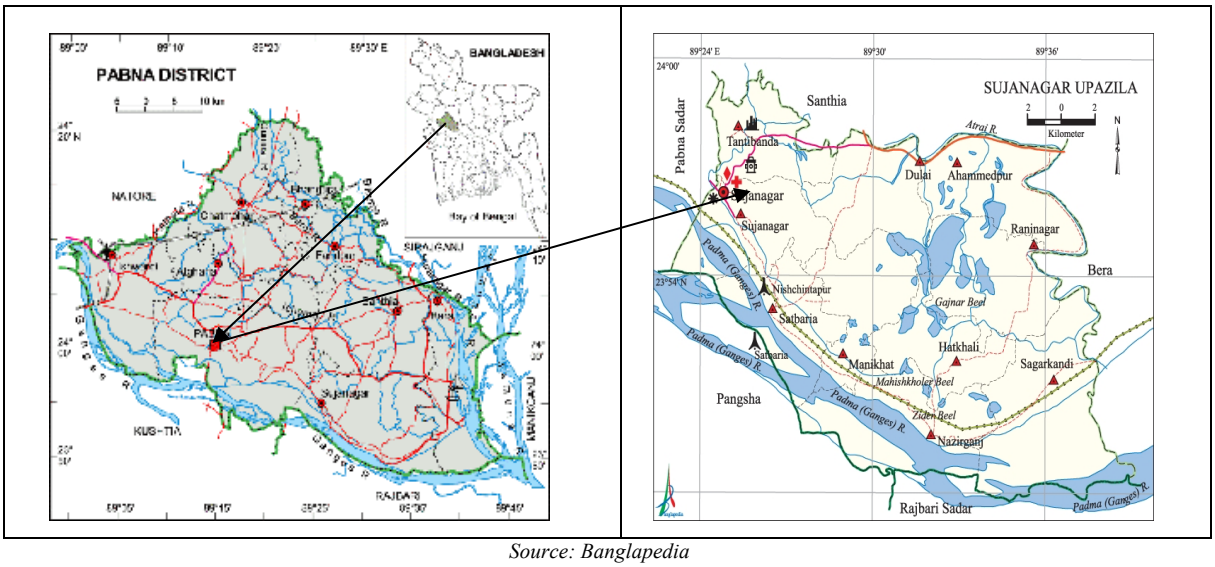
The specific objectives are;

1. to know the socio-economic condition of the respondents;
2. to determine the existing development scenario in the study area and
3. To know the poverty and inequality scenario in the study area.

3.2. Study Area

Sujanagar is an Upazila of Pabna District in the Division of Rajshahi, Bangladesh (Habibullah, 2012). The upazila is the district's agricultural heartland..Sujanagarupazila is located at 23.9167°N89.4333°E. It has 64000 households and total area 338 km². As of the 2011 Bangladesh census,Sujanagarupazila has a population of 279000. Males account for 49.82 percent of the population, while females account for 50.18 percent. Upazila's population over the age of eighteen is 102,202. Sujanagarupazila has an average literacy rate of 44.6% (7+ years), and the national average of 32.4% literate (BBS report, 2013).

Map: Study Area (Bangladesh → Pabna District → SujanagarUpazila)



Source: Banglapedia

4. RESULTS AND DISCUSSION

4.1. Demographic and Socio-economic Status of the Respondents

The demographic and Socio-economic characteristics of the respondents are identified when discussing the findings of the study. The study involves of 162 respondents of males and females. Age structure, literacy rate, family size and duration of living are essential for exploring problem identification and current situation in a particular area. General information or demographic conditions doesn't only represent the characteristics of the respondents but also reflect the validity and accuracy of primary data.

Table1: Demographic and socio-economic Status of the Respondents (householder) in the Study Area

Demographic and socio-economic Variables	Level	No. of Household	Percentage (%)
Age Structure	< 40 Years	37	22.84
	41-50 Years	97	59.88
	>50 Years	28	17.28
	Total	162	100
Gender Status	Male	117	72.22
	Female	45	27.78
	Total	162	100
Marital Status	Married	159	98.15
	Unmarried	3	1.85
	Total	162	100
Family Size	2-4	28	17.28
	5-7	87	53.70
	Above 7	47	29.02
	Total	162	100
Education Status	Can Sign	107	66.05
	Class 1-5	45	27.78
	Class 6-9	6	3.70
	Above SSC	4	2.47
	Total	162	100
Housing Condition	Mud, straw &Tin	75	46.30
	Brick &Tin	82	50.62
	Housing Problem	5	3.08
	Total	162	100
Monthly Income	<5000 tk.	23	14.19
	5001-10000 tk.	89	54.93
	10001-15000 tk.	39	24.07
	15001tk. & above	11	6.79
	Total	162	100
Occupational Status	Farmer	59	36.41
	Fisherman	38	23.45
	Day Labor	24	14.81
	Rickshaw/ Van/ Auto Driver	18	11.11
	Housewife	21	12.96
	Others	2	1.23
	Total	162	100
Source of Drinking Water	Tube well	136	83.95

	Pond	2	1.23
	Rain water	0	0
	River/ Cannel	15	9.25
	Well	9	5.55
	Total	162	100
Sanitation Condition	Open space	33	20.37
	Open latrine	104	65
	Healthy	21	12.96
	Others	4	2.46
	Total	162	100
Electricity User	Yes	143	88.27
	Not	19	11.73
	Total	162	100
Technology User	Yes	126	77.78
	No	32	19.76
	No Comments	04	2.46
	Total	162	100

Source: Field survey 2020

In table 1, illustrated that a noteworthy proportion of respondents (f = 97, 59.88%) were of the age group of 41-50. Higher portion of respondents were married (n = 159, 98.15%). Maximum respondents' (n=87, 53.70%) family size between 5-7 person whereas our national family size is 4.4 (Economic Survey, 2018). When out looked at the education status of the respondents although larger share having can sign only (n= 107, 66.05%), it was also observed that a substantial proportion of them (n = 45, 27.78%) were having class one- class five at the same time. Besides, only a small proton (n=4, 2.47%) of them having above SSC degree, confirmed the presence of the traditional perception of the low level of education among females. Not only the existence of lower rate of higher education but also occupational position showed highest number of the respondents being farmer (n =59, 56.41%). Some were engaged with fishing (n=38, 23.45%) where other chose to took part of family income by working from day labor (n=24, 14.81%), housewife and homemaker (n=21, 12.96%). Up till now, 83.95% respondents use tube well for drinking water, whereas our national scenario is 98% (Economic Survey, 2019) and also 9.25% respondents river/cannel water as drinking water. However, maximum respondents (n=82, 50.62%) built their house with brick & tin, and alas 46.30% respondents built their house with mud, straw & tin. On the other hand 3.08% of respondents were in housing problems. Monthly family income was relatively low majority of the respondent's (n=112, 69.12%) monthly income less than 10000 taka, only (n=11, 6.79 %%) respondent's income over >15,000 Tk. Electricity user were 88.27% of the respondents, it is more than the national scenario. Moreover, 77.78% respondents various types of technology to increase their life and livelihood in the study area,

4.2. Development Scenario

Growth, advancement, good change, or the addition of physical, economic, environmental, social, and demographic components are all examples of development. (https://sid-israel.org). Economic and social development is the process by which the economic well-being and quality of life of a nation, region, local community, or an individual is improved according to targeted goals and objectives (Wikipedia). The development status of pasture areas householders of sujanagarupazila in Pabna district is not so better. From the table-1, it is shown that 66% populations of this area are illiterate or have just signature ability. About 27.78% of active household members have primary education or have attained only primary level education. More than 78% of the labor forces are in the agricultural sector. Labourers are landless and engaged in subsistence farming. Only 22% of labor forces are engaged in their own land. Female labor participation rate in this study area is only 15.38% and their wage is less than half of male wage in the agricultural sector (Field Survey data). Meanwhile, there is a large disparity in wage infrastructure between the rural and urban working sectors. In the study area, 46% of householders' houses are made by mud, straw & tin, and 50.62% householders' houses are made with bricks and tin, though 3% householders face housing problem. Though recently they have access to electricity service of the study area, but 88% households have access to

electricity connection while 12% households have no electricity connection for various reasons. Water supply conditions are even better in the study areas householder; moreover 84% char areas householders have access to pure water supply by tube well but it is mentionable that 98% of Bangladeshi people have access to pure water supplied by tube well (Economic Survey, 2019). 65% of the respondents use open latrine, 20.37% use open space and only 12.96% use healthy latrine as sanitation in the study area; on the other hand, 76.8% Bangladeshi use healthy latrine (Economic Survey, 2019). In the study area about 19.76% households have no access in modern technology. Recreational facilities are not available and also people are not conscious about that; about 78% households use radio for their recreational purpose, while only 20% households use television and mobile phone for their recreational purpose. The residents of char Bishawnathpur, char bhabanipur areas householder are facing environmental problem such as pure water supply, sanitation system, solid waste mismanagement, drainage system, etc. Overall, we can say that there are very poor socio-economic conditions in pasture area of Pabna district, especially pasture area of Sujanogorupazila.

4.3. Poverty Situation

Poverty is a state in which a person or a group is deprived of or lacking the basic necessities for survival and well-being. These essentials may be material resources such as food, safe drinking water, and shelter, or social resources such as access to information, education, health care, social status, political power, or the opportunity to form meaningful connections with other people in society, because poverty is defined in many ways. (Wong report, 2003). According to the head count index, 55 percent of the population in the study area lives in poverty.. By comparing the results of head count index with Gini coefficient shows that same level of poverty exists there. A lot of people are unemployed; they use their time leisure but they want to work, if it is offered. However, their earning discrimination is gradually increasing day by day. As a result, the poor are becoming poorer day by day and inequality of all sector is simply visible. A number of factors have contributed to high incidence of poverty in Bangladesh, especially in rural and pasture areas. Illiteracy rate is very high at 66%. About 66% of active household members have no education or have attained only primary education. More than 78% of the labor force is in the agricultural sector are landless and engaged in subsistence farming. These essentials may be material resources such as food, safe drinking water, and shelter, or social resources such as access to information, education, health care, social status, political power, or the opportunity to form meaningful connections with other people in society, because poverty is defined in many ways. Very poor socio-economic condition in this selected area seems to have aggravated poverty in Pabna, Bangladesh.

4.4. Incomeinequality

Income inequality (or income disparity) is the degree to which total income is distributed unevenly throughout a population (OECD, 2008). Inequality is connected with disparities in the distribution of a certain metric, which can be income, health or any other material or non-material assets. Inequality typically refers to within country inequality on individual or group level, such as between gender, under and rural population, race, etc. (Martin, 2007). Inequality is closely linked to the ideas of equity, which has two contrasting concepts: equality of opportunity and equality of outcome. The most common measure of income inequality is the GINI coefficient. The coefficient varies between 0, which reflects complete inequality. We can show the inequality scenario of the study area by using the Lorenz curve which is found from field survey data.

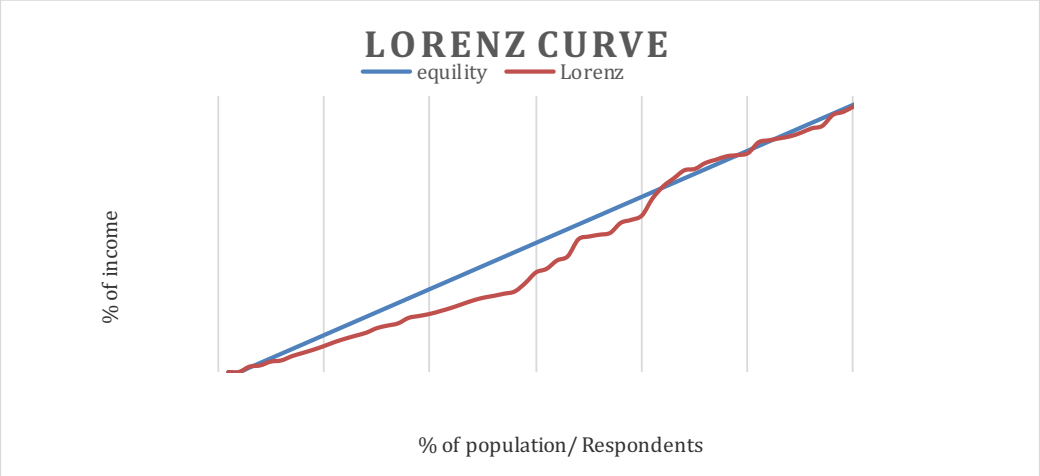


Figure 1: Inequality Scenario in the Study Area

Source: Field survey data analysis

In fact, we have plotted this Lorenz curve using horizontal and vertical axis into six equal segments corresponding to the horizontal group, ten equal segments corresponding to the vertical group. The study observed that the value of area A is 0.54503075 & area B is 0.454969625 and the value of Gini coefficient is 0.54503075, which indicates that majority of people live below the poverty line in our study area. Due to some reasons such as income inequality, illiteracy, damaged transportation, lack of health service and epidemic, lack of appropriate information, technological adequacy, higher rate of interest-based loan facilities, there are more inequality predominates in the study area.

4.5. Data Analysis

There are three types of developing status in the world: Developed, Developing and Under developing country. The countries people per capita income more than $12,736 US dollar is developed country, $1,046 to $12,736 US dollar per capita income is developing country and less than $1045 US dollar per capita income country is under developed country (World Bank, 2015). Table 1 explored that monthly income of the respondents in the study areas. Maximum respondents' monthly income almost same and they belong to the low and middle-income groups in our society. According to Islam etl (2014), the income group of rural area of Bangladesh is divided into three household income levels: higher income group (above 20,000), middle income group (5,000 to 20,000) and lower income group (less than 5,000 tk.). In the study area majority respondent's (93%) monthly income is less than 15000 Tk and also our national level. At present, our annual per capita income 2073 US Dollars or 15202 Tk. per head p/m. (Economic Review 2019). Whereas just 6.79% people monthly earning more than 15000Tk (BDT), that's indicating a better living position.

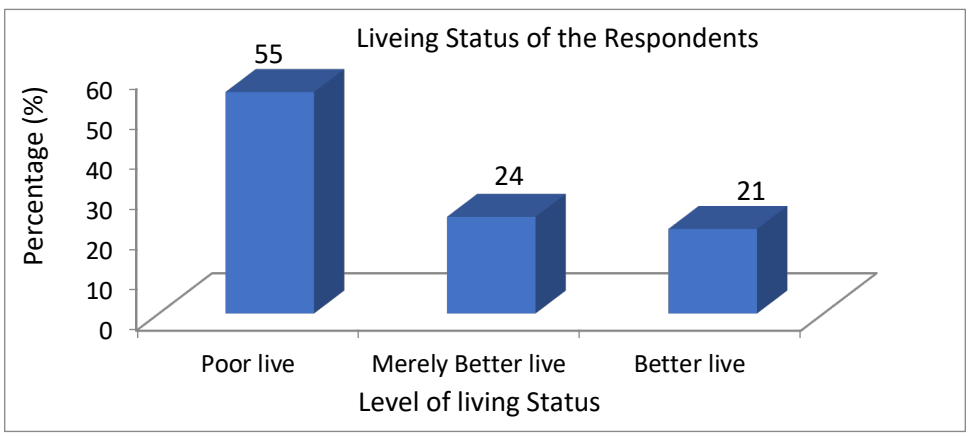


Figure 2: Living Status of the Respondents

Source: Field Survey, 2020

From figure-2, it is revealed that 55 percent of House holders were moderate risk takers living below the poverty line, 24% of house holders were moderate merely better live, they could manage to consume their necessary and needed goods and service 21% of house holders were better live. Thus, in all majority, 55% living people are poor. Studies conducted by Meyer et al. (1961), Litzinger (1963) and Peacock (1986) observed that maximum householders were intermediate/moderate risk-takers. After having moderate bear ability, householders were moving towards high risk-taking ability as observed in earlier studies conducted by Hull et al. (1980). The common way to analyze personal income to statistics is to construct which is known as a Lorenz curve. That shows the quantitative relationship between the change of income recipients and the percentage of the total income they did in fact receive during, say, a given year.

5. Conclusion

A significant number of people are still living below the poverty line in the study area. There is inadequate access to institutional finance as well as to basic services including quality education, healthcare, drinking water and sanitation. Along with focus on economic growth and employment, substantial attention needs to be given to reduce the growth of population. Inequality arises as a result of a highly unequal distribution of both physical and human capital. The rate of increasing the monthly household income of many is lower than that of the expenditure, which makes the poor more difficult to sustain and drags down more people into poverty. The United Nations fixed the sustainable development goals (17 Goals) 2016 to 2030. Where, poverty alleviation, adequate food supply, drinking water and sanitation, ecological development most of them. Now 2021, Pasture areas householders of Bangladesh mostly face inefficiency and inadequacy about that. If Bangladesh wants to achieve SDGs, they should take an action to develop this area and areas people's economic structure. They should create many employment opportunities, entrepreneurs, Government and NGO investments. Actually it is needed to increase their purchasing power, education level, reduce the discrimination of male and female achievement. The study also found that the lack of health facilities, education facilities, transportation system facilities and others are inefficient at all. But nowadays development status is rising at in increasing rate. The percentages of economic growth rate, per capita income, life expectancy along with the sustainable lifestyle are increasing in a positive rate. Adequate state intervention programs and strategic policies are needed to improve the current poverty situation. Theoretically, there are some of the strategic documents and policy papers which seem to be implementable to reduce the poverty situation. However, without proper monitoring and evaluation, the implementation of all these policies, strategies and programs seems to be useless. Building on the lessons of the past experience, the poverty reduction strategy should emphasize girl's education, female reproductive health, population control service delivery based on public-private partnership, and social mobilization. The government should be innovative in renewing and modifying techniques and approaches to control rising food costs and, as a result, food inflation, as well as increasing budgetary allocation to poverty alleviation programs. Dedicated, honest and skilled planning implanting can ensure future socio-economic and environmental friendly pasture area of Bangladesh especially in the study area.

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Determinants of Indonesian MSME Exports and Their Performance during the Covid-19 Pandemic

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Abstract
MSME proved resilient to crises, but its performance did not improve. Indonesian MSMEs when compared to other countries have low export competitiveness. The Covid-19 pandemic has weakened more than 50% of MSMEs. The research objectives are to analyze the simultaneous and partial effect of the rupiah against the US dollar exchange rate, the growth of MSME, investment, and bank credit on the export of MSME products; analyze the influence of MSME exports on GDP growth; and analyze the effect of MSME exports on employment; and to find out the export performance of MSME during the Covid-19 pandemic. Survey research with technical analysis of OLS Multiple Regression data on secondary data for the 2010-2020 quarter. Research results are: 1) Stability of the Rupiah/USD exchange rate, growth in the number of MSMEs, increased investment, and increased bank lending to the MSME sector as well as controlled inflation rates had a very significant impact on increasing exports of MSME products; 2) Exports of MSME products contribute greatly to GDP and have an impact on increasing people's per capita income; 3) The increasing export value of MSME products encourages MSME entrepreneurs to continue to increase their productivity so that this sector can absorb a significant workforce; 4) MSME's performance in the Covid-19 pandemic was shown by the decline in the value of exports and employment, but the number, investment, credit, and contribution to GDP continued to increase until the end of 2020.

Keywords: Bank Credit, Employment, Exchange Rate, Exports, GDP, Investment, Number of MSMEs

1. Introduction

Economic development is a series of efforts in an economy to develop economic activity businesses so that more infrastructure is available, more and more companies are developing, the level of education is getting higher and technology is increasing (UMN, 2016). Micro, Small, and Medium Enterprises (MSME) have an important and strategic role in national economic development. Apart from playing a role in economic growth and employment, MSME also plays a role in distributing development results (Tambunan, 2021a).

The number of Indonesian MSME business is among the largest among other countries, since 2014, the number of MSMEs in Indonesia continues to experience development and growth, and it is proven that the crisis is not affected, even the number of workers absorbed continues to increase (BPS, 2020; Tambunan, 2021b). Therefore, there is a need for cooperation for the development and resilience of MSMEs by increasing empowerment strategies through improving export performance (Adrian, 2018). The strategy to overcome the times is by controlling the market to expand the marketing network (Rajput, Rajput, Batra, & Oberoi, 2012). In addition, the application of information technology (IT) to MSME will facilitate the expansion of markets both in the domestic and foreign markets and the establishment of an IT-based MSME Development Center (Ghouse, 2014; Altun, 2017; Adrian, 2018).

Based on previous research, macroeconomic elements such as exchange rates, interest rates, inflation affect MSME export performance (Dincer & Kandil, 2011; Tulucea & Doganb, 2014; Mahadika, Kalayci, & Altun, 2017; Rudianto & Susilastuti, 2019). Financing both foreign (Foreign Direct Investment) (Sharma & Gounder, 2012), as well as banking financing (Kartikasari, 2017; Rudianto & Susilastuti, 2019), affect MSME performance. MSME performance has implications for economic growth (Kartikasari, 2017; Salim, Susilastuti & Rafiqah, 2020; Rudianto & Susilastuti, 2021; Tambunan, 2021a) and employment (Katua, 2014; Sentosa, Ariusni &Triani, 2015; Rudianto & Susilastuti, 2021; Tambunan, 2021).

Based on the previous research above, where the research is still partial, this research variable was studied simultaneously and used as a novelty because it had never been studied before. This research is a complementary follow-up study on the effect of the Rupiah (IDR) against the US Dollar exchange rate, growth in the number of MSMEs, investment, banking credit on exports of MSME products and gross domestic product and their implications for employment in the MSME sector and their performance during the Covid-19 pandemic. The pandemic condition presents a separate problem that needs to be discussed in connection with the strong influence on the national economy.

The formulation of the problem in this study is as follows:

1) How is the effect of the rupiah exchange rate against the US dollar, the simultaneous and partial growth in the number of MSMEs, investment, and bank credit on exports of Indonesian micro, small and medium enterprises (MSME) products?
2) How does the export of MSME products affect the gross domestic product?
3) What is the effect of exports of MSME products on employment in the MSME sector?
4) How was MSME's export performance during the Covid-19 pandemic?

2. Method

Survey research on quarterly time series data from 2010 to 2020 (n = 44). The variables studied were Exchange Rate (X_1), MSME Growth (X_2), Investment (X_3), and Credit (X_4) as independent variables. MSME exports (Y) are the dependent variable (exogenous), while GDP (Z_1) and Labor Absorption (Z_2) are the dependent variables (endogenous). This study uses multiple linear regression analysis and simple linear regression analysis. The regression analysis technique uses the Ordinary Least Square (OLS) technique (Gujarati and Porter, 2012).

Multiple linear regression equation:

(a) Model I

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_t \quad \text{..... (1)}$$

Simple linear regression equation:
Simple Linear Regression Equation (Simple Linear Regression) is as follows:

(b) Model II

$$Z_1 = \beta o + \beta_5 \hat{Y} + \varepsilon_t \quad \text{..... (2)}$$

(c) Model III

$$Z_2 = \beta_0 + \beta_6 \hat{Y} + \varepsilon t \quad \text{..... (3)}$$

Information :

$\beta_{0 \ldots 6}$ = Constant Equation 1 to 3
$\varepsilon_{1 \ldots 3}$ = Standard Error equation 1 to 3
$\hat{Y}$ = recursive MSME Product Export

The normality test used the Jarque-Bera test (JB Test) (Gujarati & Parker, 2012). The multicollinearity test uses the Matrix correlation test (Gujarati & Porter, 2012). Autocorrelation test using Langrange Multiplier (LM) or BG Test (Breusch Godfrey) (Gujarati and Porter, 2012). Detection of heteroscedasticity is seen with the scater plot graph (Ghozali & Ratmono, 2017).

Simultaneously test the hypothesis using the F statistical test with a 95% confidence level, so that the alpha precision level is 0.05. Partial hypothesis test using t-test with alpha 0.005. The coefficient of determination (R^2) is used to measure the model's ability to explain independent variables (Gujarati & Porter, 2012).

3. Result

3.1. Unit Root Test and Classical Test

The group unit root test for all variables using the ADF (Augmented Dickey-Fuller) method produces an ADF value of 12.6665 with Prob. value 0.0006 < α=0.05 at the level. Thus, it be stated that all the stationary variables at the level and the resulting equations are cointegrated, or do not produce spurios regression for the three models. The results of the classical assumption test stated that the three models had met the criteria of normality, multicollinearity, autocorrelation, and heteroscedasticity or were declared to meet BLUE.

3.2. Descritive Analyze

Based on the descriptive data collected, investment in the MSME sector has an average of 858,484.16 billion IDR with the highest investment value of 1,768,277.36 billion IDR in the fourth quarter of 2019. The fourth quarter of 2019 is the best moment for investment in the MSME sector to be able to boost MSME product export performance. MSME Banking Loans Sector had an average value of 798.47 billion IDR with the highest credit disbursement value of 1,047.14 billion IDR occurred in the fourth quarter of 2020.

The average inflation was 4.52 percent with the lowest inflation at 1.42 percent in the third quarter of 2020. The highest inflation occurred in 2013, the main reason being that the increase in fuel prices contributed to the inflation of 1.17%.

The Rupiah/USD Exchange Rate has an average value of 12,180 IDR with the highest Rupiah/USD Exchange Rate of 16,367 IDR occurring in the first quarter of 2020. The Rupiah exchange rate experienced the highest depreciation in the first quarter of 2020, this was due to the outbreak of the Covid pandemic - 19 had a major effect on the rupiah exchange rate throughout the first semester of 2020 which tended to fluctuate and depreciate.
Exports of Indonesian MSME Products have an average value of 228,558.17 billion IDR with the highest export value of Indonesian MSME Products of 329,446.27 billion IDR occurred in the fourth quarter of 2019, the highest value for the last 11 years. Throughout 2019, MSME contributed 60.34 percent of GDP and 14 percent of total national exports.
Employment of the MSME Sector in Indonesia has an average value of 43,051,619 workers with the highest number of employees in the MSME sector of 62,244,120 workers occurred in the first quarter of 2020.

3.3. Inferential Analyze

The results of the Simultaneous Multiple Linear Regression F Test Model I are presented in Table 1 below:

Table 1: Simultaneous and Partial Test Results Model I

Dependent Variable: Export
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.485865	2.368094	-4.005696	0.0003
INVESTMENT	0.214857	0.023557	9.120703	0.0000
NUMBER OF MSME	1.984334	0.354084	5.604138	0.0000
CREDIT	0.008332	0.042808	0.194638	0.8467
INFLATION	0.009705	0.026674	0.363825	0.7180
EXCHANGE RATE	-0.457214	0.110011	-4.156073	0.0002
R-squared	0.976642	Mean dependent var		5.342979
Adjusted R-squared	0.973568	S.D. dependent var		0.118513
F-statistic	317.7641	Durbin-Watson stat		0.551207
Prob(F-statistic)	0.000000			

Source: processed by Eviews 10

Based on Table 1 it can be stated that: a). F Prob. value = 0.00000 = 0.05 which means simultaneously significant effect. This shows that the MSME sector investment variables, growth in the number of MSMEs, MSME sector banking credit, inflation, and the Rupiah/USD exchange rate have a significant effect on the export of Indonesian MSME products. b). Partial Test of MSME Sector Investment, P-value = 0.0000 ≤ 0.05, it is concluded that it has a significant and positive effect on MSME Product Exports. c). Partial Test The growth of the number of MSME, P-value = 0.0000 ≤ 0.05, it is concluded that it has a significant and positive effect on MSME Product Exports. d). A partial test of banking credit, P-value = 0.8467 > 0.05, it is concluded that there is no significant and positive effect on MSME Product Exports. e). Partial Inflation Test, P-value = 0.7180 > 0.05, it is concluded that there is no significant and positive effect on MSME Product Exports. f). Partial Test of Rupiah/US Exchange Rate, P-value = 0.0002 ≤ 0.05, it can be concluded that it has a significant and negative effect on MSME Product Exports. The value of Adjusted R^2 = 0.9735, it means that the MSME sector investment variables, growth in the number of MSMEs, banking credit in Indonesia, inflation, and the Rupiah/USD exchange rate have a very strong effect of 97.35 percent on Indonesian MSME Product Exports, the remaining 2.65 percent influenced by other factors outside the model under study.

Based Table 1, the equation of model I is stated that:

$$\text{Ln } Y = -9{,}485865 + 0{,}214857 \ln \text{INV} + 1{,}984334 \ln \text{MSME} + 0{,}008332 \ln \text{CREDIT} + 0{,}009705 \ln \text{INFL} - 0{,}457214 \text{ Ln ER} \quad \ldots\ldots\ldots\ldots\ldots (4)$$

Based on the above equation, it is stated that: 1). Constant value = - 9.485865, meaning that statistically if all variables are ceteris paribus, then the value of MSME Product Exports is -9.485865 units. 2). Regression coefficient b1 = 0.214857, meaning that investment increases by 1 unit, then MSME product exports will increase by 0.214857 units. The value of the elasticity of investment to the export of MSME products is E = 0.214857 < 1, indicating that the increase in investment is inelastic to exports of MSME products or decreasing returns to scale. 3). Regression coefficient b2 = 1.984334, meaning that the growth in the number of MSMEs increases by 1 unit, so MSME Product Exports will increase by 1.984334 units. The elasticity value of the growth of the number of MSMEs on the export of MSME products is E = 1.984334 > 1, indicating that the increase in the growth of the number of MSMEs is an elastic or increasing return to scale. 4). Regression coefficient b3 = 0.008332, meaning that bank credit increases by 1 unit, so MSME product exports will increase by 0.008332 units. The investment elasticity of MSME Product Exports is E = 0.008332 < 1, indicating that the increase in credit is inelastic, namely decreasing returns to scale. 5) Regression coefficient b4 = 0.009705, meaning that banking credit increased by 1 unit, so MSME product exports increased by 0.009705 units. The value of investment elasticity on MSME Product

Exports is E = 0.009705 < 1, indicating that the increase in inflation is the inelastic or decreasing return to scale. 6) Regression Coefficient b5 = - 0.457214, meaning that if the exchange rate of rupiah/USD increases by 1 unit, then exports of MSME products decrease by - 0.457214 units. The elasticity value of the Rupiah/USD Exchange Rate E = - 0.457214 < 1, indicates that the decline in the Rupiah/USD Exchange Rate is inelastic or decreasing returns to scale.

The effect of Indonesian MSME product exports (recursive) on GDP (Table 2), shows a significance with P-value = 0.0000 ≤ 0.05. The value of Adjusted R^2 is 0.7896, meaning that the magnitude of the influence of Indonesian MSME product exports on GDP is 78.96 percent, the remaining 21.04 percent is influenced by other factors outside the model studied.

Table 2: Simultaneous and Partial Test Results Model II

Dependent Variable: GDP
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.036605	0.359645	8.443352	0.0000
EXPORT_R	0.857597	0.067294	12.74397	0.0000
R-squared	0.794529	Mean dependent var		7.618727
Adjusted R-squared	0.789637	S.D. dependent var		0.117951
F-statistic	162.4088	Durbin-Watson stat		0.148809
Prob(F-statistic)	0.000000			

Source : Proccessed by Eviews 10

The linear regression equation is:

$$\text{Ln GDP} = 3{,}036605 + 0{,}857597 \ln \text{EXPORT\_R} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

The interpretations are 1). Constant value = 3.036605, meaning that if all the variables are ceteris paribus, then the GDP value is 3.036605 units. 2). Regression coefficient b6 = 0.857597, meaning that the recursive Indonesian MSME Product Exports increased by 1 unit, so GDP increased by 0.857597 units. The elasticity value of MSME product exports to GDP is E = 0.857597 < 1, indicating that the increase in MSME product exports is the inelastic or decreasing return to scale.

The recursive effect of Indonesian MSME exports on labor absorption (Table 3) is significant and positive at a P-value of 0.0000 ≤ 0.05.

Table 3: Simultaneous and Partial Test Results Model III

Dependent Variable: EMPLOY
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.682447	0.178974	37.33745	0.0000
EXPORT_R	0.254875	0.033489	7.610809	0.0000
R-squared	0.579682	Mean dependent var		8.044237
Adjusted R-squared	0.569675	S.D. dependent var		0.041040
F-statistic	57.92441	Durbin-Watson stat		0.320514
Prob(F-statistic)	0.000000			

Source: *Data processed Eviews 10*

Adjusted R^2 value = 0.5697, meaning that the recursive effect of Indonesian MSME product exports on employment in the MSME sector is 56.97 percent, the remaining 43.0 percent is influenced by other factors outside the model studied. The simple linear regression equation is:

$$\text{Ln EMPLOY} = 6{,}682447 + 0{,}254875 \text{ ln EXPORT\_R} \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The interpretation of the regression equation is as follows: 1). Constant = 6.682447 means n if all variables are ceteris paribus, then the value of the MSME Sector Labor Absorption is 6.682447 units. 2). Regression coefficient b7 = 0.254875, meaning that the recursive export of Indonesian MSME products increases by 1 unit, so the MSME Sector Labor Absorption will increase by 0.254875. Elasticity = 0.254875 < 1 indicates that the increase in MSME Product Exports is the inelastic or decreasing return to scale.

4. Discussion

Descriptively, the number of MSMEs, MSME export performance, GDP, and Indonesia's employment in 2010 - 2020 are presented in Fig. 1, as follows:

Figure 1: Performance of Indonesian MSMEs in 2010-2020

Source: Data BPS (2020) processed

Based on Fig. 1, it is explained that the number of MSMEs is increasing with an average increase of 0.7% / year and is still increasing during the 2019-2020 Covid-19 pandemic. MSME's export performance increased sharply starting in 2015 but declined during the pandemic. GDP as measured by per capita income increases until 2020, which is 62,244,120.00 IDR. Meanwhile, employment in the MSME sector decreased with the Covid-19 pandemic in 2019-2020.

The influence of the independent variables is descriptively explained as follow:

The factor that caused the high investment at that time began with the issuance of Indonesian Presidential Instruction No. 7 of 2019 regarding the acceleration of the ease of doing business, the Indonesian people were able to register their businesses practically. The number of MSMEs increased positively from 2010, the highest was 70,925,020 units in the fourth quarter of 2020, the highest growth was in the third quarter of 2.08%. Several factors support the growth of MSME, namely the factor of utilizing ICT (information, communication technology) facilities, opening access to banking financing, and increasing the availability of people's business loans, as well as the opening of types of creative business fields during the Covid-19 pandemic.

Bank lending to the MSME sector during the covid-19 pandemic even increased in the fourth quarter of 2020. This is because the MSME sector is the backbone of the Indonesian economy whose business continuity needs attention and support from the government, so that the government through various policies so that MSME does not get

worse and can survive through economic pressures and continue its business affected by Covid-19. The government has prepared various stimuli through the economic recovery program. Stimulus program by preparing interest subsidies for credit, exemption from Final Income Tax article 25 for 6 (six) months, starting from March 2020, and Allocation of State Equity Participation to State-Owned Enterprises for MSME. In the Economic Recovery Program, the government takes policies to restore MSMEs. One of the policies adopted is to allocate State Equity Participation to State-Owned Enterprises aimed at assisting the recovery of the MSME sector.

The highest inflation occurred in 2013, the main reason being that the increase in fuel prices contributed to the inflation of 1.17%. In-city transportation fares contribute to inflation of 1.75%. Meanwhile, the lowest inflation occurred in the third quarter of 2020, but it was not evenly distributed in line with the development of the COVID-19 case. Indonesia's economy in 2020 contracted 3.5 percent (YoY). This condition was better than the previous quarter, which contracted by 5.3% (YoY). The improvement was driven by the National Economic Recovery Program. Bank Indonesia held the policy interest rate at 4.00 percent to maintain the stability of the Rupiah value and promote economic recovery. Since the third quarter, the Rupiah has been relatively stable, strengthening 1.8 percent from the previous quarter. Inflation developments in the third quarter were low and below the minimum level of the 2020 inflation target.

In the Government Report for Fiscal Year 2020, regarding the implementation of the State Revenue and Expenditure Budget in the first semester of 2020. It was stated that there was a weakening of the rupiah exchange rate due to the spread of the Covid-19 pandemic throughout the world, including Indonesia which caused an increase in the risk of global uncertainty so that investors tended to shift their investment funds to haven assets, such as gold, developed country government bonds, and world currencies, such as the United States dollar. This action resulted in capital outflows from emerging market countries, including Indonesia, which led to the depreciation of almost all world currencies against the US dollar. As of the first quarter of 2020, Indonesia's foreign capital outflows reached 148.5 trillion IDR, or almost three times greater than the capital outflows that occurred during the 2008 and 2013 financial crises. March 2020 fell more than 16,000 IDR per US dollar and depreciated monthly to 15,195 IDR per US dollar. The weakening of the rupiah exchange rate continued until early April 2020 where the rupiah exchange rate reached its lowest level in history at IDR 16,741 per US dollar on April 2, 2020.
In 2019, several MSME business sectors occurred in exports amidst challenging economic conditions. Among them are the culinary, fashion, and handicraft sectors. These sectors can survive because they use domestic raw materials that can reduce costs. While at the beginning of 2010, the low export value was caused by several things, such as the weak ability of MSMEs to meet market demand, weak skills in conducting online trade, and lack of access to administrative support to carry out exports. Gross Domestic Product as measured by Per Capita income has an average value of 43,051,619.00 IDR with the Highest Per Capita income of 62,244,120.00 IDR occurred in the fourth quarter of 2020. The highest per capita income occurred in the fourth quarter of 2020 in line with the increase in GDP in the same period. Indonesia's GDP per Capita has increased rapidly in the years following 2000. The World Bank's projection that Indonesia will reach the level of USD 3,000 is considered an important step as this should lead to accelerated development in several sectors such as retail, automotive, property, due to strong consumer demand increased economic growth.

Employment in the MSME sector occurred in the first quarter of 2020, in the difficult situation faced by large corporations. MSME was able to absorb 97 percent of the workforce, which is very encouraging because around 131.398,869 workers were absorbed in this sector before the end of the first quarter when the Covid-19 pandemic spread. in all corners of the country, which resulted in many MSME sectors going bankrupt which resulted in many workers being laid off and furloughed. The absorption of a large enough workforce in the first quarter of 2020 was at least able to stop the growth of unemployment and poverty due to the Covid-19 pandemic.

The simultaneous influence of investment, MSME growth, banking credit, inflation, and the Rupiah/USD Exchange Rate on Indonesian MSME product exports is significant and positive. This illustrates that the five determinants together make a significant contribution in encouraging increasing Indonesian MSME Product Exports with a determination coefficient of 97.36 percent for the last 11 years. The inclusion of MSMEs as part of export activities makes the wheels of the economy move. This is because the goods produced can be distributed and the country earns foreign exchange. This, be seen from the increasing number of MSMEs which continue to

grow every year as well as the support of Bank Indonesia in issuing credit distribution policies that are much simpler and more accessible to MSME players as well as stable inflation control followed by Bank Indonesia policies in regulating the inflation rate which continues to encourage program expansion. MSME business development program that focuses on controlling inflation and reducing the current account deficit. In monetary policy, the Rupiah exchange rate against the American dollar, which is quite stable with a range of fluctuations within reasonable limits, has been proven to have a significant effect on increasing the export value of MSME products in Indonesia.

The influence of investment on the export of Indonesian MSME products is significant and positive. Although other business sectors are having a little difficulty in carrying out operations due to the COVID-19 pandemic, on the contrary, MSME continues to grow. This is evident from the many businesses registered with OSS (online Single Submission), 60% of which are MSMEs. The investment value of MSME is predicted at IDR 10-15 million (Rinaldi, 2020), and can open new jobs for people affected by the pandemic. This is believed to be able to restore the Indonesian economy in the third and fourth quarters of 2020 and is likely to decline again due to the Java Bali PPKM policy (Implementation of Restrictions on Community Activities) in July 2021 and the soaring Covid 19 which has an impact on a decline in economic activity. Based on a survey by the International Labor Organization (ILO), 70% of MSMEs stopped production due to the impact of the COVID-19 pandemic. The cessation of MSME is because MSME is very dependent on the movement of humans as consumers (Tambunan, 2021c). The existence of the Large-Scale Social Restriction Policy and Work From Home caused the number of consumers to decrease drastically. Especially from the demand side, there was a decline in the products produced by MSME, the impact was also felt from the supply side where the number of workers was limited and workers were laid off. Cash flow was disrupted as a result of the difficulty of distributing MSME products, in addition to very limited raw materials and rising prices, thus disrupting the distribution process of MSME products.

The influence of the growth in the number of MSMEs on the export of Indonesian MSME products is significant and positive. MSMEs play a very important role in Indonesia, especially in encouraging economic growth, supporting local economic activities, creating new markets and innovation (Tambunan, 2021c). Its contribution is quite large in maintaining the balance of payments in producing exports, creating the largest job opportunities so that it is seen as a safety valve or savior in the process of national economic recovery. The MSME sector is synonymous with small people who have great potential to eliminate or reduce poverty and unemployment. In line with the Millennium Development Goals (MDGs), if MSMEs are alive, certainly, the economy in this country is also alive. If the economy in Indonesia is alive, the people will prosper. If the micro, small and medium scale economies can be turned on, and their businesses can operate at the level of the small people, and on a large scale it will become a benchmark for the welfare of the community (Tambunan, 2021a). Data from State Ministry of Cooperatives and SMEs (2020), MSMEs as a whole experience good development and growth every year, and in percentage terms the number of MSMEs in Indonesia reaches 99.9% of the total business units.

The influence of bank credit on MSME product exports has no significant but positive effect. This is supported by research by Saini and Rajpurohit (2014), and Rudianto and Susilastuti (2020) which state that one of the drivers of MSME performance is bank lending. The government set several targets for the empowerment of MSMEs, then to realize these targets policy directions were made as outlined in development programs which were implementation strategies with the issuance of Indonesian Presidential Instruction No.7 Policies to restore MSME in any way have been carried out by the government. It should be noted for MSMEs that the Government allocates State Equity Participation aimed at assisting the recovery of the MSME sector. This picture occurs in MSMEs in Indonesia so that MSMEs with the encouragement of the government is still in a lagging position which has an impact on the decline in exports of MSME products. Policies to restore MSME in any way have been carried out by the government. It should be noted for MSME that the Government needs to allocate State Equity Participation which aims to help the recovery of the MSME sector (Abdesamed & Wahab, 2014).

The effect of Inflation on MSME Product Exports has no significant but positive effect on MSME Product Exports. This is in line with the results of research by Akalpler (2016), and Rudianto and Susilastuti (2020) which state that inflation does not affect exports. Inflation is a process of increasing prices, in general, that occurs continuously (UMN, 2016). The increase in prices is generally influenced by several factors such as increased public

consumption, non-smooth distribution of goods, scarcity of goods, resulting in excess liquidity in the market (Samuelson & Nordhaus, 2015). Or in other words, inflation is a condition of a decline in the value of a currency. Inflation is related to the event of an increase in the price of an item, but not every increase in goods is included in inflation. Inflation can be an indicator that is calculated if there is a continuous increase in prices. This price increase caused by an increase in the supply of money (Abdesamad & Wahab, 2014). Inflation uses CPI (Consumption Price Index) and GDP Deflator to measure inflation. Inflation affects business, in MSME conditions the effect is the price of raw materials for MSME products. The effect of inflation is only on the supply of direct raw materials if they have been processed into products, the results of MSME products can be marketed even though the products are marketed at high prices. MSMEs are known to have high resistance to crises because they are generally based on raw materials and have a domestic marketing target (Tambunan, 2021). With many challenges faced by MSME other than capital and access to finance, weak human resource capacity, and limited reach of MSME product marketing. Bank Indonesia continues to encourage MSMEs to participate in various national and international exhibitions to motivate and trigger MSME products to continuously improve the welfare of the community. MSME in Indonesia needs development so that MSME development and business scale can move towards exporting MSME products. To support MSME development, various elements are needed that support MSME development from upstream to downstream, namely through product promotion and easier financing.

The Effect of the Rupiah/USD Exchange Rate on Indonesian MSME Product Exports has a significant and negative effect on Indonesian MSME Product Exports. The weakening of the Rupiah exchange rate against the United States Dollar recently had an impact on the Indonesian economy. Due to global economic uncertainty, many domestic sectors have been affected by the weakening of the rupiah. All industrial scales feel the impact. From the lessons of the 1998 economic crisis that hit Indonesia, the resilience of the MSME sector has become a safety valve in the informal sector. MSME resilience is seen from 1). MSME produces consumer goods and services that are close to people's needs. 2). MSME actors utilize local resources ranging from human resources, capital, raw materials, and equipment. 3) MSME business is not supported by loan funds from banks, but by own funds. These three are closely related to each other (Adrian, 2018). The weakening of the rupiah exchange rate is considered beneficial for some people and one of them is for export-oriented MSMEs.

The influence of Indonesian MSME Product Exports on GDP as measured by Per capita Income is significant and positive. GDP per person is a measure of the average welfare of individuals (Samuelson & Nordhaus, 2015). GDP per capita tells us what is happening to the average population. GDP is a good measure of well-being for many purposes, but not for all purposes. Involving MSMEs in export activities at the same time will have a good impact on the Indonesian economy and can create new jobs. Because MSME is a sector that plays an important role in economic recovery and has a big role in the formation of GDP. The contribution of the MSME sector to GDP has been increasingly visible over the last five years. State Ministry of Cooperatives and SMEs (Kmenkopukm, 2021) was recorded the contribution of the MSME sector increased from 57.84 percent to 60.34 percent. This is by the results of research by Salim, Susilastuti, and Rafiqah (2020) which state that MSME performance affects regional income. MSME has also helped to absorb labor in the country. Labor absorption in the MSME sector grew from 96.99 percent to 97.22 percent in the last five years. With the large number of workers absorbed, the MSME sector can increase the income per capita of the community. According to Adrian (2018), the increase in the number of exports is due to the increase in the production of domestic goods resulting in full employment, as a result, the per capita income of a country increases, meaning that purchasing power also increases. An increase in GDP that is greater than an increase in population will increase per capita income so that purchasing power increases (Maipita & Wahyudi, 2017). In line with this, the Indonesian government places exports as one of the locomotives of economic growth. In Indonesian statistics (BPS, 2019) it is stated that exports of goods and services are the second largest contributor to economic growth after private consumption. The government sets export growth targets in support of economic growth, job creation, and increasing the income per capita. To increase income per capita, even higher, one of the government's efforts is to encourage MSME export activities which are considered capable of boosting Indonesia's GDP per capita. Therefore, the government has prepared a plan to spur exports of MSME products (Rinaldi, 2020). This draft is being followed up by preparing global standards and strong branding provisions for MSMEs. The international trade paradigm always refers to the quality and branding of products from a country. For this reason, it is necessary to guide MSMEs so that they can find out more about global trade

trends. In this case, the government assists the MSME sector to boost exports (Rinaldi, 2020). However, several obstacles faced by the MSME sector have been mapped out, particularly related to access to banking capital. MSME must pay attention to the international standard certification process. The difficulty of obtaining certification requires easy access to facilities that are provided quickly. To boost exports of MSME products. In addition, a partnership is needed by cooperating with large companies and it is hoped that the government can prepare a place to sell MSME products (warehouses) abroad for MSME players. The government's efforts to boost people's per capita income through the MSME sector export are considered to have been successful.

In conditions full of uncertainty, the government continues to commit to providing interest subsidies for MSMEs to pay their installments. The government's contribution is by providing funds to MSMEs in the amount of 2.4 million to each MSME as capital (BI, 2020). The steps taken by the government and its ministries are collaborating with the Indonesian Export Financing Agency, specifically for exports, to encourage and support small and medium-sized businesses to help empower MSMEs amid the COVID -19 pandemic that MSMEs are facing.

The influence of Indonesian MSME Product Exports on manpower absorption in the MSME Sector is significant and positive. This is in line with the research by Rudianto and Susilastuti (2021) which states that MSME exports affect employment in both the short and long term. The definition of labor absorption is interpreted in various ways, but it absorbs labor in the sense of gathering people or workers in a business field (UMN, 2016). Absorption of labor is the capital for the movement of the wheels of development so that the prosperity of a country or region depends a lot on the use of labor as effectively as possible in increasing its productivity (Mulyadi, 2014; Katua, 2014; Tambunan, 2021). In this case, the absorption of labor shows the ability of a company to absorb labor to produce a product. The ability to absorb labor is not the same from one sector to another. Employment must be accompanied by the quality of its human resources to provide limited job opportunities and competitiveness. The local government in this case continues to strive to create job opportunities that will later be able to accommodate or reduce the unemployment rate. Unemployment amid society through the creation of job opportunities in various fields of life. With the amount of energy absorbed, the researcher assesses that the MSME sector can increase people's income. Thus, MSME has a strategic role in fighting poverty and unemployment. However, amid the current COVID-19 pandemic, MSME actors are facing very heavy pressure because they cannot carry out economic activities as usual. The current condition of MSME is the most affected by COVID-19, causing several business actors to be laid off. In 2019, the MSME sector contributed 60% to national income MSME is one of the most effective economic drivers. This year, it is estimated that MSME will be able to contribute around 61% of the National Income despite being affected by a fairly severe pandemic (Kemenkopukm, 2021). MSME actors must be able to adapt to the current conditions affected by the COVID-19 pandemic. The government issued a policy of providing stimulus to help MSME actors. Where the government provides funds for MSME actors with low-interest rates in banks so that there is economic movement in the MSME sector. This is also related to banking, but with the conditions faced by MSME, banks restructured and provided low credit facilities to be used as MSME's capital. The government and its ministries are helping to provide subsidies for People's Business Credit loans with low-interest rates and MSME actors. In conditions full of uncertainty, the government continues to commit to providing interest subsidies for MSMEs to pay their installments. The government's contribution is by providing funds to MSMEs in the amount of 2.4 million to each MSME as capital (BI, 2020). The steps taken by the government and its ministries are collaborating with the Indonesian Export Financing Agency, specifically for exports to encourage and support small and medium-sized businesses to help empower MSMEs amid the COVID-19 pandemic faced by MSME actors (ITC, 2020). With the government's policy, it is hoped that MSME can bounce back, especially in exporting their products, so that MSME actors can re-employ their employees and even absorb new workers. Thus the MSME sector is again the backbone of the Indonesian economy with the potential to absorb more workers or in other words reduce unemployment (Yolanda, 2017a).

Based on the results of research and discussion, conclusions are stated as follows: 1). The stability of the Rupiah/USD exchange rate, growth in the number of MSMEs, increased investment, and increased bank lending to the MSME sector as well as controlled inflation rates have had a very significant impact on increasing exports of MSME products. 2).Exports of various products produced by MSME entrepreneurs contribute greatly to Gross Domestic Product so that it has an impact on increasing people's per capita income. 3).The increasing export value of MSME products encourages MSME entrepreneurs to continue to increase their productivity so that this sector

can absorb significant labor. 4). The performance of MSMEs in the Covid-19 pandemic is shown by the declining value of exports and employment of the MSME sector, but the number, investment, credit value, and contribution to GDP will continue to increase until the end of 2020.

MSMEs in crisis or non-crisis conditions can become the backbone of the Indonesian economy. Due to difficult conditions due to financing, SMSME was able to become a safety valve in the informal sector, and in inflationary conditions where purchasing power declined, the MSME sector was able to survive.

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How Brand Equity Can Saves Its Company? A Study of One of the Largest E-Commerce in Indonesia

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Abstract
Marketing management is an activity that is planned and organized including the distribution of goods, pricing and monitoring of policies that have been made which aim to gain a place in the market so that the objectives of marketing can be achieved. Online marketing media in the digital era seems to be the prima donna of solving solutions, therefore business actor's flock to take advantage of online marketing media as a driving force for the wheels of their business. The type of research used in this study was quantitative research. In this study, data processing and analysis used the Partial Least Square (PLS) approach. PLS is a component-based or variant-based Structural Equation Modeling (SEM) equation model. The data analysis in this research is the Outer Model Analysis, Inner Model, and Hypothesis Testing. This research results that the price has an effect on Brand Image. Product Quality has an effect on Brand Image. Service Quality affects Brand Image. Price affects Promotion. Product Quality affects Promotion. Quality of Service affects Promotion. Promotion affects Brand Image. Promotion moderates the relationship between Price and Brand Image. Promotion moderates the relationship between Product Quality and Brand Image. Promotion can moderate the relationship between service quality and brand image.

Keywords: Brand Equity, Price, Product Quality, Promotion, Service Quality

1. Introduction

1.1 Introduction

Marketing is one of the main activities for entrepreneurs to maintain the viability of their business in order to grow and earn a profit. In addition, marketing knowledge is also very useful so that companies can compete and survive in the competition. Achieving business objectives is highly dependent on expertise in marketing, production, finance and other fields, as well as the ability to combine these functions so that the organization can run smoothly. The role of promotion is essentially a form of marketing communication that aims to encourage demand, what is meant by marketing communication is a marketing activity that seeks to disseminate information, influence and

or remind the target market of the company and its products to be willing to accept, buy, and be loyal to the product or service that is offered by the company concerned. Promotion is one of the ways used by companies to introduce their brands to a wide audience, the success of promotions is strongly influenced by how the company describes its brand in an attractive and unique way to reach the minds of consumers, so that consumers can capture the intent and purpose of the promotion. So that promotion has a significant influence on brand image (Allaham, 2015).

Promotion is an important marketing activity in informing, persuading, reminding products or services in several ways, namely by doing advertising (advertising), sales promotion (selling promotion), public relations (public relations), personal selling (personal selling), direct marketing and marketing online (direct & online marketing), and information by word of mouth (word of mouth) a promotion if done properly will have an impact on both the company and the image of the company. From the three theories above, it can be concluded that the role of promotion is the most important thing in marketing and has a big impact on brand ideals.

Online marketing media in the digital era seems to be the prima donna of solving solutions, therefore business actor's flock to take advantage of online marketing media as a driving force for their business wheels (Rohimah, 2018). According to PFS, a global e-commerce consulting agency, Indonesia is estimated to be one of the fastest-growing e-commerce markets in the Asia Pacific in the coming years. Several start-up companies in Indonesia have used online market media to develop their businesses with various payment methods, from cash on delivery (COD) payments, e-money, to credit cards. Utilization of the internet, especially as a medium of trading and buying and selling for both the business-to-business and business-to-customer level, is currently one of the needs of every company (Turban, 2017).

From the theory above, it can be concluded that digital marketing is no longer an obstacle for marketers to market goods and services by utilizing an internet connection and online marketing can be a solution to drive the wheels of business and become a source of reference for consumers because of the ease, flexibility and efficiency provided. Then with the presence of Electronic Word of mouth consumers will have more confidence, and the advantage for the company is to reduce advertising costs.

Lazada is part of the Lazada Group, which is the online shopping destination in Southeast Asia, which was founded in 2012. In the first few years Lazada managed to become the number one market place for consumers' choice and the most visited in 2017 based on the results of the iprice.com survey. However, it continues to decline until in the first quarter of 2019 it is ranked fourth to date in 2021. Price problems are caused by the competitiveness of cheaper prices which have an impact on purchasing decisions. Consumers are faced with various choices of online buying and selling sites with almost the same concept. Relatively the same price, in the end, can allow consumers to switch from one online shop site to another, even more so if an online shop site offers superior characteristics. In addition to the price offered, consumers who will make the purchase process will usually look for the quality of the product they want. Consumers can see reviews given by other consumers who have bought similar products, making it easier for potential consumers to consider the product to be purchased has good quality or not. If the product to be purchased has good reviews, the decision to make a purchase will definitely occur, because product quality is the totality of features and characteristics of a product or service in satisfying implied needs.

Like product quality, service quality factors play an important role in attracting consumers to make purchases. Service quality is a level of the seller's ability to provide all the expectations of customers in meeting their needs. One of the cases where the quality of service was experienced by Lazada consumers, quoted in mediakonsumen.com, where consumers experienced disappointment with Lazada services, in this case it was stated that the product ordered by the consumer was not delivered, and Lazada was unable to provide a clear reason for the problem, and Lazada only notifies if the product ordered failed to be delivered, for no apparent reason. This case is one of the causes of Lazada's defeat by other e-commerce. Consumers who have had bad experiences with cases of fraud or services that are not excellent in online businesses will have a bad perception of online business and can cause the trust index to be low. From this case, however, Lazada must still attract a lot of visitor interest, therefore Lazada conducts promotions to attract consumer buying interest.

Sales promotion activities through online media websites that are carried out by Lazada Indonesia are a form of communication to consumers in electronic commerce. These activities include the early stages of planning, implementation and the final stages of evaluation. Sales promotion tools used by Lazada include using discount promotion tools, vouchers, flash sales, special offers from partners, and conducting trade show activities to restore consumer confidence in Lazada.

From the consumer's point of view, brand image is often used as an indicator in determining to choose something. Brand image is the image that consumers give to a product or service. The better the quality of the product provided, the better the brand image in the eyes of consumers, as well as other factors, the better and more supportive, the better the image of the brand. A positive impression from customers will improve the brand image of a product, and vice versa, a negative impression from customers will worsen the brand image.

1.2 Prior Studies

Nasution., *et al* (2020) conducted a study with the theme of Influence of Product Quality, Brand Image, Trust, and Price on Purchase Decisions at Shopee E-Commerce, where the research resulted that Price had a significant influence on Purchase Decisions on E-Commerce Shopee, while the Product Quality and Brand Image variables do not have a significant influence on Shopee's E-Commerce Paba Purchase Decision. Then the research of Arief., *et al* (2021) entitled The Effect of Price, Product Quality, Promotion and Brand Image on Vivo Smartphone Purchase Decisions in Palembang City, resulted that the variables Price, Product Quality, Promotion, and Brand Image had a partial and simultaneous positive effect on the decision. Purchase of Vivo Smartphone in Palembang City. There is also a research by Ekaprana., *et al* (2020) which carries the theme The Effect of Product Quality, Service Quality and Brand Image on Repurchase Intentions (Honda Brand), where the research shows product quality, service quality and brand image have a positive and significant effect on intention. Repurchase of Honda motorcycles. Kurniawan and Chandra (2019) conducted a study entitled The Effect of Service Quality and Promotion on Customer Satisfaction Mediated by Brand Image (Case Study of E-Wallet Funds in a Noodle Factory), where the results of the study stated, Promotion had no effect on brand image. Service quality has a positive effect on customer satisfaction. Promotion has a positive effect on customer satisfaction, service quality has a positive effect on brand image. Then Yolanda and Wijanarko (2018) conducted a study entitled The Effect of Promotion and Product Quality on Aqua Drinking Water Purchase Decisions and Its Implications for Brand Image at the Faculty of Economics, University of Borobudur, and the study showed that promotion had a positive and significant effect both directly and indirectly through Brand Image on Purchase Decisions of the Faculty of Economics, Borobudur University. In addition, Antasari (2020) also conducted a study entitled The Effect of Location, Brand Image, and Service Quality on Savings Decisions at Islamic Banks in Semarang Regency, with Advertising Promotion Media as Moderating Variables, in which the results of the study indicate that service quality has a positive effect on brand image, service quality have a positive and significant effect on saving decisions. Promotional variables can moderate the relationship between service quality and brand image.

1.3 Hypothesis Development

Study by Arief., *et al* (2021) shows that price has a significant effect on brand image. So based on the results of previous studies, the following hypothesis was established:
H1: Price Affects Brand Image.
Previous study from Ekaprana., *et al* (2020), showed that Product Quality had a significant effect on Brand Image, and Brand Image had a positive and significant effect on Intentions Repurchase of Honda motorcycles. So from the results of existing research, the following hypothesis is determined:
H2: Product Quality has an effect on Brand Image.
From previous research by Kurniawan and Chandra (2019) where the results show that Service Quality has a positive effect on brand image. Then the hypothesis can be set as follows:
H3: Service Quality Affects Brand Image.
Previous study from Nasution., *et al* (2020) shows that the price variable has an effect on Promotion. The results of previous research from Kulsum (2019) on the transportation service "Gojek" also show that the price variable has an effect on promotion. Based on the above results it was determined the following hypothesis:

H4: The price effect on the Promotion.
Based on earlier research from Rosalina., *et al* (2019) show the results of that variable Product Quality positive effect on promotion. And both have a significant effect on customer satisfaction. So from the results of existing research, the following hypothesis was established:
H5: Product Quality has an effect on Promotion.
From previous research from Solihin., *et al* (2020) which resulted in Service Quality being proven to have a positive effect on Promotion. So from the results of existing research, the following hypothesis is set:
H6: Service Quality has an effect on Promotion.
From prior research, from Yolanda and Wijanarko (2018) where the results of this study are that Promotion has a positive and significant effect both directly and indirectly through Brand Image on Purchase Decisions, the hypothesis is set as follows:
H7: Promotion Affects Brand Image.
From the research results Setiyani., *et al* (2019) with the results of this research is that Promotion can moderate the relationship Price has a positive effect on Brand Image. So the hypothesis is set as follows:
H8: Promotion moderates the relationship between Price and Brand Image.
From the research of Setiyani., *et al* (2019) which results that Promotion can moderate the relationship between Product Quality and Brand Image. So the hypothesis is set as follows:
H9: Promotion moderates the relationship between Product Quality and Brand Image.
From previous research, Antasari (2020) showed that Service Quality had a positive and significant effect on Brand Image, Advertising Promotion media variables were able to moderate the influence of Brand Image and Service Quality on decision to save in Sharia Ban. So that the following hypothesis can be established:
H10: Promotion moderates the relationship between Service Quality and Brand Image.

2. Method

The type of research used in this research is quantitative research. Quantitative research methods are research based on the philosophy of positivism, used to examine certain populations or samples, data collection using research instruments, quantitative or statistical data analysis, with the aim of testing predetermined hypotheses. While the data used in this study consists of two primary data which is a data source that directly provides data to data collectors. The primary data sources in this study are data obtained directly consisting of the number of respondents and the number of respondents' responses. And secondary data, namely data obtained indirectly from the source, which consists of theoretical studies, journals, books, and the internet. The population in this study were all Lazada customers in Jakarta. The sample of this research is people who often shop at Lazada in south Jakarta, who have shopped at Lazada more than twice, aged 17-50 years.

2.1 Research Design

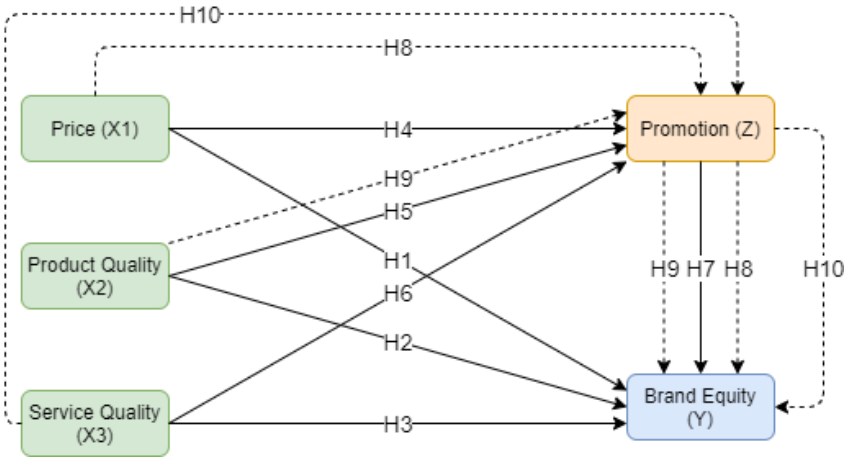

Figure 1: Research Framework

2.2 Structural Equation Modelling (SEM) Analysis

In this study, data processing and analysis used the Partial Least Square (PLS) approach. PLS is a component-based or variant-based Structural Equation Modelling (SEM) equation model. The data analysis in this study is the Outer Model Analysis, Inner Model, and Hypothesis Testing. Analysis of the Outer Model The outer model is often also called outer relation or measurement model, which defines how each indicator block relates to its latent variables. In the analysis of this model, it specifies the relationship between latent variables and their indicators. Inner Model Analysis It is also known as inner relation, structural model and substantive theory, which describes the relationship between latent variables based on substantive theory. Inner Model or Measurement Inner is also known as a structural model. Structural model is a model that relates between variables. In testing the hypothesis, it can be seen from the t-statistical test and the probability value.

3. Results

3.1 Outer Model Analysis

3.1.1 Convergent Validity

Table 1: Outer Loading Table

No	Indicators of Variabel	Outer Loading	Validity	Indicator Evaluation	No	Indicators of Variabel	Outer Loading	Validity	Indicator Evaluation
1	H2	0,677	0,5	Valid	33	PC8	0,749	0,5	Valid
2	H3	0,663	0,5	Valid	34	PC9	0,696	0,5	Valid
3	H5	0,802	0,5	Valid	35	PHC1	0,625	0,5	Valid
4	H6	0,697	0,5	Valid	36	PHC2	0,589	0,5	Valid
5	H7	0,783	0,5	Valid	37	PHC3	0,599	0,5	Valid
6	KL1	0,636	0,5	Valid	38	PHC4	0,66	0,5	Valid
7	KL10	0,795	0,5	Valid	39	PHC5	0,64	0,5	Valid
8	KL11	0,793	0,5	Valid	40	PHC6	0,731	0,5	Valid
9	KL12	0,746	0,5	Valid	41	PHC7	0,695	0,5	Valid
10	KL13	0,739	0,5	Valid	42	PHC8	0,666	0,5	Valid
11	KL14	0,551	0,5	Valid	43	PHC9	0,685	0,5	Valid
12	KL2	0,754	0,5	Valid	44	PKLC1	0,691	0,5	Valid
13	KL3	0,538	0,5	Valid	45	PKLC10	0,493	0,5	Valid
14	KL4	0,672	0,5	Valid	46	PKLC11	0,528	0,5	Valid
15	KL6	0,751	0,5	Valid	47	PKLC12	0,58	0,5	Valid
16	KL7	0,719	0,5	Valid	48	PKLC13	0,638	0,5	Valid
17	KL8	0,76	0,5	Valid	49	PKLC2	0,569	0,5	Valid
18	KL9	0,758	0,5	Valid	50	PKLC3	0,624	0,5	Valid
19	KP1	0,776	0,5	Valid	51	PKLC4	0,624	0,5	Valid
20	KP2	0,798	0,5	Valid	52	PKLC5	0,708	0,5	Valid
21	KP3	0,729	0,5	Valid	53	PKLC7	0,757	0,5	Valid
22	KP5	0,676	0,5	Valid	54	PKLC8	0,644	0,5	Valid
23	KP7	0,76	0,5	Valid	55	PKLC9	0,677	0,5	Valid
24	KP8	0,774	0,5	Valid	56	PKPC1	0,648	0,5	Valid
25	KP9	0,757	0,5	Valid	57	PKPC10	0,616	0,5	Valid
26	PC1	0,658	0,5	Valid	58	PKPC3	0,687	0,5	Valid

27	PC2	0,679	0,5	Valid	59	PKPC4	0,646	0,5	Valid
28	PC3	0,646	0,5	Valid	60	PKPC5	0,593	0,5	Valid
29	PC4	0,523	0,5	Valid	61	PKPC6	0,678	0,5	Valid
30	PC5	0,673	0,5	Valid	62	PKPC7	0,683	0,5	Valid
31	PC6	0,745	0,5	Valid	63	PKPC8	0,654	0,5	Valid
32	PC7	0,747	0,5	Valid	64	PKPC9	0,576	0,5	Valid

The Outer Model measurement model for individual reflective indicator blocks is said to be high if it correlates more than 0.50 with the construct to be measured. However, for research in the early stages of developing a measurement scale the loading value of 0.50 to 0.60 is considered sufficient (Ghozali, 2006). So it can be said that the outer loading above has met Convergent Validity. Table 1 above shown that each indicators for every variable has outer loading value above 0.50, so it can be said that all of the indicators within each variables is valid for further analysis.

Table 2: Average Variance Extracted (AVE)

Variables	AVE Value	AVE Evaluation
Brand Equity	0,507	Valid
Moderate Effect 1	1,000	Valid
Moderate Effect 2	1,000	Valid
Moderate Effect 3	1,000	Valid
Price	0,528	Valid
Service Quality	0,509	Valid
Product Quality	0,568	Valid
Promotion	0,513	Valid

The indicator is considered valid if it has an AVE value above 0.5 or shows that all outer loading dimensions of the variable have a loading value above 0.5 so that it can be concluded that the measurement meets the convergent validity criteria (Ghozali, 2006). Through measurement (outer loading) in table 2 above, it states that all variables and indicators meet the criteria so that they are declared valid with a critical value above 0.5.

3.1.2 Discriminant Validity

Table 3: Cross-Loading Table

Indicators of Variabel	Price	Service Quality	Product Quality	Promotion	Moderate Effect 1	Moderate Effect 2	Moderate Effect 3	Brand Equity
H2	0,677	0,453	0,453	0,387	0,551	0,441	0,447	0,307
H3	0,663	0,525	0,521	0,394	0,514	0,317	0,411	0,348
H5	0,802	0,579	0,603	0,466	0,474	0,427	0,33	0,416
H6	0,697	0,417	0,378	0,346	0,498	0,407	0,028	0,264
H7	0,783	0,525	0,503	0,54	0,518	0,317	0,103	0,502
KL1	0,485	0,636	0,478	0,444	0,025	0,517	0,503	0,377
KL10	0,565	0,795	0,556	0,656	0,528	0,28	0,506	0,603
KL11	0,632	0,793	0,626	0,651	0,448	0,394	0,455	0,577
KL12	0,599	0,746	0,59	0,589	0,505	0,322	0,451	0,443
KL13	0,553	0,739	0,59	0,576	0,483	0,429	0,492	0,482
KL14	0,476	0,551	0,44	0,621	0,401	0,44	0,321	0,516

KL2	0,466	0,754	0,509	0,531	0,54	0,55	0,435	0,473
KL3	0,284	0,538	0,599	0,485	0,492	0,637	0,506	0,523
KL4	0,422	0,672	0,477	0,495	0,538	0,62	0,486	0,551
KL6	0,422	0,751	0,425	0,6	0,543	0,468	0,532	0,519
KL7	0,453	0,719	0,505	0,478	0,594	0,516	0,514	0,47
KL8	0,521	0,76	0,509	0,535	0,55	0,458	0,472	0,458
KL9	0,476	0,758	0,524	0,605	0,425	0,523	0,465	0,516
KP1	0,558	0,63	0,776	0,499	0,473	0,456	0,5	0,527
KP2	0,503	0,536	0,798	0,514	0,547	0,613	0,565	0,529
KP3	0,466	0,463	0,729	0,377	0,525	0,489	0,534	0,309
KP5	0,418	0,497	0,676	0,499	0,468	0,453	0,524	0,454
KP7	0,548	0,523	0,76	0,478	0,535	0,603	0,565	0,401
KP8	0,616	0,582	0,774	0,465	0,445	0,544	0,591	0,426
KP9	0,486	0,491	0,757	0,481	0,469	0,451	0,554	0,391
PHC1	0,287	0,471	0,394	0,616	0,481	0,488	0,486	0,658
PHC2	0,389	0,48	0,37	0,587	0,359	0,503	0,461	0,679
PHC3	0,313	0,382	0,574	0,524	0,429	0,609	0,517	0,646
PHC4	0,238	0,313	0,561	0,307	0,532	0,523	0,675	0,523
PHC5	0,294	0,432	0,45	0,397	0,504	0,618	0,548	0,673
PHC6	0,39	0,574	0,454	0,577	0,525	0,45	0,544	0,745
PHC7	0,444	0,495	0,418	0,571	0,529	0,518	0,569	0,747
PHC8	0,376	0,616	0,455	0,669	0,458	0,524	0,561	0,749
PHC9	0,438	0,511	0,561	0,556	0,51	0,629	0,534	0,696
PKLC1	0,457	0,527	0,426	0,625	0,513	0,527	0,504	0,506
PKLC2	0,409	0,502	0,452	0,589	0,584	0,472	0,563	0,535
PKLC3	0,453	0,523	0,359	0,599	0,486	0,481	0,485	0,508
PKLC4	0,443	0,557	0,452	0,66	0,507	0,045	0,457	0,5
PKLC5	0,419	0,599	0,456	0,64	0,448	0,554	0,618	0,518
PKLC7	0,493	0,583	0,527	0,731	0,503	0,536	0,584	0,556
PKLC8	0,461	0,569	0,466	0,695	0,583	0,631	0,468	0,522
PKLC9	0,344	0,435	0,492	0,666	0,544	0,614	0,56	0,544
PKLC10	0,533	0,571	0,425	0,685	0,609	0,6	0,594	0,512
PKLC11	0,39	0,564	0,347	0,691	0,572	0,512	0,518	0,496
PKLC12	0,341	0,299	0,353	0,493	0,631	0,582	0,589	0,399
PKLC13	0,217	0,337	0,19	0,528	0,53	0,568	0,641	0,467
PKPC1	0,205	0,404	0,43	0,58	0,55	0,594	0,6	0,508
PKPC3	0,379	0,512	0,42	0,638	0,42	0,566	0,692	0,554
PKPC4	0,413	0,473	0,456	0,569	0,524	0,551	0,593	0,512
PKPC5	0,225	0,439	0,422	0,624	0,522	0,51	0,639	0,542
PKPC6	0,302	0,352	0,528	0,624	0,456	0,547	0,689	0,458
PKPC7	0,35	0,472	0,353	0,708	0,54	0,618	0,602	0,506
PKPC8	0,369	0,551	0,447	0,757	0,64	0,446	0,668	0,561
PKPC9	0,372	0,549	0,526	0,644	0,425	0,507	0,625	0,539
PKPC10	0,313	0,506	0,565	0,677	0,546	0,574	0,647	0,504
PC1	0,416	0,501	0,451	0,648	0,526	0,638	0,634	0,552

PC2	0,394	0,451	0,427	0,616	0,568	0,567	0,619	0,462
PC3	0,396	0,585	0,453	0,687	0,557	0,564	0,602	0,477
PC4	0,301	0,486	0,547	0,646	0,519	0,61	0,574	0,553
PC5	0,469	0,516	0,465	0,593	0,495	0,518	0,632	0,517
PC6	0,46	0,58	0,569	0,678	0,578	0,565	0,636	0,618
PC7	0,498	0,549	0,582	0,683	0,528	0,629	0,629	0,54
PC8	0,359	0,495	0,448	0,654	0,601	0,622	0,538	0,491
PC9	0,381	0,461	0,511	0,576	0,439	0,58	0,699	0,445

From the table data above, it can be seen that the comparison, the outer loadings of the indicator in the associated construct must be greater than any cross-loadings of the other constructs. So that latent variables can be said to predict their indicators better than other latent variables.

Table 4: Formell-Larcker Criterion

Variables	Brand Equity	Moderate Effect 1	Moderate Effect 2	Moderate Effect 3	Price	Service Quality	Product Quality	Promotion
Brand Equity	0,683							
Moderate Effect 1	0,564	1,000						
Moderate Effect 2	0,632	0,831	1,000					
Moderate Effect 3	0,736	0,858	0,855	1,000				
Price	0,523	0,570	0,546	0,620	0,727			
Service Quality	0,709	0,621	0,600	0,537	0,692	0,713		
Product Quality	0,587	0,545	0,078	0,089	0,683	0,710	0,754	
Promotion	0,802	0,544	0,089	0,624	0,599	0,784	0,634	0,643

The Fornell-Larcker criterion is a second approach to assessing discriminant validity. It compares the square root of the AVE value with the latent variable correlation. In particular, the square root of each AVE construct must be greater than the highest correlation with the other constructs. An alternative approach to evaluating the Fornell-Larcker criterion results is to determine whether the AVE is greater than the squared correlation with other constructs. The logic of the Fornell-Larcker method is based on the idea that constructs share more variance with related indicators than with other constructs. Based on the table above, it can be seen that the AVE value is greater than the quadratic correlation with other constructs. This shows that all the constructs in the estimated model meet the criteria for discriminant validity.

3.1.3 Reliability Test

Table 5: Reliability Test Table

Variables	Cronbach's Alpha value	rho_A	Composite Reliability
Brand Equity	0,856	0,866	0,886
Moderate Effect 1	1,000	1,000	1,000
Moderate Effect 2	1,000	1,000	1,000
Moderate Effect 3	1,000	1,000	1,000
Price	0,777	0,798	0,848

Service Quality	0,918	0,921	0,930
Product Quality	0,873	0,877	0,902
Promotion	0,950	0,952	0,954

Furthermore, the reliability test can be seen from the Cronbach's Alpha value and the Composite Reliability value. To be able to say that a statement item is reliable, then the Cronbach's alpha value must be above 0.6 and the composite reliability value must be 0.7, so it can be concluded that all constructs meet the reliability value because Cronbach's Alpha and Composite Reliability are above the reliability test standard.

3.1.4 Multicollinearity Test

Table 6: Inner Variance Inflation Factor (VIF) Value

Inner VIF Values	Brand Equity	Moderate Effect 1	Moderate Effect 2	Moderate Effect 3	Price	Service Quality	Product Quality	Promotion
Brand Equity								
Moderate Effect 1	4,678							
Moderate Effect 2	4,737							
Moderate Effect 3	5,294							
Price	2,359							2,237
Service Quality	3,599							2,411
Product Quality	2,500							2,349
Promotion	2,882							

The manifest variables or indicators in a formative block must be tested for their multicollinearity. Testing whether or not multicollinearity occurs between indicators in the formative block uses the VIF value. If the VIF value above 10, there is collinearity between indicators in one formative block. From the table results, it shows that the data above is free from multicollinearity.

3.2 Inner Model Analysis

Table 7: R-Square Table

Variables	R-Square	Adjusted R-Square
Brand Equity	0,667	0,642
Promotion	0,629	0,617

The table above shows that the R Square from Brand Equity variable has a moderate value, which is 0.667, which means that the effect of independent variables on Brand Equity is 66.7%, while the rest is influenced by other variables which were not explained in the study. Meanwhile, the Promotion variable reached 0.629 or 62.9%.

3.3 Hypothesis Testing

Table 8: Hypothesis Testing Result

Hypothesis	Original Sample	T-Statistics	P-Values	Results
Price ---> Brand Equity	0,466	8,172	0,000	H_1 Accepted
Product Quality ---> Brand Equity	0,840	18,803	0,000	H_2 Accepted
Service Quality ---> Brand Equity	1,506	8,469	0,000	H_3 Accepted
Price ---> Promotion	0,750	13,375	0,000	H_4 Accepted

Product Quality ---> Promotion	0,877	14,472	0,000	H_5 Accepted
Service Quality ---> Promotion	6,349	11,989	0,000	H_6 Accepted
Promotion ---> Brand Equity	4,781	10,126	0,000	H_7 Accepted
Price ---> Promotion ---> Brand Equity	0,325	10,100	0,000	H_8 Accepted
Product Quality ---> Promotion ---> Brand Equity	0,477	10,850	0,000	H_9 Accepted
Service Quality ---> Promotion ---> Brand Equity	0,021	12,552	0,000	H_{10} Accepted

It can be seen in the table above that a population has a relationship between one variable and another variable. It can be seen in the path coefficient (rho) by looking at the value of the original sample and the statistical T value as a statement of the significance level of the relationship between one variable and other variables.

4. Discussion

Based on information contained in table 8 above, the results of hypothesis testing in this study showed that H1 is received, this is indicated by the value of T statistic 8.172 > 1.96 and P value 0,000 < 0,050 thus concluded that the price effect on brand image, where this is in line with research conducted by Arief, *et al* (2021). The results of hypothesis testing in this study indicate that H2 is accepted, this is indicated by the T statistic value of 18,803 > 1.96 and P value 0.000 < 0.050 so it can be concluded that Product Quality has an effect on Brand Image, where this is in line with previous research from Ekaprana., *et al* (2020). The results of hypothesis testing in this study indicate that H3 is accepted, this is indicated by the T statistic value of 8.469 > 1.96 and P value of 0.000 < 0.050 so it is concluded that Service Quality affects Brand Image, where this result is in line with previous research from Kurniawan and Chandra (2019). The results of testing the hypothesis testing in this study indicate that H4 is accepted, this is indicated by the T statistic value of 13.375 > 1.96 and P value 0.00 < 0.05 so that it is concluded that Price affects Promotion, where this result is in line with previous research from Kulsum (2019). The results of hypothesis testing in this study indicate that H5 is accepted, this is indicated by the T statistic value of 14,472 > 1.96 and P value 0.00 < 0.05 so that it is concluded that Product Quality affects Promotion, where this result is in line with previous research from Rosalina., *et al* (2019). The results of hypothesis testing in this study indicate that H6 is accepted, this is indicated by a statistical T value of 11.989 > 1.96 and a P value of 0.00 < 0.05 so that it is concluded that Service Quality affects Promotion, where this result is in line with previous research from Solihin., *et al* (2020). The results of hypothesis testing in this study indicate that H7 is accepted, this is indicated by the T statistic value of 10.126 > 1.96 and P value 0.00 < 0.05 so it can be concluded that Promotion affects Brand Image, where this result is in line with research from Yolanda and Wijanarko (2018). The results of hypothesis testing in this study indicate that H8 is accepted, this is indicated by the T statistic value of 10.100 > 1.96 and P value 0.00 < 0.05 so it can be concluded that promotion moderates the relationship between price and brand image, where these results are in line with research Setiani., *et al* (2019). The results of hypothesis testing in this study indicate that H9 is accepted, this is indicated by the T statistic value of 10.850 > 1.96 and P value 0.00 < 0.05 so it can be concluded that Promotion moderates the relationship between Product Quality and Brand Image, where these results are in line with research Setiani., *et al* (2019). The results of hypothesis testing in this study indicate that H10 is accepted, this is indicated by a T statistic value of 12,552 > 1.96 and a P value of 0.00 < 0.05 so it can be concluded that promotion can moderate the relationship between service quality and brand image, where these results are in line with previous research (Antasari, 2020).

5. Conclusion

Price has an effect on Brand Image. Product Quality has an effect on Brand Image. Service Quality affects Brand Image. Price affects Promotion. Product Quality affects Promotion. Quality of Service affects Promotion. Promotion affects Brand Image. Promotion moderates the relationship between Price and Brand Image. Promotion moderates the relationship between Product Quality and Brand Image. Promotion can moderate the relationship between service quality and brand image.

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Do Financial Inclusion, Debt Behavior Affect Business Investment? Study in Small Medium Enterprise Customers of Bank BPD Yogyakarta Indonesia

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Abstract
Bank, financial inclusion, debt behavior, and business investment greatly affect the economic growth of a region industry. The main purpose of this research is to examine the effect of bank behavior, financial inclusion, debt behavior on investment decisions of Micro, Small and Medium Enterprises customers at Bank BPD Yogyakarta, Indonesia. The research sample is BPD Yogyakarta customers Respondents as 200 entrepreneurs are customers who are in debt for business investment. The analysis model uses mediation regression with PLS. The results showed that bank behavior had a positive effect on financial inclusion. Bank behavior has a positive effect on debt behavior. Financial inclusion has a positive effect on business investment. Debt behavior has a positive effect on business investment. Financial inclusion, debt behavior mediates the influence of bank behavior on business investment. The implication of this research is that a clear bank behavior and high commitment of banks are needed in offering bank products. It takes commitment and supervision from the Bank in providing credit to customers so that the use of funds is in accordance with investment objectives.

Keywords: Bank Behavior, Financial Inclusion, Debt Behavior, Business Investment.

1. Introduction

Loan to Deposits Ratio - LDR in Yogyakarta Indonesia tends to be low, around 63%-65%. The low LDR level in the Yogyakarta Banking sector is due to the fact that more people save money than use it in the form of credit. The decline in credit growth was also caused by the impact of global conditions and the Covid-19 pandemic, which affected investment and business expansion in Yogyakarta (Indonesia Bank Yogyakarta, 2021). The sectors that support credit in order are working capital, consumption, investment, and property. When examined further, consumption credit is not purely for household needs, but also loans for business capital for entrepreneur in Yogyakarta Indonesia (Heru Kristanto, 2021).

The amount of financing received by Cooperatives and Micro, Small and Medium Enterprises in the Special Region of Yogyakarta, the amount of financing has increased from 2018, 2019 and also in 2021. The amount of financing in 2020 has increased by 15.9696% from the previous year. Meanwhile, the number of entrepreneurs during the Covid-19 pandemic decreased and business decline (Bappeda DIY Indonesia, 2021).

Bank BPD Yogyakarta Indonesia is committed and continues to strive to increase financing acceleration to develop entrepreneurs in Yogyakarta by implementing several business strategies that favor SMEs. In addition to easy access to banking for SMEs, Bank BPD Yogyakarta is also active in providing education, training and business development workshops that will contribute to regional economic recovery. Bank BPD Yogyakarta as one of the regional economic actors in relation to financial services certainly tries to contribute to the recovery of economic growth in Yogyakarta, especially acceleration. Various financing products available at Bank BPD Yogyakarta Indonesia (www.bpddiy.co.id).

Bank behavior, such as diversification of financial service products, setting interest rates, grace periods, amount of compensation and similar products are bank behaviors that affect the behavior of customers or prospective customers. Research Heru Kristanto (2021), Herispon, H. (2019), Wuhan, L. et.al., (2015), Altunbas, Y., Binici, et al., (2017) show that bank behavior affects financial inclusion and debt behavior. Bank behavior also influences investment decisions from the funds obtained. If these expectations and policies are positively correlated with the predictions of formal financial institutions, then lending to customers is loose.

Heru Kristanto (2021), Hannig, Alfred and Stefan, Jansen (2010) revealed that financial knowledge and financial management are correlated with ups and downs in debt behavior and repayment behavior. Financial literacy as measured by financial knowledge, financial behavior, financial awareness and financial attitudes affect business investment when customers get loan funds.

Financial Inclusion services in the form of convenience and access, aimed at reaching all levels of society in banking services. If bank expectations and policies are positively correlated with predictions of formal financial institutions, then lending to the public or household sector is considered attractive. Research Glaser, et al., (2013), Hlaing, SW, and Kakinaka, M. (2017) reveal that financial inclusion facilitates understanding of bank products and is a driver of customer investment decisions.

Based on this phenomenon, the main objective of this study is to examine the effect of bank behavior, financial inclusion, debt behavior on the business investment of entrepreneurs Bank BPD Yogyakarta customers.

2. Literature Review and Hypothesis Development

Bank behavior is bank behavior in the form of rules, policies, implementation, bank procedures in order to improve bank health and improve the community's economy (Heru Kristanto, 2021). Bank behavior includes: 1) actions taken to identify customers. 2) the precautionary principle applied by formal financial institutions to their customers. 3) the bank's business is a conservative business (Altunbas, et al. l.,. 2017). Consumer loans for the community related to expectations and policies of formal bank operation. Expectations it includes the bank's profitability to customers, customer capacity, repayment expectations, and the value of collateral required from customers, household income and income from interest expense (Herispon, H. 2019; Wuhan, et al. l., 2015). Principle and expectations are a reference in the implementation of formal financial institutional, including bank.

In entrepreneurial life, many things are learned to achieve success and well-being. The financial management aspect is the key, where financial management is related to income and expenses within a certain period of time (Wangeci, A., 2017; Amoah, R, 2016). Financial manager need knowledge, ability, and financial management skills. Financial literacy is related to financial management on mortgages, leases, bank deposits, formation of pension funds, investments, debts and others (Mugo, 2016; Heru & Hendry, 2020).

Financial inclusion has become a global issue among developing and developed countries. Financial inclusion is a correction to financial exclusive. Hlaing, SW, and Kakinaka, M. (2017) disclose that financial inclusion is useful to maximize use, access and minimize exclusive finance. The level of financial inclusion is determined by three dimensions, namely; user, barrier, access. Financial inclusion indicators that can be used as a benchmark for financial inclusion development are: a) access that measures the ability to use formal financial services in terms of physical affordability and price. b) used to measure the actual ability of the use of financial products and services such as regularity, frequency, duration of use. c) quality to measure whether the attributes of financial products and services must meet customer needs (Luzardi, et. al., 2014; Heru Kristanto, 2021)

Becoming a customer of the Bank has the goal of saving and getting benefits such as: easy access to credit, dividends that can be received in favorable circumstances, plans for retirement, ease of arrangement for the purchase of housing or land, among others (Wameyo, 2015; Salam, 2018). A study in India by Bhushan (2014) on the relationship between investment behavior and financial literacy, found that modernization, financial products, awareness and investment preferences largely depend on individual financial literacy. That is, the higher the level of understanding of financial knowledge and financial attitude, the higher the chances of making business investment..

Child plays a role important and dominant in driving consumption and investment different between entrepreneur with varying levels of debt. Efforts made by banks are to increase the expansion of products, services and loan volumes with the aim of maximizing profits. Utilization of information technology by banks To use introduce their products through visual media, print media, radio media, internet media. The exam his to stimulate the desires and intentions of household behavior, businessman become a real behavior to own the product through debt (Heru Kristanto, 2021; Herispon, H. 2019; Wuhan, et.al., 2015). Various bank behaviors such as offers, procedures, processes credit disbursement consumers, working capital loans, investment loans affect financial inclusion. **Hypothesis 1: Bank behavior has an effect on business investment.**

Debt can make a positive or negative contribution. The positive contribution of debt in household life, entrepreneur, company is to increase the wealth of the owner. Study conducted by Argawal, Ankit. (2013), Herispon (2017) found that debt contributes to encouraging domestic life, entrepreneur, company towards the desired progress and well-being. Studies Johnson and Li (2007)found that debt can maintain and improve lifestyle. In the study of Muzeto (2014) revealed that short-term debt can increase household consumption, entrepreneur and contribute to economic growth. Finally debt is an important and useful part of modern life when debt can be managed properly. From the results of this study it was concluded that the behavior of household debt, Entrepreneur can bring businessman at a better standard of living if debt can be controlled. **Hypothesis 2: Bank behavior has an effect on debt behavior. Hypothesis 3: Debt behavior mediates the effect of bank behavior on business investment.**

The purpose of inclusive finance is to provide convenience in services and expansion that can be enjoyed by customers. Services and expansions such as: a) ease of procedures, requirements, b) competitive interest rates, c) fast loan disbursement process, d) granting credit facilities covered by cards, e) expanding marketing network by opening branch offices in certain areas, f) expanding the range of public services with ATM networks, internet banking applications, and others (Heru Kristanto, 2021; Herispon (2017). Mugo (2016), Ghauri et al. (1995), Amoah, R. (2016) reveal that healthy financial literacy because high financial literacy will make it easier to access, take risks, make decisions about bank products and services. Financial problems, financial planning and management in investment decisions for the better. Financial monitoring becomes more stringent and controlled.

Few research reveals that financial inclusion is access, community groups, and systems finance affects banking performance (Demirgüç-Kunt et al., 2008; Sarma & Pais, 2008; Sarma, 2008; Demirgüç-Kunt & Klapper, 2012). This will increase the convenience of the community in utilizing banking to get funds for business investment. On the other hand, increasing public financial literacy is needed to improve financial and economic performance a country. **Hypothesis 4: Financial inclusion mediates the effect of bank behavior on business investment.**

3. Research methods

The research was designed using the approach causality quantitatively through hypothesis testing and data analysis primary. Research design refers to the theory and results of empirical studies that support the hypothesis to be tested. The researcher conducts a theory review and empirical study results in order to map out the theory according to the research objectives and the conceptual framework of the research. The research sample is customers or creditors of business investment credit at Bank BPD Yogyakarta Indonesia. After successful data collection, the questionnaire was coded, input data, analyzed, interpret and concluded. To answer the hypothesis, used moderation regression (Greene, 2014; Wooldrige, 2020).

3.1. Identification and Operational Definition of Research Variables

Operational identification and definitions are used to clarify and sharpen the focus research in order to get the right results. Operational identification and definition describes the variables research, namely the dependent variable, the variables independent and media. Questionnaire using a 5 Likert scale.

Financial literacy is an important financial knowledge, financial behavior, financial awareness, financial awareness owned by customers (Heru Kristanto, 2021; Heru and Hendry, 2020; Amos, 2014; Mugo, 2016). Developed on an 8 item Likert scale. Bank behavior using indicators which refers to Bank Indonesia Regulation (PBI) no. 3/10 / PBI / 2001 concerning the Implementation of Know Your Customer Principles, Prudential Banking, Fiduciary Principles and Risk Aversion Principles. Developed on an 8 item Likert scale. Financial inclusion uses indicators that refer to the limits issued by the World Bank, namely: Access, User, Quality, and Wealth. Developed on an 8 item Likert scale. Business investment is awareness of alternative investment opportunities, investment in working capital, equipment, equipment, assets. Using 10 Likert scale items.

3.2. Model Specification Test

This research using multiple regression and mediation regression. Testing the model specifications to determine the best equation model (BLUE) and can be used to draw conclusions using the normality test, reliability, validity.

4. Results and Discussion

4.1. Factor Analysis

The econometric model in this study uses multiple regression and mediation regression (Grenne, W, 2014; Wooldridge, 2020). Varimax rotational, explanatory factor analysis using statistical tools SEM-PLS model. This study used a sample of 200 customers of the Bank BPD Yogyakarta Indonesia. We use Cronbach Alpha to measure reliability, factor loading to see validity. The measurement results can be seen in table 1.

Table 1: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Bank Behavior	0.938	0.947	0.949	0.700
Debt Behavior	0.921	0.923	0.933	0.584
Financial Inclusion	0.919	0.920	0.934	0.640
Business Investment	0.928	0.929	0.939	0.607

Source: Processed data (2021)

The reliability test in table 1. shows that the question items on the questionnaire research variables are reliable and valid. This is indicated by the magnitude of Cronbach's Alpha and rho_A 0.900. The results also show Composite Reliability 0.9, Average Variance Extracted 0.500.

4.2. Test of the Hypotheses

Based on the results of statistical tests in table 2, it shows that financial inclusion has an R Square of 0.118, debt behavior of 0.552 and business investment of 0.871. These results indicate that business investment or investment behavior can be explained by the variables of bank behavior, financial inclusion and debt behavior.

Table 2: Path Coefficients, Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Stats. (|O/STDEV|)	P Values
Bank Behavior -> Debt Behavior	0.744	0.745	0.028	26,345	0.000
Bank Behavior -> Financial Inclusion	0.438	0.439	0.086	5.108	0.000
Debt Behavior -> Business Investment	0.126	0.127	0.053	2,396	0.017
Financial Inclusion -> Business Investment	0.874	0.873	0.046	18,862	0.000

Source: Processed data (2021)

Table 3: Specific Indirect Effects Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics (|O/STDEV|)	P Values
Bank Behavior -> Debt Behavior -> Business Investment	0.094	0.095	0.039	2,381	0.018
Bank Behavior -> Financial Inclusion -> Business Investment	0.383	0.383	0.075	5.072	0.000

Source: Processed data (2021)

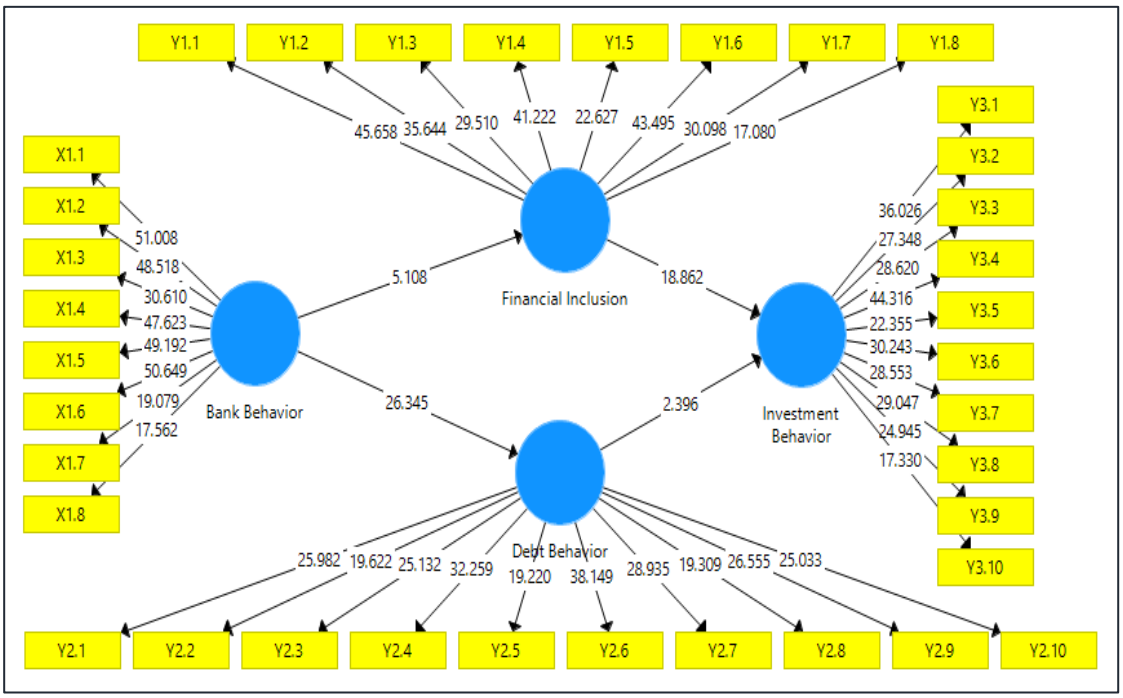

Figure 1: Path Analysis

Source: Processed data (2021)

The results of statistical tests in table 2, table 3 and figure 1, it is known that the bank behavior variable has an effect on financial inclusion. This can be seen from the t-statistic of 5.108 and the p-value (≤0.00). Bank behavior has a positive effect on debt behavior. It can be seen from the t-statistic of 26.345 and p-value. (≤0.00). Financial inclusion and debt behavior affect business investment / investment behavior. It can be seen from the t-statistic of 18.86, 2.39 p-value≤0.00,

Bank behavior has an influence on financial inclusion. This indicates that the more diverse bank behavior is, the more transparent and clear financial inclusion is needed. This research support Heru Kristanto (2021), Herispon (2019); Wuhan, et. al., (2015). The level of financial inclusion is determined by the bank's behavior, users, barriers, access. financial inclusion indicators that can be used as a benchmark for financial development

Bank behavior has an effect on debt behavior. This indicates that the easier it is to get into debt, clear rules in bank credit and credit terms, the more customers will be interested in borrowing from the bank. This research is in line with research Renanita and Hidayat (2013), Joe, D and Oh, FD (2017). The motivation of customer debt can come from: the need for company funds. chance to get luck, agreement between the giver and the recipient, bank convenience.

Financial inclusion, debt behavior is able to moderate the influence of bank behavior on investment decisions of bank customers. Customer bank has the goal of saving and getting several benefits. Benefits such as: easy access to credit, profitable dividends, plans for retirement, ease of arrangement for the purchase of housing or land among others (Wameyo, 2015; Salam, 2018). Heru and Hendry (2020), Bhushan's (2014) study found that modernization, financial products, awareness and investment preferences largely depend on individual financial literacy. That is, the higher the level of understanding of financial knowledge, the higher the chances of making investment decisions.

5. Conclusions and suggestions

This study used a sample of 200 customers of the Bank BPD Yogyakarta Indonesia. The results showed that bank behavior has an effect on financial inclusion and debt behavior. Financial inclusion and debt behavior are able to moderate the influence of bank behavior on business investment. Financial knowledge and financial management are correlated with ups and downs in debt behavior and repayment behavior. Financial knowledge, financial behavior, financial awareness and financial attitudes affect business investment when customers get loan funds.

The barriers to financial inclusion are predicted to be derived from the bank's behavior. Expectations and predictions of formal financial institutions to households about the laxity of expected expansion of credit and profit. Internal policies adopted by formal financial institutions such as: prudential banking, and risk aversion can actually be a barrier to financial inclusion. The high or low capacity and awareness of debt-paying behavior of households. Suspicion within certain limits and administrative requirements remains a constraint that will undermine household interest in relating to financial institutions (Herispon, H. (2019). The business investment or investment behavior of bank customers in using credit is largely determined by bank policies and individual behavior of bank customers.

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Effects of Infrastructure Development, Inflation and Economic Growth to Performance Company (ROA, Tobin's Q, PBV): Study on Registered Infrastructure Support Companies in IDX Period 2014-2019

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Abstract
The financial performance can be used as a benchmark of the ability of an organization or company in achieving its goals. Performance measurement is one of the most important factors for an organization or company, performance measurement is a process of measuring the extent to which a company does work to achieve its goals. The research investigated the impact of infrastructure, economic growth and inflation on financial performance of infrastructure support companies listed in Indonesian Stock Exchange Period 2014-2019 which is proxied by ROA (Return on Assets), Tobin's Q and PBV (Price to Book Value). The population of this research was the infrastructure support companies listed on the Indonesian Stock Exchange period 2014-2019. Research sampling was conducted using The Purposive Sampling Method. The data analysis was camed out using classical assumption test, multiple linear regression analysis, t-test, F-test and determinan (R2) test with SPSS 21. The research finding showed that the model has an effect on the financial performance as proxied by ROA. So the results of the hypothesis test show that: (1) Infrastructure development has a negative and significant effect on ROA. (2) The inflation rate has a positive and significant effect on ROA. (3) Economic growth has no significant effect on ROA. Meanwhile, the model has no effect on financial performance which is proxied in Tobin's Q and PBV.

Keywords: Infrastructure, Economic Growth, Inflation, ROA (Return on Assets), Tobin's Q, PBV (Price to Book Value)

1. Introduction

The company's performance is an essential part of measuring its success because it is the first thing an investor will see. The company's performance is a complete display of the company's state over a while, is the result or achievement that is influenced by the company's operational activities in utilizing the resources owned

(Srimindarti, 2004). The performance of a company can also be seen from how much profit the company earns. Corporate profits are an indicator of the company's fulfilling its obligations for funders and are one of the elements in creating company value that shows the company's prospects in the future (Veronica & Wardoyo, 2013). One of the proxies used in measuring a company's performance is Return on Assets (ROA) (Ahmad & Zabri, 2016). ROA reflects the company's ability to generate profits for its shareholders by utilizing assets owned by the company (Herli & Hafidhah, 2017). In addition, the company's performance can also be projected in Tobin's Q and PBV (Price to Book Value).

Sales growth is the most crucial part of the company's performance assessment. Generally, the higher the sales growth rate indicates that the higher the level of profitability obtained by the company. The high level of profitability of the company indicates the company's increasingly better performance.

Since 2015, the government has shifted subsidy spending to productive spending, namely infrastructure development, health, and education. The infrastructure budget continues to increase from Rp 269 trillion in 2016 to around Rp 415 trillion in 2019 (figure 1).

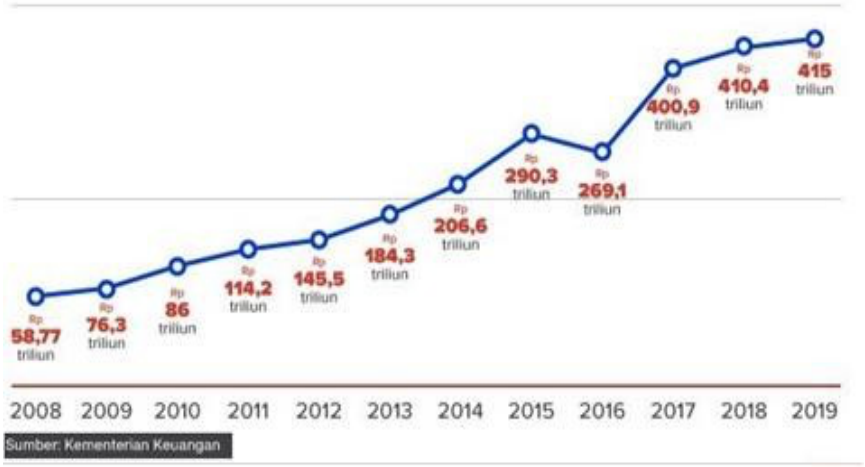

Figure 1. Government Infrastructure Budget 2008-2019

Infrastructure development is currently one of the main concerns of the Indonesian government. The increase in development projects throughout Indonesia will require cement companies to increase their production capacity and performance. This is reflected in the increase in cement sales volume from 48 million tons in 2011 to 62 million tons in 2016.

The Ministry of PUPR, through the Directorate General of Bina Marga has completed the construction of a national road along 3,432 km, including roads on the borders of Papua, Kalimantan, and NTT. Then a new toll road was built along 941 km with a target of the end of 2019 reaching 1,852 km. In support of water and food security, the target of building 65 dams, in 2018 as many as 8 dams have been completed, namely Paya Seunara and Rajui Dams in Aceh, Jatigede in West Java, Bajulmati and Nipah Jatim, Titab in Bali, Barnacle in Balikpapan, Raknamo and Tanju in NTB. The other dam will be completed gradually until 2023. The construction of 65 dams will add reservoir irrigation services by 160,000 hectares, industrial capacity of 2.11 billion m3, raw water is available as much as 3.02 m3 / second and produces energy potential of 145 MW.

Infrastructure development that continues to be launched by the government is expected to positively impact Indonesia's economic growth, increasing investment and increasing state foreign exchange through tourism is increasingly wide open with the improvement and support of the development of physical infrastructure of a region. The existence of adequate infrastructure will contribute to the smooth production and distribution of goods and services that can increase economic growth and economic equality. The existence of infrastructure development will undoubtedly encourage foreign and domestic investors, long-term investors and momentum investors to invest in Indonesia.

Some previous research became the basis of hypothesis making in this study, among others, hypothesis 1. Infrastructure development affects the company's performance. Daryanto (2018) researched that Indonesia's increasing infrastructure development projects will require cement companies to increase their production capacity and performance. This is reflected in the increase in cement sales volume from 48 million tons in 2011 to 62 million tons in 2016. Cement consumption in Indonesia continues to grow, even predicted to overgrow in the coming period and development in Indonesia planned by the government. The running of infrastructure projects followed by increasingly efficient production is believed to encourage the cement business.

Research in Prague, Czech Republic conducted by Palei (2015), examined the extent of the influence of infrastructure on national competitiveness. Research through the effectiveness of infrastructure management can improve industrial policies and gain national competitiveness. Paul (2004) examined the influence of public infrastructure on the productive performance of 12 manufacturing industries in Canada. This research shows that public infrastructure has an important role in the productivity of the manufacturing industry.

Another researcher is Bhanawat (2018), a selected cement company in India with research results showing infrastructure development and construction affect financial performance and vice versa. Infrastructure development resulted in high demand for cement which increased the cement industry's composite stock index. The corresponding research is conducted by (Bulqiah et al., 2020), which claims that government infrastructure spending affects stock prices. This means that the more government spending on the infrastructure sector, the more the stock price increases.

For Hypothesis 2, Inflation affects the performance of companies in line with Paul and Theodore's research (2012), research aims to find out the relationship between stock returns and Inflation in countries that are members of the G7. The results stated that Inflation has a positive and significant influence on stock returns. Another researcher, Kumar et al (2015), aims to find out the relationship between stock returns and Inflation. The results stated that Inflation has a positive and significant influence on stock returns.

Hypothesis 3, Economic growth affects the performance of the company. Research conducted by Egbunike and Okerekeoti (2018) in Nigeria examined the interrelationship between macroeconomic factors, corporate characteristics and the financial performance of manufacturing companies in Nigeria. The results showed economic growth had a significant influence on the company's characteristics including profitability, leverage and liquidity. Ramiz et al. (2014), examined the relationship between a company's performance, macro-economic variables, and company size. The analysis was conducted over 12 years, for seven non-financial sectors of Pakistan's economy, taking into account the emerging economy. The results showed that macroeconomic variables, including economic growth affected a company's performance. Other researchers Lim and Rice (2016), analyzed the influence of current ratio, inventory turnover, leverage, earning power, net profit margin, sales rate, inflation rate and economic growth on profit growth. Economic growth simultaneously affects the growth of corporate profits.

2. Research Method

This form of research is categorized as quantitative research with descriptive statistics. The population used in the study is an infrastructure development support company consisting of 44 (forty-three) companies listed on the Indonesia Stock Exchange in 2014-2019. Variables to be examined in the study include Return on Asset (ROA), Tobin's Q, and Price to Book Value (PBV). Roa and PBV data are obtained directly from the annual reports of each selected company. As for Tobin's Q, data processing is done using the help of Microsoft Excel. The data that will be studied consists of 44 companies in 6 periods so that the sample population is 264.

Data obtained from the Indonesia Stock Exchange (IDX) is from www.IDX.co.id and www.lembarsaham.com. Data processing analysis methods using multiple regression analysis to test hypotheses. The regression process will be done with SPSS 21 software.

Infrastructure support companies listed on the Indonesia Stock Exchange for the period 2014-2016 that report annual financial statements are:

Table 1: Infrastructure Support Companies

No	Code	Emit	IPO
		Cement Company	
1	INTP	Indocement Tunggal Prakasa Tbk	10-Des-89
2	SMBR	Semen Baturaja Tbk	28-Jun-13
3	SMCB	Holcim Indonesia Tbk	10-Agu-97
4	SMGR	Semen Indonesia Tbk	08-Jul-91
5	WTON	Wijaya Karya Beton Tbk	20-Sep-16
6	WSBP	Waskita Beton Precast Tbk	08-Apr-14
		Steel and Metal Company	
1	ALKA	Alakasa Industrindo Tbk	12-Jul-90
2	ALMI	Alumindo Light Metal Industry Tbk	02-Jan-97
3	BAJA	Saranacentral Bajatama Tbk	21-Des-11
4	BTON	Betonjaya Manunggal Tbk	18-Jul-01
5	CTBN	Citra Tubindo Tbk	28-Nop-1989
6	GDST	Gunawan Dianjaya Steel Tbk	23-Des-09
7	INAI	Indal Alumunium Industry Tbk	05-Des-94
8	ISSP	Steel Pipe Industry of Indonesia Tbk	22-Feb-13
9	JKSW	Jakarta Kyoei Steel Works Tbk	06-Agu-97
10	KRAS	Krakatau Steel Tbk	10-Nop-2010
11	LION	Lion Metal Works Tbk	20-Agu-93
12	TBMS	Tembaga Mulia Semanan Tbk	30-Sep-93
13	PICO	Pelangi Indah Canindo Tbk	23-Sep-96
		Construction & Building Industry Company	
1	ADHI	Adhi Karya Tbk	18-Mar-04
2	BKDP	Bukit Darmo Property Tbk	
3	CSIS	Cahayasakti Investindo Sukses Tbk	10-Mei-17
4	DGIK	Nusa Konstruksi Enjiniring Tbk	19-Des-07
5	IDPR	Indonesia Pondasi Raya Tbk	10-Des-15
6	JKON	Jaya Konstruksi Manggala Pratama Tbk	
7	MTRA	Mitra Pemuda Tbk	10-Feb-16
8	NRCA	Nusa Raya Cipta Tbk	27-Jun-13
9	PBSA	Paramita Bangun Sarana Tbk	28-Sep-16
10	PTPP	Pembangunan Perumahan(Persero) Tbk	09-Feb-10
11	SSIA	Surya Semesta Internusa Tbk	27-Mar-97
12	TOPS	Totalindo Eka Persada Tbk	16-Jun-17
13	TOTL	Total Bangun Persada Tbk	25-Jul-06
14	WEGE	Wijaya Karya Bangunan Gedung Tbk	30-Nop-2017
15	WIKA	Wijaya Karya (Persero) Tbk	29-Okt-07
16	WSKT	Waskita Karya (Persero) Tbk	19-Des-12
		Machinery Industry Company & Heavy Equipment	
1	AMIN	Atelier Mecaniques D'Indonesie Tbk	10-Des-15
2	GMFI	Garuda Maintanance Facility Aero Tbk	10-Okt-17
3	KPAL	Steadfast Marine Tbk	08-Jun-18
4	KRAH	Grand Kartech Tbk	08-Nov-13
		Cable Industry Companies	
1	IKBI	Sumi Indo Kabel Tbk	21-Jan-91
2	JECC	Jembo Cable Company Tbk	18-Nov-92
3	KBLI	KMI Wire and Cable Tbk	06-Jul-92
4	KBLM	Kabelindo Murni Tbk	01-Jun-92
5	VOKS	Voksel Elektrk Tbk	20-Des-90

3. Results

Before the multiple linear regression test has been done the classical assumption test but for the tobin and pbv variables do not meet the classical assumption criteria. So in this study will discuss the regression model with ROA as the dependent variable.

Table 2. Result

	Model 1			Model 2			Model 3		
Variabel	Koef.	t_{hitung}	Sig.	Koef.	t_{hitung}	Sig.	Koef.	t_{hitung}	Sig.
Constant	112.889								
Infastruktur	-0.513	-4.063	0.000	-	-	-	-	-	-
Inflasi	0.717	3.562	0.000	-	-	-	-		
Pertumbuhan Ekonomi	-1.557	-0.975	0.331	-					
f_{hitung}	5.490		0,001	1.447		0.229	0.369		0,776
R	0.244a			0.128a			0.065a		
R Square	0.060			0.016			0.004		
Ad. R Square	0.049			0.005			-0.007		
Durbin Watson	1.713			1.791			1.934		

Dependent Variabel: ROA Model 1
Dependent Variabel: Tobin Model 2
Dependent Variabel: PBV Model 3

Sumber: Hasil Analisis Regresi, Lampiran 5

From table 2 can be obtained the regression equation model as follows:

$Y = 112.889 - 0.513X_1 + 0.717X_2 - 1.557X_3$

1. Constant (a) of 112.889; This means that if the value of Infastructural (X1), Inflation (X2) and Economic Growth (X3) value is 0, then the performance / ROA of the company (Y) the value is 112,889.
2. Infastructural variable regression coefficient (X1) of -0.513; This means that if other independent variables of fixed value and Infrastructure (X1) increase by 1%, then the company's performance / ROA (Y) will increase by -0.513.
3. Inflation variable regression coefficient (X2) of 0.717; this means that if other independent variables of fixed value and Inflation (X2) increase by 1%, then the company's performance / ROA (Y) will increase by 0.717
4. Economic Growth variable regression coefficient (X3) of -1,557; This means that if other independent variables of fixed value and Economic Growth (X3) increase by 1%, then the company's ROA performance (Y) will increase by -1,557.

3.1. Goodness of Fit Test

The F test is used to determine whether independent variables together (simultaneously) have a significant effect on dependent variables. The test results of the influence of variables in infrastructure, inflation and economic growth simultaneously on the performance / ROA of the company can be seen in the SPSS output table above. The table above shows that the f score numeral value of 5,409 f score results are consulted with ftable with a significance level of 5% (0.05). This indicates that f calculates the > f of the table (5,409 > 2,639) and the degree of significance of the Sig value. 0.001< 0.05 is smaller than 0.05. So it can be concluded that Ho was rejected and Ha accepted, meaning that there is a significant influence between infrastructure variables, inflation and economic growth simultaneously on ROA (company performance). These results are in line with research (Zulfiqar & Din, 2015), which found that simultaneously inflation and interest rates positively influence a company's value as measured by ROA (Return on Assets).

3.2. T test

The t test is used to determine whether independent variables partially affect dependent variables. In this test using a sample of n = 264 and the number of variables k = 4 with a two-way test so that the significant number of 2 sides is 0.025, then (df = n-k) so that the df value of 264 - 4 = 260

3.2.1. Based on Significance Value (Sig.)

Based on the table above, the value of significance (Sig.) of infrastructure variables (X1), inflation (X2) and economic growth (X3) is 0.000; 0,000 and 0.331. Because of sig value. 0.000 ; 0,000 < probability of 0.05, it can be concluded that Ha is accepted means that infrastructure variables and inflation significantly affect ROA (company performance). While the value of economic growth significance (X3) > probability of 0.05, economic growth has no significant effect on ROA.

3.2.2. Comparison Of Value T Score With T Table

a) The influence of infrastructure on ROA (company performance).
Based on the table above, the t score value of -4.063 shows that the value of t score> ttable 3,182 can be concluded H0 rejected and Ha accepted. This means that infrastructure variables partially have a significant negative influence on ROA (company performance).

b) The Effect of Inflation on ROA (company performance).
Based on the table above can be obtained t score value of 3,277. This indicates that the value of t score > t table 3,562 shows that H0 was rejected and Ha was accepted. This means that partial inflation variables have a significant positive influence on ROA (company performance). This study is different from previous studies (Anugrah et al., 2020) and (Olalere et al., 2017). The results explained that inflation has no partial and simultaneous influence on profitability.

c) The Effect of Economic Growth on ROA (company performance).
Based on the table above can be obtained t score value of -0.975. This indicates that the value of t score < t table 3,182 shows that H0 was accepted and Ha was rejected. This means that partial economic growth variables do not have a significant effect on the performance / ROA of the company. This research is supported by research (Anugrah et al., 2020). The results explained that economic growth has no partial effect on profitability. Olalere et al., (2017) under "Bank Specific and Macroeconomic Determinants of Commercial Bank Profitability: Empirical Evidence from Nigeria." The results showed that economic growth did not influence profitability as measured by ROA (Return on Assets).

3.3. Coefficient of Determination

Table 2 obtained the number R2 (R Square) of 0.060 or (6%). This indicates that the percentage of the contribution of independent variables (Infastructiveness, Inflation and Economic Growth) on dependent variables (Performance / ROA of the Company) by 6%. Or the variation of independent variables used in the model (Infrastructure, Inflation and Economic Growth) can explain the 6% variation of the ROA dependent variable (company performance). The remaining 94% were affected or explained by other variables not included in the study model.

4. Discussion

4.1. The effect of infrastructure development on the company's performance

The test results as presented in table 2 show that infrastructure development has a significant negative effect on the company's performance (ROA), so it can be concluded that the higher government spending in infrastructure, the ROA will fall. Conversely, the lower government spending in infrastructure, roa will rise. In the opinion of researchers, this is possible because:

1. Infrastructure development carried out by the Indonesian government in the procurement process using the auction/tender mechanism so that with the auction process creates a perfect competition market where construction providers will try to offer the lowest price, so that the continued effect is likely to affect the opportunities of supporting companies in the performance of generating turnover and profit.
2. The sample studied is a supporting company, both a material provider company and an infrastructure development service provider. The researcher's hypothesis focuses on the opportunity for these companies to absorb the infrastructure budget into turnover and profits, but the results show that government infrastructure development activities actually have a significant negative effect, this means that government infrastructure development activities may have a positive effect on the performance of other companies whose business processes are not related to infrastructure development but are very dependent on infrastructure development. The availability of reliable infrastructure.

This research is different from research conducted by (Kasper, 2015), stating that infrastructure development has no effect on the value of the company as measured by ROA (Return of Assets), because the company's performance is influenced by several variables such as company characteristic variables, state characteristic variables and regulatory and competition variables (sector characteristic variables).

4.2. Effect of inflation on a company's performance

The test results as presented in table 2 show that inflation has a significant positive effect on the company's performance, meaning that inflation has a positive relationship to ROA, so that the company's performance as an implementation of the company's fundamentals is affected by inflation. This is because stable inflation and low tends to increase company sales, which ultimately results in the company's profit increases. Increased profitability of the company increases the value of the company. So it can be concluded that inflation becomes an essential factor in investors' consideration in making investments. Therefore, investors can make inflation as a reference in assessing the company's outlook.

This research supports several studies conducted by (Khan et al., 2014), (Zulfiqar & Din, 2015) (Vătavu, 2015) which stated that Inflation has a positive influence on the value of companies as measured by ROA (Return on Assets). However, this study does not support research conducted by (Olalere et al., 2017) which states that Inflation does not affect profitability.

4.3. Economic growth on the performance of the company

The results of tests, such as presented in table 4 show that economic growth has no significant effect on the performance of the company, it is possible to increase people's purchasing power to encourage people to consume goods and services but not followed by the desire to invest in the capital market. This research is in line with research conducted by (Anugrah et al., 2020) which proves that economic growth does not affect profitability as measured by ROA (Return on Assets).

The determination coefficient (R2) analysis for ROA of 6% informs that many other variables affect the company's performance, namely by 94% that are not studied.

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Effects of Strategic Orientation on Performance of Telecommunication Sector in Nigeria

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Abstract
The study explores the potential influences of strategic orientation constructs of entrepreneurial, market and technology orientations on telecommunication firms' performance using data obtained through structured questionnaires from 57 line managers and 300 customers of these firms. The data collected were subjected to the structural equation modeling technique. The results revealed that strategic orientation has a positive significant relationship with firm performance. Specifically, it showed that only technology orientation has a significant influence on telecommunication firms' performance. The study contributes to the understanding of the rationale behind which set of strategic orientations should be implemented for improved level of performance in the telecommunication sector.

Keywords: Strategic Orientation, Technology Orientation, Market Orientation, Entrepreneurial Orientation, Performance

1. Introduction

The conduct of business today is not an easy task because the environment in which business operates is characterised by a high level of uncertainty coupled with market unpredictability and intense competition. To achieve strategic competitiveness is not easy for managers particularly when at the firm level there is a lack of clear direction and understanding of what actually drives performance. Therefore, the need for firms to behave strategically by developing and executing effective strategies that enable them exploit opportunities in the market place is important. According to Slater, Olson and Hunt (2006), strategic perspective is needed in the form of strategic orientation that deals with broad outline for strategic actions and direction for firms operating in turbulent business environments. Strategy not only influences and directs the conduct of business but also is used to respond to new opportunities that lead to the foundation of long term business bottom line (Sinkovics & Roath, 2004) as

well as competitive advantage that results in superior performance (Porter, 1985). According to Habbershon, Williams and MacMillan (2003), performance outcomes that enable enterprise to attain sustained high level of competitiveness overtime is at the heart of strategic management process. For instance, researchers have regularly been concerned with what business strategy leads to superior performance? The answers to some researchers have been if firms can carefully analyse market dynamism and display market orientation, have a high entrepreneurial tendency and exhibits inventive and creative strategies, they will maintain sustained superiority in the market (Jaworski & Kohli,1993). Thus, Tutar, Nart and Bingol (2015) conclude that if firms are both market oriented and entrepreneurial oriented, it means they are strategically oriented. Strategic orientation is a philosophy geared towards reaching higher performance through executing value driven tasks (Gatignon & Xuereb, 1997). It is a body of strategic management research which deals with identifying and examining the relationship between business strategy and performance (Avci, Madanoglu & Okumus, 2011). Also, Slater and Hult (2005) note that managers place different emphasis on their strategic behaviours and select strategic orientation dependent upon not only what they wish to attain for organisations, but also for the society in which business is conducted. For example, if firms lay emphasis on creating value always, it will not only meet but also exceed customers' needs and expectations, and should be predisposed to customer and technology orientation (Day, 1994).

Although studies on strategic orientation are modest, the majority of the studies were carried out in developed countries and little is known about strategic orientation and performance relationship in the telecommunications industry in transition economy (Li & Liu, 2014) particularly in Nigeria where it has been neglected. As noted by Rauch, Wiklund, Lumpkin and Frese (2009), to assume that strategic orientation and performance relationship will yield homogeneous results in different national climes and the economic sector will be misleading. Besides, little has been known in the literature among strategic orientations dimensions that are inventive and creative for providing customer value particularly in the telecommunication sector which should deal with quality service to facilitate business operations. The telecommunications sector in Nigeria since its deregulation has helped in making available easy and efficient ways of satisfying the communication needs required to promote and enhance trade (Balogun, 2000). It has improved the information accessibility, promoted job opportunities for both skilled and unskilled thus, changing the tides of way businesses were conducted (Vanguard Newspaper, 2016; Nkordeh, Bob-Manuel & Olowononi, 2017). The sector as one of the largest telecommunications markets in Africa has had incredible contribution of about 8.8% to the GDP (NBS, 2015). Nevertheless, their inability to strategic orient which Ndukwe (2003) posits leads to inter hurdles in the form of inability to meet customer demands and expectations on one hand and persistence customer complaints of poor service has been facing this sector for a very long time. To this end, the study seeks to examine how the strategic orientation of the telecommunication sector affects its performance.

This study is adopting multiple strategic orientation as regularly used because Hakala (2011) argue that they are mutually supportive and that isolated perspective is often found to be problematic (Cadogan, 2012). Besides, studies by Baker and Sinkula (2009) and Gonzalea-Benito, Gonzalez-Benito and Munoz- Gallego (2009) have adopted combinatorial forms of strategic orientation and demonstrated that it is better to study the combined effect rather than a fragmented single strategic orientation approach. In this regard, the study adopts the most researched of the dimensions of strategic orientation which is decomposed into market orientation, technology orientation, and entrepreneurial orientation factors that have been widely used to measure firm's performance in order to identify the most important which will exert much influence.

2. Literature Review

2.1 Strategic Orientation

Strategic orientation is an important necessity which is needed by organizations to behave strategically in order to achieve success. It reflects the concept which firm has of the competitive actions in the environment and its reactions to these conditions. Hakala (2011) notes that it is the fundamental guiding beliefs that direct and influence firm's activities, and generate the intended behaviours for its viability and performance. It can be said to be the pattern of responses that organization make to its operating environment for performance enhancement. According to Teece, Pisano and Shuen (1997), strategic orientation is concerned with how a firm adapts to its external

environment through its internal capacity to create proper behaviours for superior performance. Several aspects of strategic orientation have been identified in the literature, such as market orientation, entrepreneurial orientation, customer orientation, cost orientation, innovation orientation, competitor orientation, learning orientation, employee orientation and interaction orientation (Grawe, Chen & Daugherty, 2009).

Market orientation according to Slater and Narver in 2000 as cited in Ejdys (2014) involves knowing and understanding customers and competitors as well as creating superior value for buyers that will lead to continuous superior business performance. Market orientation essentially provides the underpinnings for planning and executing strategies that aim to deliver customer satisfaction accomplish and sustain competitive advantage.

Entrepreneurial orientation describes an entrepreneurial approach to the styles, ways and practices of decision making. It refers to the business perspective encompassed and used by an enterprise, the firm level of behavior, the management practices, the owner behavior and an approach that anticipates new market and product needs (Kreiser, Marino & Weaver, 2002). Entrepreneurial firms are characterized as autonomous, aggressive toward competition, proactive, innovative and willing to take risks (Laukkanen, Nagy, Hirvonen, Reijonen & Pasanen, 2013).

Technological orientation is the firm's predisposition to acquire, possess and use large sophisticated technologies for the purpose of developing new products and services (Gatignon & Xuereb, 1997). This means that technological orientation deals with not only using new technology, but also investing more on research and development and meeting new needs of new and existing users of firm's products when firms critically leverage on their resources. In a generalised view, it is the firm's behaviour to engage in exploratory and exploitative innovation for continuous customer value creation.

2.2 Firm Performance

The successful operation of a firm determines its performance. Because firm performance is a multidimensional concept, a comprehensive view of performance is needed to consider it as not only financial, but also non-financial performance. While financial view is considered as lagging indicator, the non-financial indicators are known as prominent performance measures (Paranjape, Rositter & Pantano, 2006; Niven, 2002). Multiple performance dimensions have been used in the literature such as sales growth, market share, profitability, stock turnover, customer satisfaction, customer service return on assets, and return on investment (Lumpkin & Dess, 1996). Reijonen, Hirvonen, Nagy, Laukkanen and Gabrielsson (2015), Deutscher, Zapkau, Schevens, Baum and Kabst (2016) and Avci *et al.* (2011) argue that financial measure is not sufficient for understanding organizational performance because of the complexity of factors variables, hence, non-financial performance has increased in use. This study uses the subjective and self-reported measures by the line managers which are consistent with (Smart & Conant, 1994).

3. Materials and Methods

The study was carried out in Southwestern states in Nigeria. There are six states in southwest Nigeria. These are Ekiti, Ondo, Ogun, Oyo, Osun and Lagos State. There is full presence of all the Nigerian telecommunication firms in Southwest Nigeria. The operational headquarters of the telecommunication firms are also located in one of the States (Lagos State) with almost the highest population and one of the largest commercial cities in Africa which may affect the number of telecommunication subscriptions in Nigeria. The population for this study comprised all the major telecommunication firms in Nigeria. These are MTN, GLO, AIRTEL, 9mobile and the infinite number of customers. The population of interest in the telecommunication firms includes the marketing managers, business development managers, operations managers and IT managers from each of the 4 major telecommunication companies in each of the three (3) states covered namely Lagos, Oyo and Ondo states. In total the study targeted a population of 48 telecommunication managers. In addition, the customer care staff of these firms was included to gauge performance occasioned by the frequency of complaints by customers. Since the numbers of customer care staff are spread in state offices of the telecommunication firms, three (3) customer care staff was included in the population in each of the sample states to give nine (9) additional numbers. In total, 57 respondents were

covered in the telecom firms. Purposive and random sampling techniques were used for this study. The choice of purposive is due to specificity of the study to telecommunication firms' orientation strategies. Due to the size of the target population, all the 57 respondents from the telecom firms were sampled. In order to ensure efficiency of data collection, random sampling of telecommunication subscribers was carried out at each of the telecommunication offices. Preliminary survey showed that most customers besieged telecommunication offices to physically lodge complaints due to the ineffectiveness of online mediums for customer service. Since the population of customers is also infinite, random sampling was used to select 100 respondents from each of the sample states. In total, 300 customers were randomly selected. Data was collected through the use of structured questionnaire which was largely constructed on a 5-point Likert scale with the exception of performance measures which were put on nominal scale. Strategic orientation was measured using market orientation, entrepreneurial orientation, technology orientation adapted from Panda (2014) while organizational performance, represented by non-financial performance, was adapted from (Hernaus, Bach & Vuksic, 2012). The data collected were subjected to descriptive and inferential techniques.

4. Results and Discussion

4.1 Results

4.1.1 Effect of Strategic Orientation on Performance of Nigerian Telecommunication Firms

Results in Table 1 show the goodness of fit indices of the SEM model. The indices of goodness of fit include the ratio of chi-square to degree of freedom, comparative fit index, normed fit index, relative fir index, incremental fit index, Tucker-Lewis index and RMSEA. The estimated values of the indices fall within the expected and acceptable standards. The ratio of χ^2/df is 4.21 which fall within the expected range of 0 and 5. All the other indices also fit into the acceptable range. The CFI is 0.720; NFI is 0.686, RFI is 0.535, IFI is 0.728, TLI is 0.585, and RMSEA is 0.026.

Table 1: Goodness of fit indices

GOODNESS OF FIT INDICES	CONSTRUCT	REFERENCE VALUE
χ^2 /degree of freedom	4.21	$1<\chi^2/df < 5$
CFI(Comparative Fit Index)	0.720	0.95< CFI< 1
NFI (Normed Fit Index)	0.686	0.90<NFI<1
RFI (Relative Fit Index)	0.535	0.90<RFI<1
IFI (Incremental Fit Index)	0.728	0.95<IFI<1
TLI(Tucker-Lewis Fit Index)	0.585	0.95<TLI<1
RMSEA (Root Mean Square Error)	0.026	RMSEA<0.08

4.1.2 Path Analysis of Strategic Orientation to Performance Outcome of Telecommunication Firms

The path analysis of the model is presented in Figure 1. The market orientation is represented by a number of constructs including engagement in market orientation (sm1), market sensing and customer-linkage (sm2), market adaptation (sm3) and introduction of market orientation products (sm4). Its contribution to performance is 0.29. The entrepreneurial orientation is represented by the firm ability to grab external opportunities (se1), proactiveness in taking risky decisions (se2), firms' inventive ability (se3), and proactive innovations (se4). The entrepreneurial orientation contributes 0.01 to performance outcome of the firms. The technology orientation of the firm accounts for 0.45 of the firms' performance outcome and it is represented by product differentiation and competitive product design (st1), effective response to customers' preferences (st2), bias towards technology application in product and marketing effort (st3) and acquisition of superior technological background (st4).

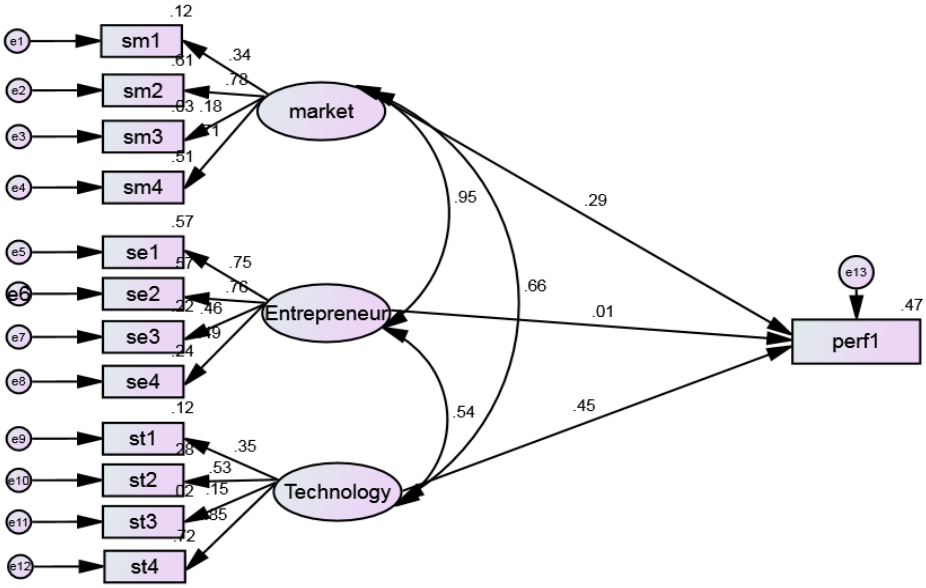

Figure 1: Path Analysis of Strategic Orientation on Performance

The Estimated Effect of Strategic Orientation on Performance

Following the appropriateness of the SEM specification (Table 1), regression model was specified within structural platform to determine the effect of strategic orientation on the performance of the telecommunication firm. Results of the analysis are presented in Table 2. Both market and entrepreneurial orientations do not have significant effect on the performance of the firm. However, technology orientation exerts a significant effect ($p<0.05$) on the performance outlook of the telecommunication firms. The effect of technological orientation is positive suggesting direct relationship with performance in the telecommunication firms. The results further imply that strategic orientation of telecommunication firms should tilt more towards technology since every unit increase in technology orientation of the firms is expected to yield positive performance outcomes.

Table 2: Estimated Effect of Strategic Orientation on Performance

			Estimate	S.E.	C.R.	P
Perf	<---	Market	1.059	2.291	.462	.644
Perf	<---	Entrepreneur	.016	.812	.020	.984
Perf	<---	Technology	1.856	.667	2.784	.001

4.2 Discussion

The analysis of effect of strategic orientation on performance of Nigerian telecommunication firms shows that strategic orientation requires a number of strategic components. These include market orientation, entrepreneurial orientation and technology orientation. Each of these strategies is further represented by a number of strategic sub-factors. Respectively, the findings revealed that technology orientation, market orientation and entrepreneurial orientation are important strategic orientation factors in the order presented. This finding positions technology orientation as a critical strategic factor in the telecommunications firms. Technology in a firm promotes creative effort of the firm (Obeidat 2016). Technology superiority determines the acceptability of the products and services provided in the market because customers prefer quality goods and services (Ibrahim & Shariff, 2016). This result is in line with the findings of Zhou and Li (2010) which maintain that technological orientation assists telecommunication firm with factors needed to satisfy customers through provision of quality service and high level telecommunication services and products. According to Hakala (2011) and Salojari, Ritala, Sainio and Saarenketo (2015), a technology oriented firm has the inclination to acquire new and advanced technology for both exploratory and exploitative innovation which involves designing better products to the market, develop new

processes, services, redesigning and repackaging existing products hence, contributes immensely to the long-term success of firm and improvement of business performance. The expected outcome from good service delivery occasioned by sound technological orientation is positive performance. Consequently, the estimated effect of technological orientation through structural equation modeling is positive and significant.

Table 2: Estimated Effect of Strategic Orientation on Performance

			Estimate	S.E.	C.R.	P
Perf	<---	Market	1.059	2.291	.462	.644
Perf	<---	Entrepreneur	.016	.812	.020	.984
Perf	<---	Technology	1.856	.667	2.784	.001

5. Conclusion and Recommendations

The study calls for empirical tests to identify strategies and actions that can help telecommunication firms attain superior performance using a combination of technology orientation, market orientation and entrepreneurial orientation as constructs of strategic orientation. The study provides an all en-compassing analysis of which strategic orientation constructs that has effect on telecommunication firms in Nigeria. The study revealed that only technology orientation is critical and thus, has positive significant relationship with performance. Although, the result did not go in line with many of previous studies carried out in other firms other than telecommunication sector in other contexts, it contributes to the understanding of the rationale behind which set of strategic orientations that will always help in advancing new products to respond to customer demands and expectations should be implemented for improve level of performance in the telecommunication sector in the Nigeria business environment. Besides, the study helps to shed light on effects of strategic orientation on performance of telecommunication sector which has not been given any attention and also provide an underlying fact on the need to invest on advanced technology in order to always deliver customer value for sustained competitive advantage.

6. Limitation of The Study

The study is not but without some limitations that may impinge on its generalisability. It was carried out at the corporate headquarter cities of the most prominent mobile GSM operators in only three states. The study was cross-sectional and because strategy is never static (Atuahene-Gima & Ko, 2001), hence may not cover the dynamics of changes in strategic orientation. Therefore, future research on strategic orientation may utilise a longitudinal study.

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Equal Opportunity Within the Workplace

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Abstract
In the recent years, the representation of Black, Asian and Minority Ethnics (BAME+) in top management positions has been stagnant despite the increased talent pool. With the current issues arising involving the BAME+ community, it is of no surprise that these ethnic groups are still discriminated, even at their workplace. This is usually due to the culture and type of leadership at the company. Thus, this secondary research paper aims to find out the hurdles culture and leadership climate pose to talented BAME+ employees' career progression. Nonetheless, the investigation, using existing data in the form of surveys, reports, and articles, will be limited to certain companies in the UK and US only. The result of this paper indicates that although there are some companies with good cultures and leaders which allow its BAME+ employees to progress in their careers, most companies do not practice an inclusive culture thus, talented BAME+ staff is often side-lined.

Keywords: Culture, Leadership Climate, BAME+, Career Progression, Ethnic Discrimination

1. Introduction

As of late, the world has seen an unparalleled improvement in workforce compositions due to the increased involvement of Black, Asian, and Minority Ethnics (BAME+) individuals in the labour force. Although the proportion of BAME+ staff may vary significantly amongst different institutions, their confinement to lower-level positions is almost certain (Wyatt and Silvester, 2015; Roberts and Mayo, 2019). The general perception would be that employees' talent and determination play a huge role in the opportunities received to climb the corporate ladder. However, there is no denying the impact that leaders have on the decision-making processes regarding the selection of talented employees that are deem fit to develop and progress in their careers (Bean, 2017). Thus, the objective of this paper is to evaluate and discuss the possibilities of culture and climate being the causes that act as hindrance to the career progression of BAME+ staff in a firm and provide recommendations on ways companies can create equal opportunities for the development and progression of their BAME+ staff.

This paper will be divided into four parts which will thus include the literature review, discussion, conclusion as well as the recommendations. Since there is a wide scope relating to the organizations in which BAME+ staff work in, this paper will therefore focus on the cultural and leadership climate barriers which hinder the progression of talented BAME+ staff in certain UK and US companies. Thus, for the purpose of this research paper, more emphasis will be placed on organizational cultures as well as leadership climate. Fakhar et *al.* (2012) relate

organizational culture to a set of similar values, beliefs and behaviours of employees which can be distinguished by categorizing culture into four different types – clan, adhocracy, market, and hierarchy (Grensing-Pophal, 2018). On the other hand, leadership climate can be defined as the similar perspectives through which leadership in a company is enacted (Day, Griffin and Kim, 2014).

2. Literature Review

As a way of analysing the impact of cultural and leadership climates on the progression of talented BAME+ staff, the literature review of this research paper will touch on five aspects which are Organizational Culture, Leadership Climate, BAME+, Ethnic Discrimination at Workplace and Critical Race Theory.

2.1 Organizational Culture

Organizational culture is often defined as the shared values, viewpoints and beliefs among employees in an organization (Day, Griffin and Kim, 2014; Ostroff, Kinicki and Rabjah, 2013). Fakhar et *al.* (2012) further add that the culture which exists in a workplace is considered strong if majority of the employees adhere to the same beliefs in the organization by choice. In short, a culture which aligns organizational goals to each individual employee's goal is a strong and successful culture that will most probably be able to attract better employees (Maseko, 2017). On the other hand, a weak culture is one whereby majority of the employees in an organization do not share the same beliefs and values (Odor, 2018; Fakhar et *al*., 2012). Organisational culture, as mentioned by Schein (1990, cited in Odor, 2018), can be demonstrated via three layers, which are, Observable Artefacts, Espoused Values & Beliefs and Basic Underlying Assumptions (Kumar, 2016; Lim, 2019) [r*efer to Appendix 1*].

2.1.1 Attributes of Organizational Culture

Organizational culture is better understood by identifying its characteristics and attributes since there is no certain definition for this term. The most common attribute of organizational culture is that it is shared. This is since most of the definitions of culture mention that all the aspects which make up the culture of a company, are shared (Odor, 2018). This attribute is in line with clan culture whereby a lot of similarity exists among employees (Grensing-Pophal, 2018).

To add on, organizational culture, according to Ehrhart, Schneider and Macey (2013), is symbolic, expressive, and subjective. The relationship between culture and symbols is interlinked as culture is made up of different symbols whereas symbols are influenced by cultural practices (Ostroff, Kinicki and Rabiah, 2013; Sigdel, 2018). Culture, such as the adhocracy type, is said to be expressive as it allows individuals to convey their thoughts and emotions (Felipe, Roldan and Leal-Rodriguez, 2017). Nonetheless, symbols and expressions are subjective as they might not have the same contextual meanings when compared with one another (Sigdel, 2018).

Culture is often created by taking into consideration a company's traditions and history. This is supported by Ehrhart, Schneider and Macey (2013) who believe that a company's culture reflects its past as the practices at a workplace are influenced by historical activities. This is linked to another attribution which states that culture provides order and rules to an organization. This is because the shared knowledge regarding certain matters that employees have, creates an order in the workplace that is to be complied with, thereby eliminating ambiguities (Tianya, 2015). The hierarchy and market culture type, as noted by Chandler, Heidrich and Kasa (2017), can be explained using this cultural attribute.

2.2 Leadership Climate

Leadership climate refers to the shared processes, perceptions and procedures regarding policies by means of which leadership is enacted (Day, Griffin and Kim, 2014; Bitsani, 2013). Since meaning is said to be attached to the leader-related perceptions with regards to climate, it is safe to assume that individual members of an organization are subject to the same leadership environment. As noted by Ostroff, Kinicki and Rabiah (2018), climate influences the perception of an employee towards its organization due to the company's practices which

will then affect the employee as well as firm's performances (Dulay, Cakmak, Karadağ, 2015; Nansi et *al.*, 2019). Holloway (2012) believes that since leadership is a two-way relationship between leaders and employees, an appropriate conduct of organizational climate is required to influence employees' behaviour and perceptions.

2.2.1 Dimensions of Organizational Climate

The way leadership climate works in an organization can be explained via the study of organizational climate. According to Day, Griffin and Kim (2014), organizational climate explains the method in which the shared perception of leadership climate affects the outcomes in a company. This is supported by Holloway (2012) who identified three main dimensions of organizational climate, which are **structure**, **responsibility,** and **reward**. **Structure** is the basis on which employees perceive if the policies in a company are well defined. The methods that leaders use to play out their company's strategies to achieve their organizational goals indicate the structure that exists in the company.

To add on, **responsibility**, which requires for both leaders and employees to take charge, depending on the situation. While a leader is responsible to support the development of its employees, employees should also be held responsible with regards to taking up any opportunities available to progress in their career. Another dimension of organizational climate is **reward**, which is what an employee gets for doing a good job. Employees usually look for positive rewards such as pay increments and promotions although the general requirement is for an organization to have a fair reward system within the organization to indicate fairness and equality (Holloway, 2012).

2.3 Black, Asian and Minority Ethnics

Barrett (2018) notes that BAME+ is a well-known term in UK which is used in reference to black, Asian and other minority ethnic individuals who have faced racism due to the colour of their skin tone. However, the ethnic grouping that resulted from using this term when highlighting the inequality and discrimination faced has led to people losing their sense of individuality. Nora and Macaulay (2020) are of the opinion that the term 'BAME,' despite being used officially by the government, should be scraped off as it marginalizes non-white individuals and puts them into one category despite the difference in issues and challenges faced by each and every ethnic group.

2.3.1 Labyrinth Theory

Wyatt and Silvester (2015) came up with a theory of linking the challenges faced by the BAME employees in the workplace with 'Labyrinth,' a metaphor relating to an elaborate maze which has its prize in the centre. Nonetheless, since there are various routes that lead up to the centre, the experience of each individual while navigating the maze will most certainly be different. The 'glass ceiling' term that is frequently used to describe the challenges faced by women in comparison to men, was used as a reference by Wyatt and Silvester (2015) as they argue that BAME employees face a 'concrete ceiling' scenario since the hurdles they have to overcome in order to climb the corporate ladder are more challenging and difficult. This explains why although more organizations have increased their recruitment rates of BAME individuals, only a few of these BAME employees manage to attain senior level or leadership roles (Budjanovcanin, 2015).

2.4 Ethnic Discrimination at Workplace

Discrimination at a workplace often indicates inequality among certain minoritized groups in comparison to others (Triana, Jayasinghe and Pieper, 2015). The difference in treatment includes, but is not limited to recruitment, remuneration and lack of opportunities to develop one's career. These three aspects, as noted by Budjanovcanin (2015), are inharmonious because although one might get recruited, the employment will not provide assurance that the employee will be given an appropriate remuneration or trainings and promotions in order to develop and progress in their career. This explains why minority groups usually have lower-level jobs, with close to no opportunity for advancement (Wyatt and Silvester, 2015).

2.4.1 Types of Discrimination

Discrimination, previously, used to be blatant and in an overt form. However, due to the recent political changes with regards to minoritized ethnic groups, discrimination has taken a more covert form, as people now display their prejudice and racism in a subtle way (Williams, 2015). Ethnic discrimination often refers to racial discrimination involving those from minority ethnics. Although not apparent as before, discrimination, any and all types of it, still exists. The recent form of racial discrimination is known as **modern racism** as there is a preconceived notion that because minoritized individuals are now getting opportunities to pursue their careers, they are no longer discriminated (Roberts and Mayo, 2019).

Modern racism can be explained through **microaggression, colour-blind perspective** as well as **tokenism**. **Microaggression**, as Williams (2015) notes, is a term used to describe the discrimination faced mostly by racial and ethnic minorities, which often goes unnoticed by others. Microaggression has elements of overt as well as covert forms as two of its subcategories, microinsult and microinvalidation, refer to subtly insulting and invalidating an individual's competency and struggles (Harrison and Tanner, 2018) whereas microassault refers to the blatant use of derogatory terms to target and verbally attack minoritized individuals.

In addition to that is the **colour-blind perspective** that most organizations adopt to indicate that all individuals are viewed the same despite their apparent differences. This refers to another covert form of discrimination as those who hold this view are less likely to be aware of their discriminatory actions. The concept of this perspective which is to convince people that everyone is treated the same invalidates the discrimination faced by others (Williams, 2015). **Tokenism**, on the other hand, is when companies hire certain individuals for the sole purpose of avoiding criticism. In this context, tokenism is the act of recruiting individuals from minority ethnics to display the firm as fair and inclusive (Yilmaz and Dalkilic, 2019).

2.4.2 Factors of Discrimination

Ethnic discrimination occurs either deliberately or unconsciously as racism has been inhabited and inherited in everyday life. Salter, Adams and Perez (2018) believe that using the cultural-psychological perspective to understand racism allows for ethnic discrimination to be understood. One of the main factors of discrimination is the feeling of **superiority** that exists in certain individuals whereby they assume their characteristics, most noticeably, their skin tone, makes their ethnic group seem more developed than those different from them. For instance, **'white superiority'** is a term that has been widely used in the recent years due to the privileges that white individuals, be it at their workplace or in general, get since they have lighter skin tones (Gray, 2019).

Another factor that causes ethnic discrimination at a workplace is **homophily**, which Wyatt and Silvester (2015) explained to be the tendency of employees to form links with those who are ethnically similar. Thus, in this context, there is inequality among the groups that exist at a workplace as those belonging in majority ethnic groups more often than not hold a powerful position and the forming of network with employees who have similar characteristics will result in the ethnically minoritized employees being left out from important social networking activities (Lawrence and Shah, 2020).

2.5 Critical Race Theory

Critical Race Theory (CRT) touches upon issues regarding inequality and discrimination and demands for radical change in organizations and systems as a way of reducing the discrimination faced by minoritized ethnics (Campbell, 2014). CRT attempts to challenge the notion that 'Whites' are the standards by being more inclusive towards the other ethnic groups. The six main tenets of CRT [r*efer to Appendix 2*], as identified by Rocco, Bernier and Bowman (2014) touch upon society's regularization of classifying citizens by their race and essential identity, which, as supported by De La Garza and Ono (2016), can be restrained if minoritized ethnic individuals were given opportunities to share their perspectives, thereby validating their struggles and experience.

3. Discussion

Odor (2018) is of the opinion that culture plays a big part in motivating and shaping the performance of its' employees which will ultimately have an impact on the performance of the organization (Maseko, 2017). Organizational culture, as agreed by Edwinah and Mildred (2013), should be measured based on its effectiveness instead of the benefits a certain type of culture will have on the company and its employees. Thus, no matter if a company practices clan, market, adhocracy, or hierarchy culture, if the leaders of the company do not ensure the culture and working environment is suitable for its employees, the organizational culture will not be effective in bringing out the best in its employees. To add on, Seppala and Cameron (2015) believe that **positive leadership climate**, where leaders ensure all employees are treated well and are presented with opportunities fairly, also contributes to creating a positive workplace culture as leaders play a huge role in motivating employees (Nansi et *al.*, 2019; Fang et *al.*, 2019). Thus, it is important for companies to focus on cultures that are beneficial to their organization whilst taking up measures to put an end to the beliefs and practices at the workplace that do not provide any positive result (Odor, 2018).

A biased leadership climate at the workplace will result in unfair treatment amongst employees whereby one group will be given all the chances while another group will be deprived of deserving opportunities. Although as of late companies have made it their aim to promote diversity and be more inclusive, the methods adopted by these firms have not resulted in any proper changes as BAME+ employees rarely receive opportunities to acquire top level positions due to organizational culture and leadership climate (Roberts and Mayo, 2019). This is supported by a **survey** conducted by the Chartered Institute of Personnel and Development (2017) through YouGov PLC involving 1290 UK employees which showed that 38% BAME employees felt that their career progression did not meet their expectations and most of the reasons cited were office politics, working practices or culture, disregard of an individual's talent as well as the lack of training and development programs. Although 57% of the BAME employees agree to have an inclusive corporate culture at their workplace, about 34% of them feel the need to tweak their behaviour to fit in with the rest of the employees at work [*refer to Appendix 3*].

Many companies now project themselves as ethnically inclusive although the corporate culture and actions of these companies indicate that the recruitment of BAME+ staff is done out of political correctness to avoid being questioned by the public (Foote, 2018; Abril, 2020). Thus, these companies hire BAME+ staff for the sake of it instead of allowing the employees to develop their skills and progress in their respective careers. For instance, **Bon Appetit**, a food magazine channel on YouTube, was called out by its ex-employees for not approving ideas by its BAME+ employees while presenting the business as one that cares about minoritized ethnics (Harris, Haasch and Greenspan, 2020). This shows that companies, despite hiring BAME+ staff, prefer to focus on the career progression of their white employees whilst treating their BAME+ staff as tokens for brownie points from the public instead of creating a fair culture at the workplace which favors all the employees equally (O'Keefe, 2020). Unsurprisingly, a similar situation transpired at **Refinery29**, a media and entertainment company, where the co-founder of the company was accused of rejecting work involving BAME+ individuals citing absurd reasons (Flynn, 2020). This shows that modern racism inadvertently exists in the culture of many companies despite firms indicating the opposite.

Poor culture at companies like **Google**, which is said to be tolerant towards racism and sexism (Levin, 2017) also affects the career progression of talented BAME+ staffs due to the discouraging and discriminative, especially microaggressive behavior at their workplace thereby resulting in employees leaving the firm as they are neither respected nor presented with opportunities that will help them progress in their careers (Guynn, 2020). Despite being termed as the exemplar of clan culture in a company, most BAME+ employees at Google have raised their voice regarding the favoritism (Abril, 2020) that goes on in Google whereby white male managers, the dominant group in the company, only supports and promotes those similar to themselves. This can be linked to the sociological theory, **homophily**, as noted by Wyatt and Silvester (2015), whereby the white men at Google often create social networks amongst themselves which then allows them to receive more advanced opportunities whereas the talented BAME+ staffs are excluded and reduced to low level jobs since they do not have role models who can lead and guide them (Levin, 2017).

Despite the increased need for diversity and inclusion at the workplace to combat racism and provide BAME+ individuals a safe space to carry on with their jobs and showcase their talents, certain companies are still ambivalent about giving opportunities to BAME+ employees to progress in their careers. Much of this could be linked to the type of culture a company has adopted at their workplace which normalizes homophily and the need to remain in power and be seen as superior (Rocco, Bernier and Bowman, 2014; Ray, 2019; Wingfield and Chavez, 2020). The **British Broadcasting Corporation (BBC)**, with its top-down leadership style which indicates hierarchy type culture at the firm, is one example of top management refusing any change as the only BAME+ board member of the company was removed (Roberts, 2021). The removal of the senior BAME+ member, against the diversity guidelines of the firm (British Broadcasting Corporation, 2018), has left the BBC News Board homogenous. This shows that leaders and the top management are more responsible than projected with regards to the development of BAME+ staff thereby justifying the claim that culture and leadership climate are barriers to the progression of talented BAME+ employees.

On the contrary, there are companies in UK and US that practice good corporate culture and leadership climate as well. This shows that responsible companies still exist as the management and leaders of these companies are aware of the prevailing inherent differences, in line with the **Critical Race Theory**, among employees of diverse ethnicities at a workplace, instead of adopting a colour-blind perspective which will make BAME+ employees feel invalidated (Rocco, Bernier and Bowman, 2014; De La Garza and Ono, 2016). These companies do not only work on creating an environment and culture that is inclusive of all, no matter the race or ethnicity but the leaders are also empathetic and mindful of the consequences of their behaviour and actions on the firm as well as the employees. Thus, companies with good cultures and supportive leaders often pave the way for talented BAME+ staff to receive training and promotions which helps the employees progress in their careers (Seppala and Cameron, 2015).

One such firm that supports and cares for its BAME+ staff is **Sainsbury's**, a supermarket chain in the UK. The Chief Executive Officer (CEO) of Sainsbury's, Mike Coupe, has created an extremely inclusive culture at the workplace, despite public backlash (Skopeliti, 2020; Mamona, 2020, Gayle, 2020), which encourages employees to be more participative. Inclusion in this context not only refers to BAME+ staff feeling included in the workplace but also refers to the involvement of leaders in the daily work life of these employees (Carayol, 2021). Leaders that are constantly involved in the employees' work can monitor their progress and recommend training programmes that will benefit the employee and indirectly, the company as well (Fang et *al*., 2019). One of the dimensions of organization climate, which is responsibility, requires for employees to be responsible for their own careers and to take up all opportunities presented to them (Holloway, 2012). Thus, in an inclusive culture, as observed in Sainsbury's, communication between employees and leaders is made easier and the interdependence amongst both parties will result in a trusting relationship as well.

Another company with good culture and leadership climate which benefits BAME+ staff is **Accenture**, a professional service firm which is included in the Top 10 Diversity and Inclusion Index (Pratt, 2020). Accenture's achievement in receiving this accolade consecutively (Cole, 2019) indicates that the firm is not just making empty promises to the public but is instead taking up serious measures to achieve its mission of "improving the way the world works" (Jesiah and Kalakada, 2013, p. 6) as the firm has managed to create a good and inclusive culture which allows all its employees, regardless of their race and ethnic, to prosper in their respective careers (Sweet and Shook, 2020). Accenture's secret to success in creating an equal and inclusive culture should be credited to their leaders who believe in treating each employee as an individual first instead of categorizing them as per minority groups (Bell, 2018).

Although **Sainsbury's and Accenture** support the narrative against organizational culture and leadership climate being barriers to the career progression of talented BAME+ staff, it is not enough to completely disregard the claim. This is because out of the innumerable companies that exist in UK and US, only a selected few walk the talk and provide opportunities for the development of BAME+ staff at their workplace. Even then, BAME+ staff are not treated equally as one ethnic group often gets an advantage over the other. For instance, **Intel**'s numbers regarding race, pay and gender equality showed that Asians were dominating the firm's top ranks (Musil, 2019; Ingram, 2019; Green and Recht, 2019) but the number of other minorities, such as African Americans and

Hispanics do not even sum up to half the number of Asians [*refer to Appendix 4*] (Intel, 2020). This indicates unequal treatment of BAME+ employees at workplace which reaffirms the claim of cultural and leadership climates as barriers.

4. Conclusion

To conclude, the career progression of talented BAME+ staff differs from one another, but the main barriers faced to advance in their respective careers can be classified into two – **organizational culture** and **leadership climate**. Although the scope of this study is extended to certain companies in the United Kingdom and United States of America only, there is no doubt that these barriers hinder the career development of BAME+ employees in other countries as well since racial inequality still exists (Drew, 2021) in various nations. Racial inequality results in unconscious bias and favouritism, among other forms of discrimination, and thus, it plays a part in the type of culture that is created at a workplace by the leaders (Roberts et *al.*, 2020). Since this paper used a secondary research method, a further research can be done by conducting surveys in specific companies to find out if internalised racism affects the career progression of ethnically minoritized individuals in their own countries.

5. Recommendations

One of the ways companies can create equal opportunity for talent development and progression within the workplace is by **changing the corporate culture** (McGregor-Smith, 2017). As discussed before, certain companies with an unjust culture do not allow for their BAME+ employees to advance in their career thus it is important for organizations to change their ways and understand why inclusion and diversity are important for their business. As Day, Griffin and Kim (2014) have noted, variation is vital to promote diversity as it benefits the company since competitive advantage among employees brings out the best in them (Urbancova, Hudakova and Fajcikova, 2020). In fact, employees from different ethnicities have different and unique perspectives which can contribute to the success of the firm (Matthews, 2017; Scarborough, Lambouths and Holbrook, 2019). Thus, the first step towards creating equal opportunities is to create an inclusive culture at the workplace.

In addition to that, companies can **introduce leadership programmes** in order to provide training to their leaders regarding unconscious biasness (Ashe and Nazroo, 2015; McGregor-Smith, 2017) and subsequently monitor the change in behaviour of these leaders in their interactions with BAME+ employees (Williams, 2015). By implementing this programme, companies can also allocate and achieve new talent development and progression targets in accordance with their diversity and inclusion strategies while leaders can devise individual development plans for each employee (Roberts and Mayo, 2019). The management of **Ernst and Young (EY)** has initiated a similar Inclusive Leadership Programme (ILP) at their workplace (McGregor-Smith, 2017) which has resulted in a remarkable number of BAME+ employee promotions in 2019 (Smith, 2020) thereby motivating the company to invest in similar programmes.

Lastly, companies should **set fixed policies regarding recruitment, training, and promotion** of all their employees and strictly adhere to these regulations without letting any biasness cloud their judgment (Kang et *al.*, 2016) as a way to avoid discrimination amongst employees. For instance, leaders or those in charge of suggesting promotion or training programmes should monitor the performance of their employees using fixed guidelines or indicators (Ali, Sofia and Kalsom, 2019) instead of making the decision on one's adequacy to receive any promotion or training that will develop and advance their careers based on their race or ethnicity (Wang and Seifert, 2018). Thus, this will allow all employees to receive equal opportunities based on their merits and BAME+ employees will not have to change themselves (Kang et *al.,* 2016; Roberts and Mayo, 2019) to fit in with the rest in order to make themselves eligible for training and promotions.

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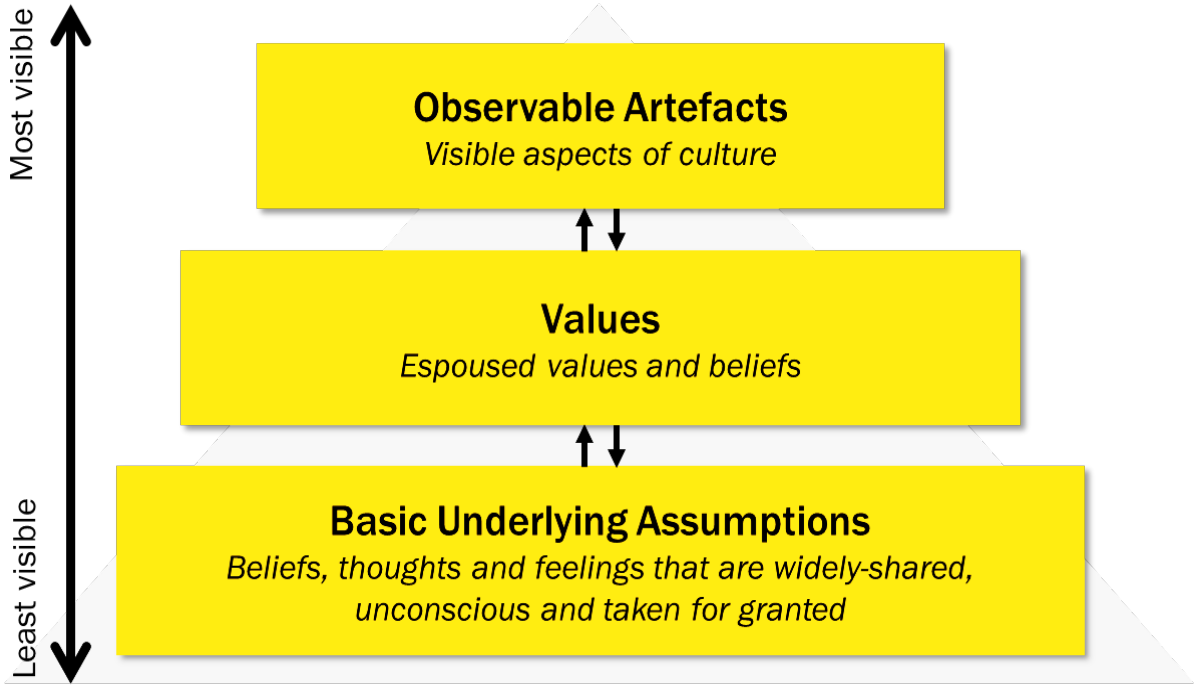
APPENDICES

Appendix 1: Layers of Organizational Culture (Lim, 2019)



Appendix 2: Tenets of Critical Race Theory (Rocco, Bernier and Bowman, 2014)

Social Construct of Race	Racism is Endemic and Ordinary	Differential Racialization
Interest Convergence and Material Determinism	Intersectionality and Anti-Essentialism	Voice of Colour

Appendix 3: Survey Results involving 1290 UK employees (Chartered Institute of Personnel and Development, 2017)

Table 6: Which, if any, of the following factors RELATED TO THE WORKPLACE have prevented you from meeting your career expectations? (% of those who said their career progression to date has failed to meet expectations) (Respondents were asked to select UP TO FIVE factors that have been most significant)

	Net: BAME	Indian/ Bangladeshi/ Pakistani	Chinese/other Asian	Black	Mixed race	Other ethnic group	White British
Base	258	72	34	47	63	42	184
My skills and talent have been overlooked	35	35	31	27	46	28	31
Negative office politics	31	32	24	32	33	29	29
A lack of effective training and development programmes at work	30	20	42	30	31	40	26
Experienced poor quality line management from my immediate manager when I entered work or at key points during my career	29	26	45	25	28	28	35
Job vacancies at higher levels than my current role don't become vacant very often	30	25	30	31	37	20	34
Engrained working practices or cultures have made it hard to progress	27	18	37	32	27	18	26
Poor performance management at work has meant my achievements are not recognised	19	12	31	16	19	30	30
Received no training or inadequate training when I first entered the workplace	19	13	12	21	25	19	17
Experienced discrimination (that is, related to age, disability, gender, gender reassignment, race, religion/belief or sexual orientation)	20	22	9	29	15	17	11
A lack of flexible working opportunities	18	16	20	24	16	7	14
Did not benefit from a coach or mentor when entering employment or at key points in my career	16	12	21	17	17	14	13
Lack of role models in my organisation of 'people like me' with a similar identity or background	17	20	17	19	11	19	11
Was not able to get on an effective graduate programme after completing a degree	12	13	5	9	16	17	3
Was not able to get on an effective apprenticeship programme	3	2	0	3	6	3	2

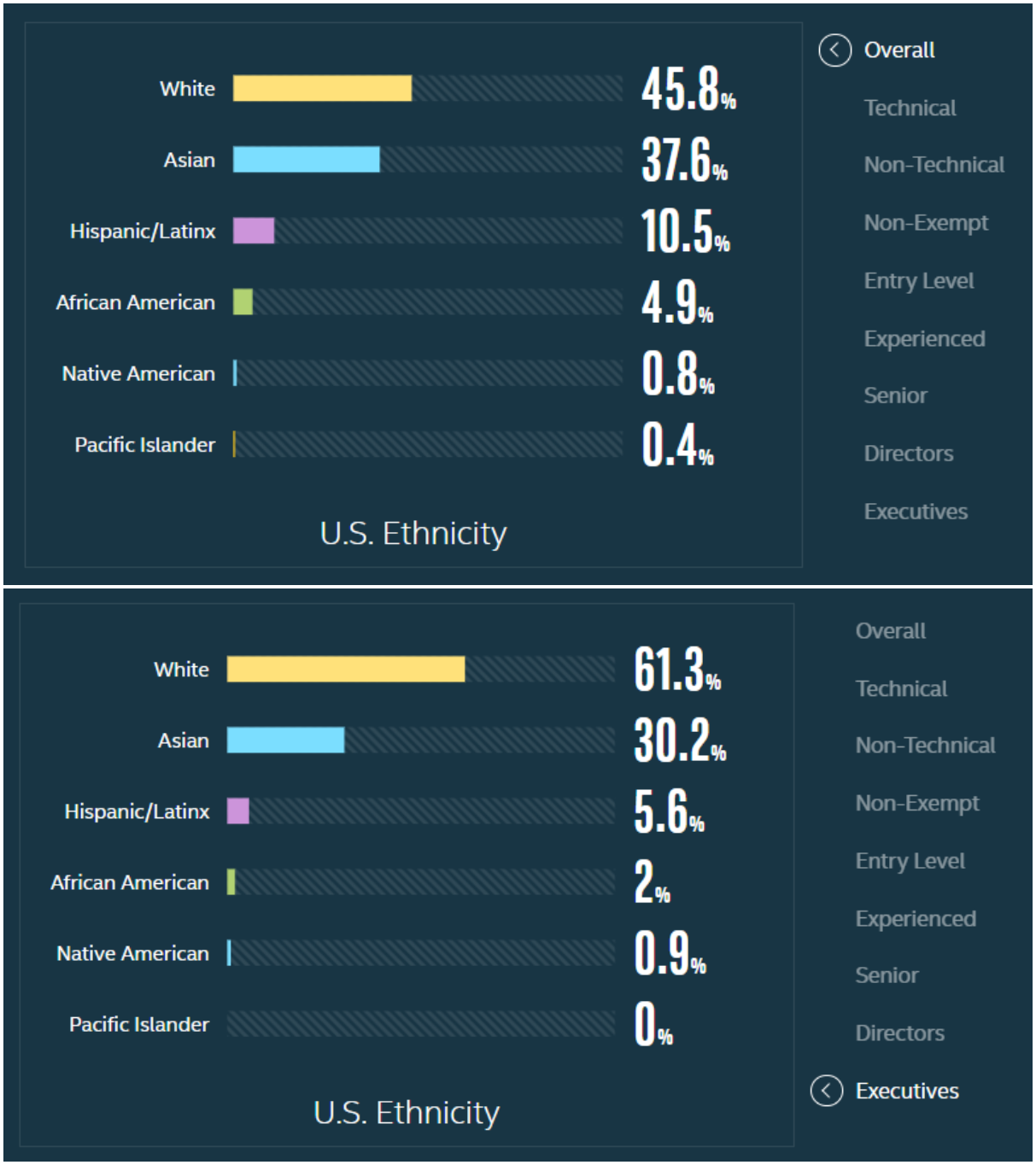
Figure 9: My organisation has an inclusive culture (% agree)

Base: BAME: 700; Asian: 116

Figure 11: I feel I need to change aspects of my behaviour at work in order to fit in (% agree)

Base: Indian/Pakistani/Bangladeshi: 201; Chinese/other Asian 117; black: 111; mixed race: 155; other ethnic group: 116; BAME: 700; white British: 590.

Appendix 4: Intel's Overall Employees and Executive Data (Intel, 2020)



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Improved Seeds Adoption Among Smallholder Rice Farmers in Togo: The Case of NERICA in the Savannah Region

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Abstract
The low adoption of new technologies, particularly improved seeds, remains a critical issue hampering the development of agriculture in many developing countries. The objective of this research is to identify the determinants of (i) the farmer's knowledge,(ii) the adoption decision and (iii) the adoption intensity of NERICA rice varieties in the Togolese Savannah region. Probit and Tobit models were used to analyse data collected from 150 rice growers randomly selected. The results of the estimations showed that the knowledge, the adoption decision and the adoption intensity of NERICA are determined by socio-economic and institutional factors. The common factors affecting the knowledge, the adoption decision and the adoption intensity are credit access, extension service and gender. However, the adoption intensity is specifically affected by the rice income, the land ownership and the membership to a farmer's base organization. These findings suggest the necessity to improve the agricultural credit access, the extension services access and to take gender into account in policies making in order to give men and women the same chances of access to innovations.

Keywords: Agricultural Innovation, Adoption, Improved Seed, NERICA

1. Introduction

Agriculture plays an important role in the economic growth of a country through its role in increasing the income of the poor, employment and food security (Ortega and Tschirley, 2017; N'souvi and al., 2018; Breisinger and al., 2008). Several authors have emphasized the importance of food self-sufficiency for an economy (Janin, 2021; Labonne, 1986; Yabilé Kinimo, 1986). They focused on the economic consequences of a country's food dependence on imported food. Food sovereignty is seen as an instrument of commercial pressure between countries (N'souvi and al., 2018). Among agricultural products, rice occupies an important position in the world not only by its production but also and particularly by its consumption. Rice is the second most cultivated cereal behind wheat in terms of area and ranks third in relation to its production after wheat and corn. It is the staple food for more than half of the world's population (N'souvi and al., 2018). In addition to being the fastest growing food source in Africa, rice cultivation employs around one billion people living in rural areas in developing countries (Baris and al., 2017). Rice is an integral part of agricultural production systems in Africa, where it has been cultivated for over 3,000 years.

In Togo, the agricultural sector which contributes about 38% of the GDP and employs more than 65% of the working population is highly dependent on cereal production. According to the Direction of Agricultural Statistics, (DSID), over the period 2000 to 2012, the share of agricultural products in the GDP was mainly due to the production of cereals (68%). Agricultural sector has great potential to directly improve the income of the poor. Despite the important role of agriculture in its national economy, Togo is unable to meet its cereal needs including rice (N'souvi and al., 2018). This situation is explained by the low efficiency of extension services and the limited capacity of agricultural research, thus limiting the generation, dissemination and adoption of new technologies (World Bank, 2017; N'souvi and al., 2018).

Rice is a strategic crop in Togo as in other African countries (N'souvi and al., 2018). It is one of the main food crops in the country. Indeed, rice occupies third place after maize and sorghum in terms of production. Considered in Togo as a food for special occasions, rice is now consumed almost at every meal and everywhere. Its average per capita consumption in 2007 was estimated at 15 kg per year or even 20 kg in urban areas (Agbobli and al., 2007). Rice is therefore of major importance for the food and nutritional security of populations in low-income countries like Togo.

Paddy rice production has grown dramatically with the implementation of the National Investment and Food Security Program (PNIASA) over the past decade. Indeed, it increased from 85,637 tons of paddy rice in 2008 to 140,519 tons in 2017, an increase of around 39% (DSID, 2017). Despite this growth, production is still insufficient to meet national rice consumption needs. The country still resorts to massive imports every year to meet an ever increasing demand. This causes foreign exchange outflows estimated on average at US $ 7 million per year (MAEP, 2010).

Increasing local rice production and reducing imports remain the major challenge facing rice cultivation in order to contribute to food security and poverty reduction in Togo (Aboa, 2013; N'souvi and al., 2018). To meet this challenge, it must necessarily go through the intensification of rice cultivation. However, a current reading of the evolution of the yields of cultivated areas clearly shows the opposite. For example, between 2008 and 2017, the rice area increased from 36,492 hectares to 84,395 hectares, almost 57% of increase (DSID, 2017). At the same time, yields have remained almost stagnant around 1 to 2 tons per hectare (MAEH, 2015) indicating that the growth in production observed in recent years is strongly linked to the expansion of rice areas rather than to the increase in improved productivity (Pere, 2016). This situation shows once again that Togolese rice cultivation is characterized by low productivity, explained in particular by the low rate of adoption of rice innovations, primarily improved seeds and fertilizers (N'souvi and al., 2018). It is also indicated that farmers mainly use seeds of the traditional type (85%) coming either from their previous harvests or from the local market against 15% of improved seeds acquired from extension services or local non-governmental organizations (NGOs) (MAEP, 2014). The development of new rice varieties remains a major element of efforts to increase rice productivity and production (Diagne, 2006). N'souvi and al. (2018) recommend the promotion of seeds with high yields and resistant to climatic anomalies. Although many improved varieties have actually been developed and introduced by national and international agricultural research institutions to farmers, the finding is that these innovations have not always met with the expected success; some are only adopted by a part of the farmers, others are rejected after adoption. This situation reopens the debate on the factors determining the adoption of innovations and shows the importance of continuing investigations aimed at improving knowledge on the adoption of technological innovations in agriculture.

Among the improved seeds introduced and disseminated in Togo are the NERICA (New Rice of Africa) rice varieties, introduced in the years 1998 by the Association for the Development of Rice Cultivation in West Africa (WARDA now AfricaRice) with a view to increase rice yields and production to cope with food insecurity in Africa. (Kijima and Sserunkuuma, 2013), claim that this high-yielding attribute of NERICA, however, does not guarantee high adoption rates.
According to surveys by the Direction of Agricultural Statistics, (DSID, 2014), NERICAs are cultivated by only 7.4% of rice farmers in Togo on 2% of the rice areas (640ha). This shows that the adoption rate remains low about two decades after the introduction and dissemination of these improved rice varieties in Togo. This situation raises

the main question of this research, which is to know what factors should be acted on to boost the adoption of NERICAs in Togo. This enables us to measure the efforts that remain to be made for the dissemination and wide adoption of these new varieties of rice in Togo.

The research undertaken in Togo on rice focused more on the analysis of competitiveness (Yovo, 2010), the determinants of supply (N'souvi and al., 2018), the importance of varieties of rice cultivated in Togo and the poverty profile of rice farmers (Gnatoulouma and al., 2010; Komi, 2010). However, knowing the factors behind the adoption of new varieties is crucial for improving productivity and increasing the income of farmers. Thus, knowledge of the determinants of seed adoption would make it possible to put in place suitable mechanisms for better adoption and, in turn, improved productivity and income. This is why this study focuses on the factors of adoption of NERICA rice varieties in Togo. While many studies on adoption of NERICA rice verities have been limited to the determinants of adoption decision (Diagne, 2006; Kijima and Sserunkuuma, 2013), this research goes further by seeking to measure the determinants of the adoption intensity of NERICA.

The main objective of this study is to identify the factors of adoption of NERICA rice varieties in Togo. Specifically, the study aims to: i) analyse the factors that influence knowledge of NERICA, ii) identify the determinants of adoption and iii) those that influence the intensity of NERICA use.

The remainder of the article is articulated into three main sections. The first section presents the NERICA dissemination process in Togo, section 2 deals with the methodology of the study and section 3 discusses the results, draws a conclusion and some policy implications of the study.

2. NERICA rice varieties dissemination process in Togo

The NERICA rice varieties or New Rice for Africa were created in the 1990s by a team of researchers from the West African Rice Development Association (WARDA), current AfricaRice. The NERICA rice varieties are the result of interspecific crosses between African rice (*Oryza glaberrima*) and Asian rice (*Oryza sativa*) with the objective to compensate the problems of low resistance or tolerance of Asian rice varieties (Oryza sativa) and poor yields of African varieties (Oryza glaberrima) (Diagne, 2006). NERICA varieties have therefore inherited the advantages of productivity from their Asian parent (resistance to shattering, lodging resistance, yield potential) and adaptability to the growing environment of the African parent (tolerance to diseases, insects and weeds), anything that helps improve their productivity. The performances linked to these varieties have led some authors to consider NERICA as the centrepiece of the hope for a "green revolution" in Africa (Diagne, 2006). Thus, the African Rice Initiative (ARI) was created in 2001 to promote its wide dissemination in Africa in order to sustainably fight against food insecurity and poverty. This initiative, officially launched in 2002 by WARDA (current AfricaRice) has benefited from several support from technical and financial partners in particular by the African Development Bank (ADB), Japan, the United States Agency for International Development (USAID), the World Bank, the International Research and Development Center (CIRD), the Rockefeller Foundation etc (Diagne, 2006).

The NERICA varieties were introduced in Togo since 1998 for experimentation by WARDA (now AfricaRice). Their dissemination in Togo was carried out using the Participatory Variety Selection (SVP) approach advocated by WARDA and enable researchers, extension workers, agricultural producers and consumers to be involved in the choice of varieties to promote. The Participatory Variety Selection (SVP) sessions took place on experimental plots with an area of 48 m² per variety and were directly managed by the pilot producers under the supervision of researchers from the Togolese Agronomic Research Institute (ITRA) and agricultural advisers from the Institute for Advice and Technical Support (ICAT). These discussion and opinion-sharing sessions were organized in all regions of Togo at the vegetative stage and at physiological maturity with intention to collect the impressions of producers on these different varieties. After the harvest, tasting tests were organized for the final choice. Following the participatory varietal selection sessions, all the stakeholders were able to identify and retain nine (9) varieties of NERICA as preferred by Togolese farmers and consumers. These preferred varieties with their characteristics shown in Table 1 are those which have been disseminated in Togo.

Table 1: Different varieties of NERICA disseminated in Togo

Variéties	Cycle (days)	Average yield (t / ha)	Ecology	Coated grain format
NERICA 1	100	3-4	Rain-fed	Medium and aromatic
NERICA 2	100	4	Rain-fed	Long
NERICA 4	100	4	Rain-fed	Long
NERICA 6	100	3-4	Rain-fed	Medium
NERICA 7	100	4	Rain-fed	Long
NERICA 8	85	4	Rain-fed	Long
NERICA-L-14	120	5	Lowland / Irrigated	Long and thin
NERICA-L-19	120	5	Lowland / Irrigated	Medium
WAS 161-B-9-2	120	5	Lowland / Irrigated	Long

Source : Aboa, 2006

ITRA's 2010 activity report indicates that the results of participatory varietal selections (SVP) enable to understand that the varietal characteristics desired by producers are based on precocity, tillering, plant height, plant homogeneity, panicle load and grain size. Bearded kernels are also sought after in strict rain to reduce guarding costs (ITRA, 2010). After the pre-extension phase, the NERICA varieties selected by the farmers at the end of the SVP were subjected to an extension program supported by WARDA (now AfricaRice) and the West and Central African Network for rice cultivation (RoCaRiz). Indeed, small grants were granted by WARDA to finance inputs (fertilizers, herbicides, seeds) for farmers. Despite the strong participatory extension process around NERICA, a survey conducted in 2014 by the Agricultural Statistics service (DSID) in collaboration with AfricaRice, indicates that NERICA are cultivated by only 7, 4% of rice farmers in Togo on 2% of rice areas in Togo. The adoption rate therefore remains low and some researchers recommended that studies should be carried out in order to identify the obstacles to NERICA adoption.

3. Materials and methods

3.1. Theoretical framework for the adoption and dissemination of innovations

Much theoretical and empirical works has been devoted to innovations and their diffusion and adoption. Studying the factors of adoption and diffusion would require a review of the concepts around innovations, diffusion and adoption.

When discussing innovation topics, we always refer to their dissemination and adoption by users. In the process of disseminating innovations, whether it is a new production technique, a new product, or a new procedure, these innovations start from a sending system and are diffused towards a receiving system. (Rogers, 1983). Rogers and Burdge (1962) define the innovation adoption process as a mental process by which an individual starts from the first information he has about an innovation to the final adoption. According to Rogers (1983), adoption can be defined as the decision to choose a given innovation as the best alternative, to apply it and to continue to use it. Theoretically, the analysis of farmers' decision to choose a new improved seed variety can be based on the randomized utility model of McFadden (1973). The utility maximization theory is applied to agriculture where the producer has in front of him several possibilities of choice. He will prefer a much more profitable alternative

choice. Thus, (Ellis, 1993) considers innovation as a technical change and defines it as the first practical use of a new, more productive technique. The innovation process consists in changing the combination, quality or quantity of inputs required to produce the same type of output. It is considered to be the change in the use of the factors of production that saves the relatively expensive factor. It is the transition from one production function to another following the use of a new input to replace an old one that is more expensive or less efficient (a high-yielding variety replacing a traditional seed in agriculture), either to the addition of a new input to existing ones (eg chemical fertilizers or pesticides), or to a better combination of existing inputs allowing the improvement of production possibilities. This response of technical progress to factor endowment is synthesized in the concept of "innovation process" (Ruttan, 1997). This process according to Rogers and Shoemaker (1971) is divided into four stages namely: awareness, interest, evaluation and finally adoption. Clearly, the adoption process refers to both the diffusion and the actual adoption of an innovation. The diffusion of an innovation is also considered as a cumulative set of individual decisions, with the decisions of members of the social system to adopt or not to adopt an innovation spread over time (Monge and al., 2008). In the same context Young (2009) assimilates the diffusion of innovations with a phenomenon of contagion, social influence and social learning. This implies that each individual faced with a choice has a reaction influenced by several factors (Martey and al., 2014).

In this research, the notion of adoption is defined as the decision to choose a given innovation as being the best alternative (Rogers, 1983), to apply it and to continue to use it (van den Ban and al., 1980). It is both the dichotomous adoption decision (adoption / rejection) and the use intensity (continuous choice of cultivated surfaces). However, it is assumed that the likelihood and use intensity of improved seeds are separate decisions. All of the factors that affect the two decisions are expected to be different. Martey and al. (2014) account for the existence of a significant number of farmers with positive desired demand for modern inputs but are too constrained to adopt them.

3.2. Study area

The study was conducted among rice-growing households in three (03) prefectures of the Savannah region in Togo. The Savannah region is located in the northern part of Togo. It lies between 10 ° 45 "and 11 ° 15" North attitude and between 0 ° 30 "and 1 ° East longitude. It is bounded to the south by the Kara region, to the north by Burkina Faso, to the east by Benin and to the west by Ghana. The savannah region is 8,470 km^2, representing 15% of the surface area of Togo (Djagni, 2007). This region is divided into five (5) prefectures which have recently been increased to seven (7) with the creation of the prefectures of Oti-sud and Kpendjal-ouest which are added to those of Tône, Cinkassé, Oti, Tandjoaré and Kpendjal.

The importance of rice production and the presence of rice-growing lowlands added to the food insecurity that reigns in the Savannah region have made this region a favourable area for the dissemination of rice-growing technologies, thus justifying its choice for the present research on the dissemination and adoption of NERICA varieties in Togo. In addition, the savannah region is one of the regions in which NERICAs have been introduced and disseminated. Participatory varietal selection tests (PVS) were conducted in several localities in the region by ITRA and ICAT. In general, there is a low use of improved seeds in this region. In fact, farmers mainly use seeds of the traditional type (85%) coming either from their crops or from the local market against 15% of improved seeds acquired from the extension services of the State or local non-governmental organizations (NGOs) (MAEP ,2014). Few studies have been carried out on the adoption of NERICAs in this part of Togo, although it represents 39% of national agricultural production.

3.3. Data source and sampling technique

The data are obtained from questionnaire surveys conducted with 150 rice producers in three (3) prefectures of the savannah region, namely the prefectures of Tône, Cinkassé and Tandjoaré. The questionnaire survey was associated with group interviews with producer organizations. The collection was financially supported by the African Forum for Agricultural Research (FARA) through the Support Program for Innovation Research (PARI). The two-stage sampling method was used to carry out the sample with the townships as the primary unit and the rice farmer’s secondary unit. The choice of townships was made in a reasoned manner, taking into account the

existence of rice-growing lowlands. The 150 rice farmers were selected using the empirical sampling method based on visiting lowland rice fields, given the unavailability of an exhaustive list of all rice farmers. It consisted in choosing the rice farmers present in the lowlands of the selected cantons. If a rice farmer is unavailable or refuses to answer the questionnaire, the interviewer moves on to the next one until the number is obtained.

3.4. Econometric models and definition of variables

3.4.1. Model specification

Models ranging from binary to multinomial have been proposed to analyze the adoption behavior of farmers (Martey and al., 2014). Usually, the econometric specification largely depends on the objectives of the study and the available data. Logit and Probit models in which the dependent variable is dichotomous are often used while the Tobit model is used to measure the intensity of technology use (Adesina and Zinnah, 1993). The econometric specification of the determinants of adoption of NERICA employs two definitions of adoption. To do this, the Probit and Tobit model were employed for the analysis with the assumption that the decision and the use are independently determined.

- **The Probit model**

Mathematically, the Probit model is represented as follows:

$$\emptyset\,(\beta x_i) = \int_{-\infty}^{\beta x_i} \frac{1}{\sqrt{2\pi}} \exp\,(\frac{-t^2}{2})\,dt \quad (1)$$

Where βx_i represents, according to the law of normal distribution, the probability that individual i adopts the NERICAs; β is a vector of coefficient to be estimated; x_i is a vector of characteristics of individual i; t is a random variable distributed according to a normal distribution; exp is an exponential function.

The analysis of the results of this model will focus on determining the quality of the model and the significance of the estimated coefficients. The quality of the model is attributed by the significance threshold of the chi-square value or the likelihood ratio (LR) or by the log of the maximum likelihood. At a given threshold (1%, 5% or 10%), the model is globally significant when the value of the LR is greater than that of the chi-square at the same degree of freedom. The signs of the coefficients are important because they indicate whether the associated variation influences the probability upward or downward. In other words, these signs indicate in which way the explanatory variable influences the explained variable (Gnatoulouma and al., 2010).

Empirically, the models of the determinants of knowledge and of the adoption decision are specified as follows:

$$\text{EXPO}_i = b_0 + b_1\ AGE_i + b_2\ HSIZE_i + b_3\ EXPER_i + b_4\ SUPRIZ_i + b_5\ SEXE_i + b_6\ EDUC_i + b_7 MEMB + b_8\ EXTENSION_i + b_9\ SVP_i + b_{10}\ TENUR_i + b_{11}\ CREDIAGRI_i + \varepsilon_i \quad (2)$$

$$ADOPT_i = b_0 + b_1\ AGE_i + b_2\ HSIZE_i + b_3\ EXPER_i + b_4\ INCOME_i + b_5\ SEXE_i + b_6\ STAMAT_i + b_7\ EDUC_i + b_8\ MEMB_i + b_9\ EXTENSION_i + b_{10}\ SVP_i + b_{11}\ TENUR_i + b_{12}\ CREDIAGRI_i + \varepsilon_i \quad (3)$$

- **The Tobit model**

If we consider that the latent variable V_i enable us to estimate the intensity of use of the innovation adopted by farmer i, the Tobit model is written:

$$V_i^* = \beta' Z_i + \mu_i \quad (4) \qquad \text{With}$$

$$V_i = \begin{cases} V_i^* \ si\ V_i^* > 0 \\ 0\ si\ V_i^* \leq 0 \end{cases} \quad (5)$$

V_i, being the observable variable and V_i* the latent variable of the model. Assuming V_i is a function of the characteristics of the farmer and his holding, Z_i is the vector of the characteristics of the farmer and his holding, β' represents the parameters of the model and μ_i is the independent error term and identically distributed according

to the normal law. This model enables us to estimate the parameters from the observations of V_i and Z_i. The estimation of a Tobit model is done by maximizing the likelihood function. This method is one of the most widely used because compared to ordinary least squares, it provides unbiased estimates (Yovo, 2016).

Empirically, the model used to determine the intensity of use of improved seeds of NERICA rice is given as follows:

$$USEADOPT_i = b_0 + b_1\ AGE_i + b_2\ HSIZE_i + b_3\ EXPER_i + b_4\ INCOME_i + b_5\ SEXE_i + b_6\ STAMAT_i + b_7\ EDUC_i + b_8\ MEMB_i + b_9\ EXTENSION_i + b_{10}\ SVP_i + b_{11}\ TENUR_i + b_{12}\ CREDIAGRI_i + \varepsilon_i \quad (6)$$

3.4.2. Definition of variables

The dependent variables in the model are exposure and adoption status for the determinants of knowledge and adoption decision; and the area of land devoted to the NERICA rice varieties for analysis of the use intensity. Certain explanatory variables were introduced into the models in order to estimate their effect on the explained variable. These variables include: age of farmer, sex, membership of a rural organization, formal education, marital status, area cultivated with rice, access to credit, size of household, access to technical support, number of years of experience, participation in variety selection tests, land tenure method and income from rice sales.

The age of the farmer (AGE): This is a quantitative variable whose expected sign on adoption cannot be determined in advance. Indeed, there is no consensus regarding the effect of age on the adoption of agricultural technologies in the literature. Old people can adopt new varieties more easily than young people. They can also be nostalgic and resistant to any change. Age generally has a negative role in the adoption of innovations according to Anderson et al. (2005) because older farmers have a shorter planning horizon. They value less the long-term benefits of certain innovations. However, young operators are often under severe financial constraints which can dissuade them from investing in new technology. However, the expected effect of age on exposure is positive because greater longevity for producers allows them to be exposed to more agricultural innovations.

The farmers' gender (SEX): According to the literature, the female gender would have a negative effect on knowledge and adoption of improved varieties. Men have more access to information and inputs compared to women (Dey, 1981). It is also assumed that in Africa most extension workers are male and tend to favour men in their extension work on new technologies.

Membership of a farmers' organization (MEMB): Membership of a farmers' organization can facilitate contact with the extension service and therefore allow the farmer to be more easily exposed to new varieties. A positive sign is expected on the exposure and adoption of improved rice varieties.

Formal Education (EDUC): Education could positively influence the exposure and adoption of improved rice seeds. Formal education promotes the use of new technology. It enables farmers to seek information on agricultural innovations (Ouedraogo and Dakouo, 2017).

Marital status (STAMAT): the marital status affects access to factors of agricultural production, especially land developed for rice cultivation (Ouedraogo and Dakouo, 2017). In addition, it conditions membership of certain social groups (rice producer organization) which can be channels for the dissemination of agricultural innovations. Married status would have a positive effect on the exposure and adoption of improved varieties.

The area sown in rice (SUPRIZ): An individual who owns a large estate will seek to increase his production. However, the increase requires intensification with the use of improved seeds and therefore will seek to know the improved seeds. It should also be noted that large producers are more exposed to innovations because they are more privileged by the extension services.

Access to agricultural credit (CREDIAGRI): In the absence of credit, the unavailability of liquidity is the main problem for agricultural producers who want to buy inputs. So the lack of credit limits access to inputs. Access to

agricultural credit would therefore have a positive effect on the adoption of improved seeds. Its sign on the exhibit is undetermined.

Household size (HSIZE): large families have more labour to carry out agricultural activities (Ouedraogo and Dakouo, 2017). This would generally encourage the adoption of new agricultural technologies. Household size increases the likelihood that at least one household member will be aware of the existence of new improved varieties. A positive sign is expected on the exposure and adoption of improved rice varieties.

Access to technical support (EXTENSION): contact with extension agents through the visits they operate is indicative of the information. Therefore, this contact allows the producer to have a more in-depth knowledge of the proposed technology (cost and benefit) and therefore promotes their adoption. A positive sign is expected on exposure and adoption.

Experience (EXPER): It facilitates the adoption of innovations that reduce perceived risk, but it can have the opposite effect on the adoption of innovations that increase perceived risk (Roussy and al., 2015). The experience thus has a contrasting effect on adoption. Indeed, according to Soule and al. (2000), experienced farmers know their production context better and can take more risks, however they have a shorter planning horizon which does not encourage them to change practices. However, a positive effect is expected on exposure.

Participatory varietal selection tests (SVP): SVP is an approach that allows farmers to be involved in the process of selecting new varieties. With this approach, farmers are exposed to new varieties very early on, thus facilitating their rapid adoption. Its expected effect on exposure and adoption is positive.

Mode of tenure (TENUR): land plays a key role in the economic and social organization of village communities in Togo. It occupies a preponderant place among the factors of production (Cesar, 2016). A farmer who owns his land will invest more in it than one who has rented the land for a limited time. A positive effect is expected on the adoption of improved varieties.

Income from rice sales (INCOME): Wealth is considered to be a key factor in adoption, firstly through its effect on risk aversion (the richer an individual is, the more he is willing to take risks). In addition, the level of wealth conditions the investment and also makes it possible to bear short-term losses during the implementation of the innovation (Roussy and al., 2015). In the literature, different indicators of wealth are used: net income (Feder and Umali, 1993), social capital (Baffoe-Asare and al., 2013) or turnover. Wealth generally has a positive effect on adoption.

Table 2: Definition and signs of variables

Variable	**Définition**	**Expected sign**	
		Exposure	**Adoption**
AGE	Age of the farmer in years	+	+/-
SEXE	Binary; 1 if feminine and 0 if masculine	-	-
MEMB	Binary; 1 if a member of the Producers' Organization and 0 if not	+	+
EDUC	Binary; 1 if achieved formal education and 0 if not	+	+
STATMAT	Binary; 1 if married and 0 otherwise	+	+
SUPRIZ	Area sown with rice in hectares	+	+
CREDIAGRI	Binary; 1 if access to micro-credit and 0 if not	+	+
HSIZE	Number of household agricultural assets	+	+
EXTENSION	Binary; 1 if access to extension services and 0 if not	+	+
EXPER	Number of years of experience in rice cultivation	+	+
SVP	Binary; 1 if participation in selection test and 0 if not	+	+

TENUR	Binary; 1 if landowner and 0 if not	+	+
INCOME	Income from the sale of rice in FCFA	+	+

Source: The authors

4. Results and discussion

The results of the estimates are presented in this section. The descriptive statistics of the variables used are presented first.

4.1. Descriptive statistics

Analysis of the results shows that the study sample consists of 69% men versus 31% women. The majority (94%) of them are married, 3% are single, 2% are widowed and 1% divorced. About 96% of them practice agriculture as their main activity. Petty trade is the first secondary activity and employs nearly 3% of producers, mainly women, followed by livestock which employs less than 2% of the rice farmers in the sample. The majority of farmers (61.74%) are illiterate against 38.26% of educated people, most of whom stopped at primary or secondary level. The average age of rice farmers is around 42 years, varying between a minimum age of 16 and a maximum of 76 years with a standard deviation of 15.92. This shows that the agricultural population in Togo is aging and agriculture is less attractive to young people. The average number of years of rice growing experience is around 15 years with a maximum of 50 years and a minimum of 2 years. This testifies to the good experience of the farmers in the cultivation of rice. The average household size is 9 people with a maximum of 20 (standard deviation = 4.155) indicating the availability of family labor but also a challenge regarding land pressure. The average area sown to rice is 0.55 hectares and varies between 0.1 and 3 hectares with a standard deviation of 0.38 thus confirming that rice cultivation is still practiced by small agricultural producers. The average yield is 1960 kg / ha for the IR-841 variety, 1700 kg / ha for the NERICAs and 1000 kg / ha for the other unidentified varieties. This yield remains low compared to the potential yields of these varieties which are 6,000 kg / ha for the IR-841 variety and 5,000 to 8,000 kg / ha for the NERICAs. This is explained by the failure to follow technical itineraries and the use of seeds from previous harvests without wanting to buy new seeds each crop year and the low use of mineral fertilizers due to the low purchasing power of farmers. The overwhelming majority (77.33%) did not receive training in rice cultivation in the last three years before the survey, 76% do not have access to extension services and 75.33% do not have never participated in a participatory variety selection session. Likewise, 64% do not have access to agricultural credit and only 14% have ever received an improved seed subsidy in the past three years. Only 36.67% belong to a peasant organization or agricultural cooperative, testifying to the low level of organization. This constitutes major institutional challenges which can act as a brake on the adoption of new technologies.

Various varieties of rice are used by rice farmers. The IR-841 variety is the best known (90%) and the most used (40%). As for the NERICA varieties, they are known by nearly 65% but are only used by about 28% of rice growers. NERICA 14 and NERICA 8 are the best known and most used by farmers in the Savannah region of Togo. The main sources of knowledge of NERICA varieties are contact with ICAT and ITRA (45%) through PVS sessions and exchanges between farmers (35%). NGOs and projects have enabled 20% to learn about NERICA varieties. About 44% of the farmers in the sample obtain their seed through the Social Enterprises and Organization of Rice Producers (Rice ESOP), 34.70% rather use crops from previous campaigns, 14% exchange seeds between producers, only 6.8% manage to buy seeds from seed companies in each campaign.

Interviews with stakeholders in the field, in particular the agricultural advisers of ICAT, researchers of ITRA, some former coordinators of the NERICA dissemination project in Togo and the heads of farmers' organizations, it emerges that culinary habits, power purchase and outlets would be factors influencing the adoption of new varieties, in this case NERICAs. Indeed, agricultural producers would have financial difficulties to buy the improved seeds and would lack outlets to sell their production. Furthermore, it is indicated that consumers have a great preference for flavoured varieties which give off a good aroma when cooked, which is not the case with NERICA varieties.

4.2. Econometric analysis

4.2.1. Estimation of the determinants of exposure to NERICA rice varieties

The determinants of exposure to NERICA varieties are analysed using a Probit model. The results of the estimates presented in Table 3 indicate that the model is globally specified, because the significant Wald chi-square value of 58.88 indicates that the explanatory variables jointly influence the farmers' exposure to NERICA rice varieties. Analysis of the model coefficients indicates that exposure to NERICA is determined by all other variables except household size, area sown to rice and participation to varietal selection (SVP) sessions. Exposure to NERICA is positively influenced by years of experience in rice cultivation, female gender, formal education, rural organization membership, access to extension services and land ownership. Age and SVP participation negatively influence exposure to NERICA. These results are consistent with those of Roussy and al. (2015) who find that experience contributes to exposing producers to technological innovations. Similarly, the significance of the female gender variable is explained by the fact that women are more likely to belong to peasant associations which are the privileged frameworks for acquiring information on new varieties. Along with educated farmers who are constantly looking for new technologies and ways to increase their yield to meet the needs of the market and their families, uneducated peasants would be conservative of traditional habits, thus explaining the positive sign of the formal education variable. Belonging to a farmer organization that can facilitate contact with the extension service and therefore enable the farmer to be more easily exposed to new varieties explains the positive signs of these two variables. On the other hand, the negative sign of the age variable is explained by the fact that the curiosity of young people leads them to discover new improved varieties. Indeed, the young farmer is able to have information because of his ability to make frequent trips to come into contact with producers in other localities (Seye and al., 2017).

Table 3: Results of the Probit regression for NERICA rice varieties knowledge

Explanatory variables	Modalities	Coefficients	Z
Age	**Years**	**-0,047**	**-2,20****
Household size	Units	-0,082	-1,45
Rice growing experience	**Years**	**0,092**	**2,43****
Rice area	hectares	-0,131	-0,22
Female gender	**0/1**	**1,373**	**2,94*****
Formal education	**0/1**	**0,983**	**2,50****
Membership to rural organization	**0/1**	**1,098**	**2,89*****
Access to extension services	**0/1**	**0,822**	**1,93***
Participatory varietal selection	0/1	0,554	0,81
Land tenure mode	**0/1**	**-0,668**	**-2,05****
Access to agricultural credit	**0/1**	**-1,137**	**-2,83*****
Constant	-	1,366	2,78
Number of Observations	145		
Wald chi2 (13)	58,88		
Prob > chi2	0,000		
Pseudo R2	0,5087		

Source: computed from survey' data, 2018

*Robust z-statistics with ***significant at the 1%, **significant at 5% and * significant at 10%.*

4.2.2. Estimation of the determinants of NERICA adoption and use intensity

The results of the KLEIN rule-based multicollinearity test indicate that there is no multicollinearity between the explanatory variables used for the two models. Indeed, all the partial correlation coefficients in absolute value between the explanatory variables, apart from the values of the diagonal, are less than 0.8. Consequently, all the explanatory variables of the basic model are retained in the final model.

The determinants of the use intensity of NERICA rice varieties are analysed using a Tobit model while the adoption decision was estimated by the Probit model. The results of the estimates presented in Table 4 indicate that the two models are globally specified, because the significant wald chi-square value indicate that the explanatory variables jointly influence the farmers' adoption and the use intensity of NERICA rice varieties.

In addition, the results show that the variables that significantly determine the adoption decision are different from those that influence the use intensity NERICA with the exception of the variable access to agricultural credit. Consequently, the analysis will be done in two stages: the analysis of the determinants of the adoption decision using the estimation of the Probit model then the analysis of the determinants of use intensity of NERICAs provided by the results of the Tobit model.

The regression estimate of the Probit model of the determinants NERICAs adoption

The decision to adopt NERICAs is significantly determined by access to extension services, agricultural credit, membership of a peasant organization and female gender. All of these variables positively influence the dichotomous decision to adopt NERICAs.

Contact with extension agents through the visits they operate is indicative of information. Consequently, this contact allows the producer to have a more in-depth knowledge of the proposed technology (cost and advantage) and therefore promotes their adoption, explaining the positive sign of the coefficient of the variable (extension services) on the adoption decision.

Membership of a farmers' organization facilitates contact with the extension service and allows the farmer to be more easily exposed to new varieties with more opportunity to adopt them. The positive sign of the coefficient of the female gender variable is in accordance with the results of DSID (2014) according to which NERICAs are cultivated by 16% of women against 8% of men. These results also corroborate those found by Ouedraogo and Dakouo (2017) stating that being male decreases the probability of adopting NERICAs by 10% in Burkina Faso. The sign of the coefficient of the variable access to credit could be explained by the fact that in the absence of credit, the availability of liquidity is the main problem for agricultural producers who want to buy inputs.

The Tobit model regression estimate of the determinants of the use intensity of NERICA

According to this model, the income from rice sales, membership of a farmer organization, land ownership and access to credit significantly determine the use intensity of NERICAs by producers.

The negative sign of the coefficient of the variable Income, it is contrary to the sign expected in connection with the literature (Rogers, 1983; Griliches, 1957). According to Rogers (1983) the adoption of innovation by an individual correlates with the individual's resources and the benefits of the innovation. For Griliches (1957), wealth is considered as a key factor in adoption, firstly through its effect on risk aversion (the richer is an individual, the more risk-taking he is). In addition, the level of wealth determines the level of investment and also enables the individuals to bear the short-term losses during the implementation of the innovation (Roussy and al., 2015). This result can be explained by the fact that rice farmers cultivate several types of rice varieties. Interviews with producer organizations revealed that NERICA varieties are intended for self-consumption and are not marketed in the Savannah region and therefore do not bring in much income. In particular, the IR-841 variety is the most marketed rice in savannah region. Therefore, as the income from the sale of IR-841 rice increases, the rational farmer also increases the space allocated to this variety at the expense of NERICAs in order to increase his profit. This is the reason why an increase in the income from rice sales results in a decrease in the space devoted to NERICA. Concerning the variable relate to the membership of an organization, the negative sign is explained by the competition between different varieties available to the farmer. In fact, farmers who are members of an organisation are more likely to know many improved varieties.

This could lead to a negative influence on the intensive use of NERICA. On the other hand, access to credit and the mode of land tenure encourage the adoption of new technologies because the two variables represent the

availability of resources with effects on risk aversion (Griliches, 1957). This result is in line with Roussy and al. (2015) according to which the level of wealth conditions the investment and also enables to bear short-term losses during the implementation of the innovation.

Table 4: Estimation results of NERICA adoption decision and the adoption intensity

Variables	Probit		Tobit	
	coefficients	z-statistics	coefficients	t-statistics
AGE	-0,0126	-0,77	0,0034	0,89
HSIZE	-0,0606	-1,31	-0,0036	-0,38
EXPER	-0,0071	-0,34	0,0016	0,34
INCOME	-0,0072	-0,19	-0,0217	**-2,4****
SEXE	1,1805	**3,55*****	-0,0041	-0,06
STATMAT	-0,3316	-0,42	-0,3699	-1,65*
EDUC	0,5185	1,51	0,1175	1,53
MEMB	0,6052	**1,67***	-0,2159	**-2,83*****
EXTENSION	1,6598	**3,94*****	0,1155	1,32
SVP	0,5947	1,29	0,1455	1,37
TENUR	0,4960	1,61	0,1955	**3,02*****
CREDIAGRI	0,7892	**2,14****	0,3186	**4,05*****
Constant	-0,4205	-0,49	1,0683	4,93
Number of observation	149		149	
Wald chi2 (13)	41,52		41,52	
Prob >chi2	0,0001		0,0001	
Pseudo R2	0,3727		0,2351	

Source: computed from survey' data, 2018

Robust z-statistics with ***significant at the 1%, **significant at 5% and * significant at 10%.

5. Conclusion and Policy Implications

Rice occupies a major position in food security in low-income countries like Togo. Despite the important place of rice in the country, Togo domestic production of rice is not consistent to meet the demand for this food. Although many improved rice varieties in particular the NERICA were disseminated, the adoption rate remains weak. The present study investigated the factors influencing knowledge, adoption and use intensity of NERICA among smallholder farmers in the Togolese Savannah region. Probit and Tobit models were used to analyse data collected from 150 rice growers. The common factors affecting both the knowledge, the adoption decision and the adoption intensity are access to credit, extension service and gender. However, the adoption intensity is specifically affected by the rice income sales, the land ownership and the membership of a peasant organization. In order to increase the productivity of rice to guarantee food security, it is necessary to improve the agricultural credit access, the extension services access and to take gender into account in policies making in order to give men and women the same chances of access to innovations.

Moreover, it is also important to improve the capacity building of rice farmers through training and adequate agricultural technical assistance that enables them to improve their access to productive resources (improved seed); take gender into account in policies making in order to give men, women and young people the same chances of access to innovations, to better organize the rice farmers in cooperatives in order to facilitate their access to market and then, solving the land access problem.

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Profitability and Risk Analysis of Catfish Farming Breeding Business in Sleman District, Sleman Regency, Yogyakarta

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Abstract
This study aims to analyze the profitability and risk of the catfish breeding business in the catfish farmer group in Sleman district, Sleman district, Yogyakarta. Respondents were selected using the census method because the number of population members was less than 30 people. The results of the profitability analysis using the Expense Structure Ratio (ESR), show that the ESR is 0.041, which means that the fixed costs used in production are 4.1% of the total cost. Benefit Cost Ratio (BCR) of 1.304 which shows that every 1 Rupiah in catfish farming investment will generate a profit of 30.4%. The results of the Gross Margin Ratio of 0.265 indicate that the breeding cultivation business provides a gross margin of 26.5% of the remaining income after paying direct costs related to production. From the results of the risk analysis, it was found that the income risk opportunities faced were 14.4% in each harvest season, the magnitude of the risk opportunities due to the increase in feed prices was 5.55%, and the risk of loss due to production fluctuations was 0.28. This study recommends that catfish farming farmers need to ensure the expenditure of production costs and strive to overcome risks both from internal and external factors.

Keywords: Profitability, Risk, Catfish Farming, Breeding

1. Introduction

Current catfish farming is increasingly in demand by the public because it is a profitable business. There are many advantages of catfish farming compared to other freshwater fish. When compared to other types of freshwater fish, catfish have fast growth, are easy to maintain, are resistant to bad water conditions, and have a high nutritional value and economic value. Within 3 months, catfish can be marketed. The market is never empty and the price is relatively stable. From these advantages, the catfish farming business is a good business opportunity and is expected to increase income.

The commercial fish farming business aims to produce fish that can be sold at competitive prices and generate profits. Profit is the biggest motivation for entrepreneurs to move the company (Ajagbe, 2018). Every entrepreneur will invest in a viable and profitable company. Therefore, efficient use of resources becomes very important

because efficient resource management can make the difference between profit and loss in a business (Engle, 2010). The fish farming business has a short turnover period (maximum six months) and is very profitable (Mohammed et al. 2015; Alawode and Jinad, 2014; Olasunkanmi, 2012). Research by Engle and Stone (2014) shows that the majority of fish farming businesses can be classified as small-scale enterprises. The analysis of small-scale fish farming is divided into three main, interdependent analyzes; namely biological performance analysis, financial analysis, and marketing analysis (Ajagbe, 2018). Failure of any of these analyzes can cause losses in the cultivation business. Therefore, prudence in decision-making in catfish farming is needed.

Profitability is a positive difference between total revenue and total cost. Business profitability can be analyzed using the company's report, namely the income statement. Items used in the income statement to analyze profitability are total income, total variable costs or cash expenditures, and non-cash expenses such as depreciation for one production cycle (Engle, 2012). By using profitability analysis, a business can know the amount of income and profits or losses of a business which in this case can help entrepreneurs to assess the feasibility of their business.

Risk is a condition of uncertainty about the income generated in the future. In the fish farming business, the risk of uncertainty can be caused by factors that cannot be controlled by farmers, such as weather factors, feed prices, and selling prices. According to Pappas and Hirschey (2005), risk can be measured by determining the density of the probability distribution. One measure is to use the standard deviation. Measurements with standard deviations describe risk in terms of the likelihood of deviations from the actual observations around the expected mean value. The amount of production, price, or profit that is expected to describe the average amount of production, price, or profit obtained by the farmer, while the standard deviation is the amount of fluctuation in production, price, or profit that may be obtained or is a risk borne by the farmer.

The Sleman sub-district breeder group is one of the Catfish Cultivation Groups located in Sleman Regency, Yogyakarta. Sleman sub-district consists of 5 sub-districts, namely Caturharjo, Pandowoharjo, Tridadi, Triharjo, and Trimulyo. The cultivation that has been carried out so far uses a catfish breeding system using a tarpaulin pond. This fish farming business is a supporting business for the community to improve their welfare. However, some of the problems that become obstacles for cultivators in running a catfish farming business are the high price of seeds due to the relatively remote location of the purchase of seeds, and the lack of public understanding about knowledge of catfish farming that can provide benefits to farmers. Based on the explanation of the background above, the researcher is interested in researching the "Analysis of Profitability and Risk of Catfish Raising Business in Farmers' Groups in Sleman District, Sleman Regency, Yogyakarta. This research aims to provide information on catfish farming business activities in the Sleman sub-district farmer group, regarding the structure of costs, revenues, benefits, and risks faced. Profitability analysis is used to determine the business condition of the Sleman sub-district farmer group by looking at the structure of costs, revenues, and profits. Meanwhile, risk analysis is carried out to determine the magnitude of the risks faced by farmers and how to overcome these risks. It is hoped that this analysis can provide an overview of the diversity of catfish farming businesses, as well as how to overcome the problems faced.

2. Method

This research was conducted on a group of catfish farmers in the District of Sleman Yogyakarta. The sampling technique uses a saturated sample technique (census), where all members of the population will be the research sample. This is done because the number of population members is less than 30 people.

Profitability analysis is aimed at detecting the cause of the profit or loss generated by each type of product in a certain period. This study used total fixed costs, total variable costs, and total revenue in measuring profitability. The profitability of catfish cultivators is obtained by subtracting revenues from costs incurred during the production process (Adebayo et al., 2013).

$$Profit = TR - TC \quad (1)$$

Several ratios that are also used for profitability analysis in this study include (Ajagbe, 2018):

$$Expense\ Structure\ Ratio\ (ESR) = Fixed\ cost/Total\ cost \quad (2)$$

$$Benefit\ cost\ ratio\ (BCR) = Total\ revenue/\ Total\ cost \quad (3)$$

$$Gross\ Margin\ Ratio = Total\ Revenue - Total\ Variable\ Cost/\ Total\ revenue \quad (4)$$

Risk analysis is measured by determining the density of the probability distribution. One measure is to use the standard deviation (Pappas and Hirschey, 2005). Measurements with standard deviations describe risk in terms of the likelihood of deviations from the actual observations around the expected mean value. The amount of production, price, or profit that is expected to describe the average amount of production, price, or profit obtained by farmers while the standard deviation is the magnitude of fluctuations in production, price, or profit that may be obtained or is a risk borne by farmers. The smaller the standard deviation, the denser the probability distribution, resulting in a lower risk.

Measurement of the standard deviation value obtained by the formula (Salvatore, 2005):

$$V^2 = \sum_{i=1}^{n} \frac{(E-E^2)}{n-1} \quad (4)$$

$$V = \sum_{i=1}^{n} \sqrt{\frac{E-E^2}{n-1}} \quad (5)$$

Where V (variance): standard deviation (standard deviation); Ei: possible outcome; E: the average of the expected results (mean).

In its use, there are several problems when the standard deviation is used in the measure of risk. To overcome this problem, the coefficient of variation is calculated by dividing the standard deviation by the average value. If the value of the coefficient of variation (CV) is known, it will be possible to know the magnitude of the production risk, price, and profit that must be borne by the farmer. The CV value is directly proportional to the risk faced by the breeder, where the greater the CV value obtained, the greater the risk that must be taken borne. Conversely, the lower the CV value obtained, the smaller the risk to be borne.

3. Results and Discussion

3.1 Characteristics of Respondents

The catfish farming business carried out by the farmer group in Sleman District began in January 2019 with 26 members. Cultivation carried out by farmers is carried out independently or individually with fish breeding techniques starting from seeds with an average price of Rp. 180,- per head. Fish breeding is done using pond media where 60% of farmers use their land, 20% use leased land with a profit-sharing system, and the rest rent land at a cost of around IDR 600,000 per year. The area of land used for catfish farming is on average about 200 m^2. Fish breeding is carried out in a 3-month cycle, starting from the time the seeds are sown until the fish are harvested.

Workers who carry out cultivation are pond owners or landowners themselves assisted by an employee with an average wage cost of Rp. 1.000.000,- per harvest. The average yield is 650 kg and can be sold for IDR 17,000 per kg. Most of the respondents sell their harvests to middlemen, and only 20% of the respondents sell their crops directly to the market. In fulfilling their capital needs, all respondents financed their capital with a capital requirement of around IDR 4,000,000 to IDR 10,000,000. For the initial investment, the investment costs consist of the purchase of tarpaulins, sorting buckets, fish scoops, digital scales, and machines of Rp. 4,160,000.

The characteristics of respondents who are members of the Bolopijah catfish farmer group are shown in table 1 below.

Table 1: Respondent Characteristics Cultivation Catfish Farmers in the district of Sleman

Variable	Number (person)	Percentage (%)
Age: < 31 Years 31 – 40 41 – 50 Years > 50 Years	 5 16 5 0	 19 62 19 0
Gender: Male Female	 26 0	 100
Education: Junior High School Senior High School D3/Bachelor's Degree	 0 18 8	 0 69 31
Length of business: <6 months 6 months – 1 year >1 year	 0 21 5	 0 81 19

3.2 Profitability Analysis

Analysis of business carried out in cultivation Catfish in the Sleman sub-district farmer group is carried out for three months according to the length of time the fish seeds are sown until the fish are ready to be harvested (one cycle of cultivation). Total revenue is obtained from the multiplication of production results for one business cycle with the average price prevailing at the time of the study, which is IDR 17,000 per kg with a fish size of about 7 to 12 fish per kg. The calculated cost component consists of 2 components, namely variable costs and fixed costs. In the farmer group in the Sleman sub-district, the fixed costs consist of land rent and equipment depreciation. While variable costs consist of direct labor costs, electricity costs, costs for seeds, animal feed, medicines, and vitamins. These costs are calculated from the average spent by all respondents.

Table 2 shows an analysis of the income and costs of farmer groups in the Sleman sub-district. The total cost of production is Rp. 124.910.000,- which consists of variable costs and fixed costs.

Table 2: Profitability Analysis in the Cultivation Breeders group in Sleman District

Item	**Cost**
Total income (TR)	IDR 170.000.000
Total variable costs (TVC) (costs of wages, electricity, seeds, fish feed, medicine, and vitamins)	IDR 124.910.000
Total fixed costs (TFC) (land lease and equipment depreciation)	Rp 5,433,750
Total cost (TC)	Rp 129,910,000
Gross margin (TR – TVC)	Rp 45,090,000
Gross profit (TR – TC)	Rp 39,656,250
ESR	0.041
BCR	1,304
Gross Ratio	0.265

The results of the profitability analysis show that the ratio of the cost structure (ESR) in table 2 is 0.041. This means that the fixed costs are 4.1% of the total production costs. The amount of fixed costs to total production

costs reflects that most of the resources used for catfish cultivation in this study are variable resources. The nature of these costs will increase along with the amount of production (Adabayo and Daramola, 2013).

Benefit-Cost Ratio (BCR) is a profitability ratio used to analyze the costs and benefits of a business. The results show that the BCR is 1.304. The value of 1.304 means that for every 1 Rupiah, investment in catfish farming will generate a profit of 30.4%. This shows that the cultivation of catfish carried out by the farmer group using breeding is still quite profitable and feasible to continue Akegbejo-Samsons and Adeoye (2012), Tunde, et al. (2015), and Alawode et al. (2016) in their research stated that the BCR value greater than 1 indicates that the business is carried out is profitable and feasible to continue.

The Gross Margin ratio is a profitability ratio to calculate the percentage of profit gross to revenue from sales minus Cost of Goods Sold (HPP). This measures the company's efficiency in using production raw materials and labor in charge of producing or selling goods. The calculation of the Gross Margin Ratio in this study obtained a result of 0.265. These results indicate that the farmer group in Sleman sub-district has a gross profit margin of 26.5% of the residual income after paying direct costs related to production.

The results of this study indicate that catfish farming with breeding techniques is widely carried out because it is quite profitable for farmers. However, the number of costs associated with feed costs needs to be considered so that the use of feed can be optimized so that there is no wastage. In principle, the enlargement stage is an effort to raise fish seeds into fish that are ready to be sold, around 100 to 150 grams per head or 7 to 10 fish per kg. Thus, the speed of the catfish breeding process to reach a ready-to-sell size is the key to profit. This needs to be supported by proper cultivation management, detailed pond preparation, selection of good quality seeds, and appropriate cultivation techniques, structured feed management, and pest and disease control that is carried out as early as possible to support successful cultivation (Rochman, 2014).

3.3 Risk Analysis

The risks that may be faced by catfish farmers in the farmer group in the Sleman sub-district are production risk, price risk, and income risk. The price of catfish every harvest season often fluctuates, especially during a pandemic. The highest price of catfish obtained by respondent farmers was Rp. 25,000.00/kg and the lowest price was Rp. 15,000.00/kg with an average price of Rp. 20,000.00/kg. Fluctuating prices occur due to various factors such as low demand and unfavorable harvest conditions. Production risk can be caused by environmental stress due to limited media while fish are kept in large numbers, low water circulation, climate change that affects pond temperature, and diseases that attack catfish. This can cause fish production to decline which can lead to crop failure and decreased income. Income risk can also be caused by rising production costs, one of which breeders often complain about is feed prices that are unstable and tend to rise. This causes an increase in production costs and results in a decrease in income.

Table 3: Analysis of Production, Price and Income Risk of Farmer Groups in Sleman District

Condition	Probability	Selling Price (Rp/kg)	Feed Price (Rp/kg)	Production (Kg)
Good	0.43	23.500	288.000	550
Normal	0.27	20,000	305 000	900
Recent	0.30	16,500	327 500	1,250
Total	1.00	60,000	920 500	2,700
Mean		20,000	306,833.3	900
Variance(⌠2)		8710661	286 391 899	79291.91
Standard Deviation(σ)		2951.383	16.923.117	281.59
Coefficient of Variation (CV)		0.144	0.055	0.28

The results of the calculation of the risk of catfish farming in table 3 show that the expected average selling price in each growing season is Rp. 20,000/kg, while the fluctuations in the selling price are may be obtained (standard

deviation) of Rp. 2,951.383/kg. The value of the coefficient of variation on the price is 0.14 which means the amount of income risk opportunities that may be faced by catfish farmers is 14.4% in each harvest season. This shows that farmers face the risk of loss due to fluctuations in income in the future. The average price of feed which is one of the largest components of production costs that farmers often complain about is Rp. 306.833,3 per kg. Price fluctuations that may occur are Rp. 16,923.117 with a coefficient of variation of 0.055. This means that the potential risk due to the increase in feed prices that farmers may face is 0.055 or 5.5% in each harvest season. For catfish farming production, the expected yield in each harvest season is 900 kg, while the production fluctuations that may be obtained are Rp. 281.58 / kg or the value of the standard deviation (standard deviation). The coefficient of variation in production is 0.28, meaning that for every one rupiah generated from catfish farming, the risk of loss faced by respondent farmers is 0.28 kg.

Several factors that cause risk in the catfish farming business faced by farmer groups in the Sleman sub-district come from external factors in the form of changes in weather during transitions, fungal attacks on fish, and feed prices that tend to rise. Some of the efforts that have been made by the Sleman sub-district farmer group in dealing with production risks related to the decrease in production due to fungal attacks on fish are providing vitamins, drugs and maintaining the cleanliness of the pond water. Vitamins and medicine specifically for catfish are purchased at veterinary supply stores. While the cleanliness of the pond is done by keeping the water clean to avoid pollution and environmental pollution because catfish require good water circulation, adequate oxygen distribution, avoid harmful compounds, maintain temperature, and prevent the growth of fungi and parasites. Efforts to reduce production levels are also carried out by maintaining a conducive pond environment so that catfish avoid stress. Environmental stress can cause cannibalism in catfish so that they tend to prey on each other. Associated with the risk of production costs due to the rising price of fish feed, a group of farmers in the Sleman sub-district has worked around this by feeding their own farmed catfish from trash fish. However, this homemade feed affects the duration of the harvest. If using factory feed, catfish can be harvested within 3 months. Meanwhile, if given artificial fish feed, the yield is 14 days adrift.

Conclusion

The results of this study indicate that catfish farming carried out by the farmer group in the Sleman sub-district is still a profitable business and deserves to be continued. From the results of the profitability analysis, it appears that this cultivation business is still profitable and can provide income welfare for farmers. However, the profits obtained from catfish farming are the cumulative gains in the final yield. In this case, farmers must realize that to increase their profits, they must ensure that production costs are as low as possible and minimize the risks that may occur, both risks originating from external and internal factors.

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Cost-Benefit Analysis of Palm Mill Oil Effluent Becomes Bio-CNG as HSD Fuel Substitution in West Kalimantan Province

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Abstract
Indonesia is the largest palm oil producer in the world and West Kalimantan Province is the second largest province in the palm oil industry with an area of 1.8 million hectares of plantation land. In palm oil processing at the plant, several types of waste are produced. One of them is liquid waste called Palm Mill Oil Effluent (POME). POME can be used as biogas with an Anaerobic Biological process. Biogas that has been purified and packaged in high pressure tubes is called Bio-CNG. Methane gas levels in Bio-CNG are 96-98% and CO^2 gas is 2-3%. The province of West Kalimantan has limited electricity infrastructure, so it relies a lot on diesel power plants (PLTD) to generate electricity. The installed capacity of PLN UIW West Kalimantan in 2019 is 211,713 KW with a PLTD capacity of 125,768 KW or 59% of the total installed capacity. The use of fossil energy sources cannot be sustained because Indonesia's oil production continues to decline and imports of fuel continue to increase. Therefore, this study aims to analyze the costs and benefits of POME into Bio-CNG as a substitute for HSD fuel in PLTD with the CBA (Cost Benefit Analysis) method. The result shows that the potential of POME energy into Bio-CNG in West Kalimantan Province meets the needs of PLTD PLN UIW West Kalimantan as a substitute for HSD fuel. In addition, based on the cost and benefit analysis that has been carried out on the Bio-CNG project obtained a greater value of benefits than the cost, so that the utilization of POME into Bio-CNG as a substitute for HSD fuel in PLTD is feasible to run.

Keywords: Biogas, Diesel Power Plants, Electricity, Palm Mill Oil Effluent

1. Introduction

One of the most needed types of energy is electrical energy. Electricity is often the benchmark for a region's progress. Without the availability of electricity, it is difficult for an area to develop in terms of economy, education and human resources. The Government of Indonesia through the National Energy Policy (KEN) contained in Ministerial Regulation No. 79 of 2014, targets an electrification ratio of 85% in 2015 and close to 100% in 2020. Also targets to achieve a national energy mix based on New Renewable Energy (NRE) of 23% in 2025 and 31%

in 2050 and a petroleum energy mix of less than 25% in 2025 and less than 20% in 2050 (National Energy Council, 2019).

Electrical energy is needed for households and industry, both for lighting and or supporting various electronic equipment and machines. The installed capacity of PT PLN UIW West Kalimantan as of the end of December 2019 was 211,713 kW. Consisting of: 125,768 kW Diesel Power Plant (PLTD); Micro Hydro Power Plant (PLMH) 2,025 kW; 180 kW Solar Power Plant (PLTS); and Rent/Buy of 83,740 kW (PLN, 2020). Thus, most of the electricity needs of West Kalimantan Province are supplied by PLTD, whose fuel source uses HSD type oil which has a cetane number of 45. The large amount of fuel needed for this PLTD cannot be continuously supplied by fossil energy. Therefore, the government through its national energy policy targets to minimize the use of petroleum and maximize the use of NRE. One of them is by converting fossil energy to renewable energy sources which are very abundant in Indonesia.

Palm oil is one of the plantation commodities that has an important role in economic activities in Indonesia in increasing Gross Domestic Product. In 2018, the total area of oil palm plantations in Indonesia was 14.3 million hectares with palm oil production of 36.6 million tons. The province with the largest oil palm plantation in Indonesia in Riau Province with an area of 2.7 million hectares, then West Kalimantan Province with an oil palm plantation area of 1.8 million hectares (Directorate General of Estates, 2019).

The processing of Palm Oil Fresh Fruit Bunches into Crude Palm Oil (CPO) produces a large amount of biomass waste in the form of organic waste in the form of empty palm oil bunches, shells and coir, as well as liquid waste (Palm Oil Mill Effluent/POME). POME can be converted into biogas which can then be used as a source of electrical energy. Utilization of POME will add value, increase profitability, reduce environmental impact and produce renewable energy (Luthfi, 2018); (Chin et al., 2013).

In accordance with the National Energy Policy article 3 section 2 stated that there are 2 main policies, namely the availability of energy for national needs and the utilization of national energy resources. Then supported by the policy in section 3, namely energy diversification (National Energy Council, 2019). Energy diversification is the diversification of the use of energy sources (something that can produce energy either directly or through a conversion or transformation process). POME can be a good potential source of renewable energy because Indonesia is the largest producer of CPO. If managed properly, POME can be an alternative energy diversification, especially in this study as a substitute for HSD (High Speed Diesel) fuel.

POME has the potential as a raw material for biogas which can be upgraded to become Bio-CNG. However, Bio-CNG technology has not been implemented in Indonesia, it is still a pilot project. Therefore, it is necessary to analyze the cost and benefit of implementing Bio-CNG as a substitute for diesel fuel for PLTD. So, it can be input to the government and entrepreneurs to apply the use of POME to Bio-CNG in West Kalimantan Province, especially in areas close to oil palm plantations and support the targets of the National Energy Policy.

In palm oil extraction, there are 3 main processes that produce POME, namely the FFB sterilization process, the CPO purification process (Clarification Process), and the squeeze of empty bunches. Palm oil mills produce 0.7 to 1 M^3 POME for every tonne of fresh fruit bunch processed. The newly produced POME generally has a hot temperature of 60-80 C, is acidic (PH 3.3 to 4.6), thick, brownish in color with solids, oil, and fat content, Chemical Oxygen Demand (COD), and Biological Oxygen Demand (BOD). POME contains large amounts of nitrogen, phosphate, potassium, magnesium, and calcium, so it can be used as a good fertilizer for oil palm plantations. However, the mill operator must treat POME before it is used on the land. Direct use of untreated POME on land can kill vegetation and contaminate soil (Rahayu et al., 2015). The quality standard for POME applications on land is regulated in the Decree of the State Minister of the Environment Number 28/2003.

The high number of COD, BOD and color concentration in POME can also affect the environment, especially water resources. However, POME is recognized as a prospective source of renewable biogas such as biomethane and biohydrogen. By treating wastewater to produce new renewable energy in the palm oil industry, the industry can help reduce environmental issues, and can produce cleaner energy with greater sustainability (Ahmed, Yaakob, & Sopian, 2015).

Biogas is formed naturally when liquid waste, POME, is decomposed under anaerobic conditions. Without control, biogas is a major contributor in the palm oil industry in producing greenhouse gas emissions. Biogas consists of 50-75% methane gas, 25-45% carbon dioxide, and small amounts of other gases (Abdurrahman, Azhari, & Said, 2017). If the management of POME is not controlled, then the methane gas in the biogas will be released directly into the atmosphere.

Biogas can be used directly as an energy source for power generation, but can be compressed and purified into Bio-CNG to produce gas with >95% methane content. In the process of purifying biogas into Bio-CNG, there are several processes in order to obtain a quality comparable to natural gas. Bio-CNG purification technologies include water scrubber, cryogenic, physical absorber, chemical absorber, pressure swing absorber, and membrane technology. Basically, the purification process begins with a scrubbing unit consisting of a CO^2 separation unit, an H2S separation unit, and a water vapor separation unit. After purification, the composition of CH4 should be more than 97%, with CO^2 less than 3%, H2S less than 10 ppm and water content should be less than 32 mg/M^3 (Subramanian & Lahane, 2013), (Aminullah et al., 2018). Utilization of POME Bio-CNG as renewable energy is considered a new technology and financing this project is considered a high-risk investment. However, according to reference (Nasrin et al., 2020), the integration of biogas and Bio-CNG refineries in palm oil mills is a viable business model, technically and economically, in providing commercial and environmental benefits for the palm oil industry and industrial users.

2. **Method**

Data and variables were collected from PT Cipta Usaha Sejati and other literature sources. In order to evaluate the cost and benefit of POME into Bio-CNG as a substitute for HSD fuel in PLTD, a cost benefit analysis is used. Cost and benefit analysis is carried out with categories of direct and indirect costs, as well as tangible and intangible benefits. Through this analysis, it will be known whether the Bio-CNG development project from POME has a benefit value that is greater than the cost value, so that it can attract the interest of both the government and developers or investors to build the project. Cost benefit analysis can also determine the financial viability of the project.

Financial feasibility analysis in this study used 2 calculations: 1) Financial Analysis of Bio-CNG Plant Development; 2) Financial analysis of diesel fuel substitution with Bio-CNG. The feasibility value parameter is viewed from the value of Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit Cost Ratio (Net BCR), and Payback Period (PBP).

IRR (Internal Rate of Return) is a method of calculating investment by calculating the interest rate that equates the present value of the investment with the present value of net cash receipts in the future. If the IRR calculation result is higher than the weighted average of the cost of capital (WACC) of the total funds used in project investment, the project is concluded to be financially feasible. NPV (Net Present Value) is a calculation that uses the present value principle by finding the difference between the initial investment of the project and the total net cash flow value over the life of the project. If the results of the NPV calculation are positive, the project is concluded to be feasible. Whereas the payback period is the period of return of funds that have been invested in the project. Furthermore, sensitivity analysis is carried out to ensure business certainty in changes in normal conditions.

3. Results and Discussion

POME as the main raw material for Bio-CNG is obtained from the remaining processed palm oil mills in liquid form. Processing of palm fruit into palm oil goes through several processes that produce POME, the oil extraction process, the washing and cleaning process at the factory which will end up being POME. In general, the ratio of POME production to processed fresh fruit bunches is 0.6 to 1 M³, but each factory has a different ratio depending on the process in the factory. Most of the palm oil mills in Indonesia have not utilized POME as biogas energy, such as PT Cipta Usaha Sejati which still carries out conventional Pome processing by draining POME into an open pond before it is channeled into a river.

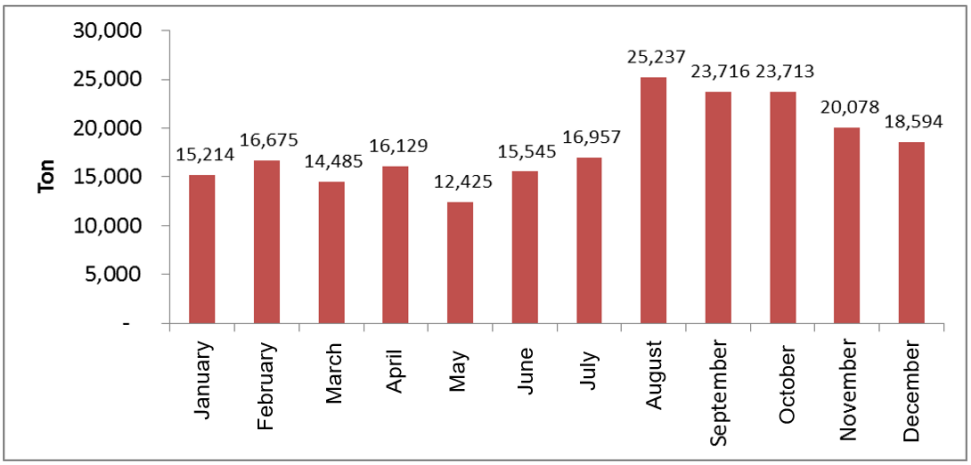

Figure 1: POME Production of PT Cipta Usaha Sejati

Source: PT Cipta Usaha Sejati, 2021

The number of fresh fruit bunches (FFB) processed in 2021 as shown in table 1, is 363 thousand tons with an average of 1,212 tons of FFB per day. This is in accordance with the PKS capacity, which is 60 T/J with 20 hours of processing time per day, so that the FFB processing per day is based on the factory capacity of 1,200 Tons. The amount of FFB raw material will determine the feasibility of the project so that POME production continues.

Then for the calculation of POME production using a ratio of 0.60 m³/Ton FFB or by measuring the flow rate of POME to the waste pond. In this study, researchers obtained POME flow data from PT Cipta Usaha Sejati during 2020, when compared with processed fresh fruit bunches, the ratio was 0.60 M³/Ton FFB. The COD value was obtained based on an independent Lab analysis conducted every month by PT Cipta Usaha Sejati as the basis for research on the average COD POME value in 2020.

Table 1: Raw Material Parameters (PT Cipta Usaha Sejati, 2020)

No.	Types	Value	Unit
1.	Palm oil mill capacity	60	Ton/hour
2.	Fresh fruit bunches processed	363,649	Ton/year
3.	Average fresh fruit bunch processing per day	1,212	Ton/day
4.	Working days	300	Day/year
5.	Working hours per day	20	Hours/day
6.	Pome production	0.60	m3/ton FFB
7.	Pome production per day	727	m3/day
8.	COD	64,000	Mg/liter

Table 2: Calculation of Bio-CNG Potential

No.	Types	Value	Unit
1.	POME	36	m3/hour
2.	COD Loading	2,304	Kg/hour
3.	CH4 Production	726	Nm3/hour
4.	Biogas Generation	1,152	m3/hour
5.	Captive Power	115	m3/hour
6.	Bio-CNG	674	m3/hour

3.1 Cost Benefit Analysis

A cost benefit analysis was conducted to aim at how much economic the Bio-CNG project would be and the benefits it would derive. Prior to the analysis, the costs and benefits of Bio-CNG development and HSD substitution are grouped, so that researchers can calculate the economics of the project. The classification of costs and benefits is carried out based on the classification of real costs and benefits consisting of direct-indirect, tangible-intangible, and internal-external cost-benefit categories. The classification can be seen in table 3.

Table 3: Classification of Cost and Benefit Analysis

Category	Cost	Benefit
Direct	Construction of a Bio-CNG plant	- Increase company revenue - Creating new renewable energy from factory waste
Tangible	Production machinery and O&M (operation and maintenance)	Production of bio CNG from pome
Indirect	- Technical studies - Service and fixed cost - O&M costs	- Reduce solar use - Carbon Credit
Intangible	Land degradation	- as methane capture - Employment
Internal	Policy maker for the use of POME	Increase company revenue
Eksternal	Water pollution due to residual pome waste	Environmental pollution reduction

3.1.1 Cost

Direct cost. The cost component that has the most influence on the project's economic analysis is the direct cost. Direct costs are costs incurred directly for the purpose of the project. In this study, the direct costs are fixed costs, which consist of machines and buildings for the Bio-CNG plant. The biggest cost in the construction of a Bio-CNG plant is the cost of the biogas system and the biogas purification system into Bio-CNG. In general, Indonesia and several countries in Asia use closed pool biogas technology systems and reactor tanks. Anaerobic/enclosed ponds generally have poor bacterial-to-substrate contact, with hydraulic retention times between 20–90 days and require a large area.

In general, for the same sewage treatment capacity, the capital investment for a closed pond is lower than for a tank/CSTR system, but requires a larger area. The investment cost of the reactor tank is more expensive than the closed pool system. The investment costs for tank systems range from 2.5 million to 3.5 million USD per MWe,

while the cost of enclosed pools ranges from 1.5 million to 3 million USD per MWe (Rahayu et al., 2015). In this study, tank reactor technology was used because of the better biogas production and smaller land use. Another consideration is that the reactor tank is believed to be more durable than the open tank lagoon system.

Furthermore, there is a large cost in the technology for refining Biogas into Bio-CNG, each technology has a different working system and has a different output. Several studies have concluded that membrane technology has the lowest investment and operational costs, and produces good output. Table 4 shows the cost comparison of biogas purification technology. The table shows that membrane technology is a technology that has low investment and operational costs. In this research, the technology used is Membrane Pressure.

Table 4: Comparison of Cost of Biogas Purification Technology

Purification Technology	Capital Cost (USD/m3)	Operating Cost (USD/m3)
Water Scrubbing	5,669	0.58
Cryogenic Separation	6,338	5.57
Physical Absorption	5,669	1.33
Chemical Absorption	5,669	1.33
Presure Swing Absorption	6,123	1.07
Membrane Technology	4,654	1.00

Source: Aminullah et al., 2018

Indirect cost. Indirect costs are operational and maintenance costs, which consist of labor, consumables, spare parts and operational materials. Operational and maintenance costs are usually calculated annually. In this study, operational and maintenance costs are budgeted at 200.000 USD/year, as shown in table 5.

Table 5: Variable Cost Component

Type	USD
Gas Engine Operation	40,000
Biogas Plant Operation	30,000
Scrubber & Bio-CNG Plant Operation	35,000
Operator	28,125
Helper	17,438
Plant Incharge	9,375
Extra Provision/others	40,000
Total	**200,000**

Tangible and intangible costs. Tangible costs are costs that have market value and are tangible, including investment costs and operational and maintenance costs, as shown in Table 6. Intangible costs are costs that are intangible and are usually difficult to measure. In this study, the cost of land degradation used for the construction of the Bio-CNG plant, in this land use it will involve changing the ecosystem from garden land or vacant land into buildings. However, in the construction of the Bio-CNG plant, generally the land used is in the existing waste pond land, meaning that there is no additional use of new land around the factory but uses existing land. So, the costs incurred are not significant.

Table 6: Component of Tangible Cost

Type	Unit	USD
Biogas system and materials	Lot	1,985,000
Gas Engine 350 Kwe	Unit	495,000
Biogas Purification and Bottling capacity: 850 m3/hr	Lot	1,240,000

Mechanical/Erection Works	Lot	365,000
Civil Work	Lot	330,000
Gas Engine Operation	Lot/year	330,000
Biogas Plat Operation	Lot/year	30,000
Scrubber & Bio-CNG Plant Operation	Lot/year	35,000
Operator	Person/year	28,125
Helper	Person/year	17,438
Plant Incharge	Lot/year	9,375
Extra Provision/Others	Lot/year	40,000

Internal costs and external costs. The internal cost incurred in this project is the policymaking in the use of POME. The government must support the use of NRE by making policies that encourage and prioritize NRE as an energy source. So that investors/private sectors are interested in undergoing EBT projects, the use of POME into Bio-CNG. The external cost in this project is water pollution due to residual POME waste. Water pollution from POME waste basically occurs due to waste disposal from factories. POME waste will eventually be channeled into the river with the specified quality standards. With the quality standards that have been calculated, the pollution that occurs does not change the ecosystem.

3.1.2 Benefit

Benefits are divided into several components: direct, indirect, tangible, intangible, internal and external. Direct benefits are benefits that are obtained directly from project development, namely creating Bio-CNG as a substitute for HSD fuel. This benefit is obtained by private parties/investors of Bio-CNG development and PLN as users of Bio-CNG. The private sector as the project builder will benefit from the sale of Bio-CNG, while PLN will benefit from the savings in substitution of HSD with Bio-CNG from the difference in the purchase price. The potential profit obtained by the private sector from the sale of Bio-CNG. The next benefit obtained by PLN UIW West Kalimantan is the savings in PLTD fuel costs from the difference in the price of HSD with Bio-CNG.

Table 7: HSD Usage in 2019

Description	Unit	Value
HSD	Kilo Liter	115,676
Cost	IDR	1,219,954,715,443
Cost per Liter	**IDR/Liter**	**10,546**

The data in table 7 is the use of HSD and the cost of purchasing in 2019. The price per liter of HSD is IDR 10,546. So, if the price of Bio-CNG per M^3 is IDR 5,500, the potential savings per liter of HSD is IDR 5,000. If the use of HSD per year is 115,676 Kilo Liter, then the potential savings that can be made is IDR 578,380,000,000. From these calculations, it can be seen that the potential savings using Bio-CNG as a substitute for HSD is almost 50%. However, this savings advantage must also be taken into account with the cost of PLTD modification on the generator engine. Converting HSD fuel to Bio-CNG requires a conversion kit on the generator engine. The conversion kit investment cost per machine unit is 11,500 USD – 17,000 USD, so the return on investment when compared to the savings benefits only takes less than one year.

Another potential income from the development of the Bio-CNG project is the sale of carbon credits. The sale of carbon credits can be done through the carbon market which is divided into the compliance market and the voluntary market. In the compliance market, carbon credits are generated by projects operating under one of the UNFCCC mechanisms. The compliance market consists of industrialized countries, which have made commitments under the Kyoto Protocol to reduce greenhouse gas emissions. These countries monitor and regulate carbon-intensive industries and impose annual emission limits for each industry. Industry stakeholders can

purchase carbon credits in the compliance market to offset emission outputs that exceed the allowable allocation. The UNFCCC registered project and its products are called Carbon Emission Reduction (CER). The main market for CER is the European Union emissions trading scheme (ETS). The calculation of the Biogas CER is:

$$CO_2\ emission = Biogas\frac{generation}{day} \times Methane\% \times methane\ density \times \frac{25}{1000}$$

$$= 27{,}648\ {}^{m^3}/_{day} \times 0.6 \times 0.656 \times \frac{25}{1000} = 227.06\ {}^{TCO^2}/_{day} \times 300 = 81{,}617\ {}^{TCO^2}/_{year}$$

Average market price for carbon credits is 0,55 USD/TCO². So, the potential income from selling carbon credits per year is 44,889 USD/Year. Based on the calculations that have been made for each component of the cost benefit, the results can be seen in Figure 2. Where the total cost is 18,567,158 USD and the total direct benefit is 30,167,709 USD, while the indirect benefit is 51,542,009 USD.

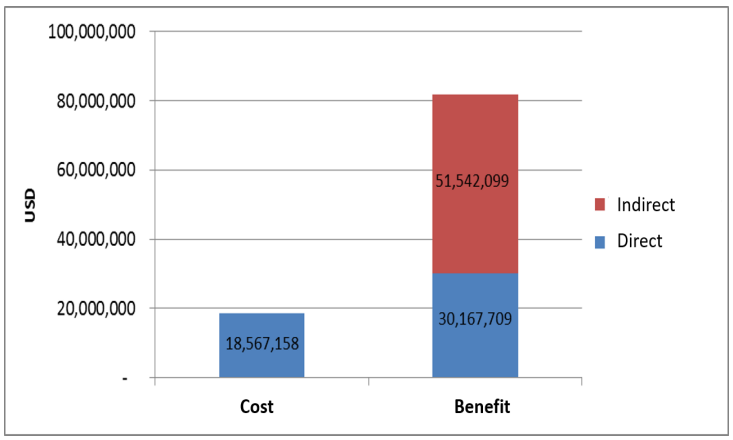

Figure 2: Comparison of Total Cost & Benefit Value

3.2 Financial Feasibility Analysis

The feasibility value parameter is viewed from the value of Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit Cost Ratio (BCR), and Payback Period (PBP). Then a sensitivity analysis is carried out to ensure business certainty in changes in normal conditions. Before calculating the financial feasibility analysis of the project, it is necessary to use the basic assumptions, as follows:

1. Project period of 30 years;
2. Increase in variable cost 5% per year (Employee salaries and material prices for operational needs);
3. Income Tax is 2%;
4. Discount Rate of 12.75%.

The value of NPV, IRR, BCR, and PBP can be calculated by compiling the calculation elements, namely the investment value, the total cost, and the income value. The investment value is the capital or cost component required for the construction of the Bio-CNG Plant in the palm oil mill and modification of the generator set for the PLTD. Based on table 8, the total investment value of the construction of the Bio-CNG plant is 4,415,000 USD.

Table 8: Bio-CNG Plant Investment Cost Component

Type	USD
Biogas system and materials	1,985,000
Civil Work	330,000
Gas Engine 350 Kwe	495,000

Biogas Purification and Bottling capacity: 850 m3/hr	1,240,000
Mechanical/Erection Works	365,000
Total	**4,415,000**

The total cost is the cost incurred for project operations each year after the investment. Both are issued from the procurement of employee salaries and the purchase of operational materials. The component of the total cost value can also be called the variable cost component, which is shown in Table 5. The total of variable cost is 200.000 USD. Whereas, the income value is derived from the sale of Bio-CNG at a price of 0.39 USD. It is known that the annual production of Bio-CNG is 4,852,224 m^3. So, the income value is 1,892,367.36 USD.

The calculation of the financial feasibility analysis is carried out to determine whether the project is feasible or not from a financial perspective. Prior to calculating the basic assumptions, the project is assumed to be 30 years old and a discount rate of 12.75% per year which is the highest standard for Bank Indonesia. From the results of the financial feasibility analysis in table 9, a positive NPV value of 4,412,295 USD, which indicates that the project is feasible to run. Radiks Purba (1997) states that if the NPV value is more than zero (positive NPV), it means that the benefits are greater than the costs and investment, so the project is favorable. The payback period is in the 6th year. The IRR value is 23.9% higher than the discount rate of 12.75%. This means that the project is feasible and safe to run if there is an increase in the discount rate due to rising inflation and others. The BCR value also shows a positive value of more than 1, meaning that the profit or benefit during the technical-economic life of the project is greater than the costs incurred, so this project is feasible to run.

Table 9: Components of Analysis of Financial Studies

Year	Project Year	Total Revenue	Total Cost & Operational	Investment	Income Before Tax	Income Tax	Nett Cash	NCF	DF (12,75%)	NCF PV	Kum NCF PV
2020	1			2.480.000				- 2.480.000	1,271	- 3.152.716	- 3.152.716
2021	2			1.935.000				- 1.935.000	1,128	- 5.334.428	- 5.334.428
2022	0	1.906.233	200.000		1.706.231	476.558	1.229.673	1.229.673	1,000	1.229.673	- 4.104.755
2023	1	1.906.234	210.000		1.696.231	476.558	1.219.673	1.219.673	0,887	1.081.750	- 3.023.005
2024	2	1.906.235	220.000		1.685.731	476.558	1.209.173	1.209.173	0,787	951.164	- 2.071.841
2025	3	1.906.236	231.525		1.674.706	476.558	1.198.148	1.198.148	0,698	835.913	- 1.235.928
2026	4	1.906.237	243.101		1.663.130	476.558	1.186.572	1.186.572	0,619	734.223	- 501.705
2027	5	1.906.238	255.256		1.650.975	476.558	1.174.417	1.174.417	0,549	644.525	142.819
2028	6	1.906.239	268.019		1.638.212	476.558	1.161.654	1.161.654	0,487	565.428	708.247
2029	7	1.906.240	281.420		1.624.811	476.558	1.148.253	1.148.253	0,432	495.703	1.203.951
2030	8	1.906.241	295.491		1.610.740	476.558	1.134.182	1.134.182	0,383	434.261	1.638.211
2031	9	1.906.242	310.266		1.595.965	476.558	1.119.407	1.119.407	0,340	380.136	2.018.347
2032	10	1.906.243	325.779		1.580.452	476.558	1.103.894	1.103.894	0,301	332.477	2.350.852
2052	30	1.906.244	864.388		1.041.842	476.558	565.283	565.283	0,027	15.444	**4.412.295**

3.3 Sensitivity Analysis

Sensitivity analysis is carried out to determine the guarantee of business certainty. In calculating the sensitivity analysis, the parameters that have the greatest impact/most sensitive to changes are selected. From the calculation of the sensitivity analysis of the three parameters will be seen changes to the value of NPV, IRR, and PBP. The growth change values of the three parameters are assumed to be 80%, 90%, 100%, 110%, and 120%. In other words, these three factors decreased by 20% and 10% and increased by 10% and 20%. 100% is a normal condition. The results of the Sensitivity Analysis of the Bio-CNG Project can be seen in table 10.

Table 10: Bio-CNG Project Sensitivity Analysis results

Sensitivity	NPV (USD)			IRR (%)			PBP (year)		
	I	C	R	I	C	R	I	C	R
80%	5,479,181	4.930.238	1,945,008	27.29	24.64	19.07	5	6	10
90%	4,945,738	4.671.266	3,178,651	25.60	24.32	21.83	5	6	8
100%	4,412,295	4,412,295	4.412.295	23.99	23.99	23.99	6	6	6
110%	3,878,852	4,153,324	5.645.939	22.44	23.63	25.73	7	6	5
120%	3,345,409	3,894,352	6.879.582	20.94	23.26	27.16	8	7	5

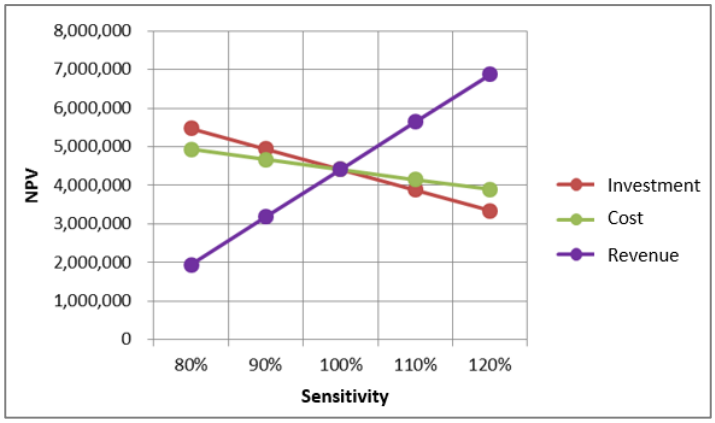

Figure 3: Graph of sensitivity to NPV

Based on the graph of sensitivity to NPV shown in Figure 3, it is found that the revenue parameter has a sensitivity of significant changes to the NPV. This indicates that the components that comprise income have the most sensitive factors to changes. The income component is the quantity of Bio-CNG production and the unit price of Bio-CNG, if there is a significant reduction in production or price reduction, the NPV can be close to 0 or minus which makes the project unfeasible. However, from sensitivity analysis experiments with a change in the growth of 80% or a decrease in value of up to 20%, the NPV is still much greater than 0, so the project is still safe to run.

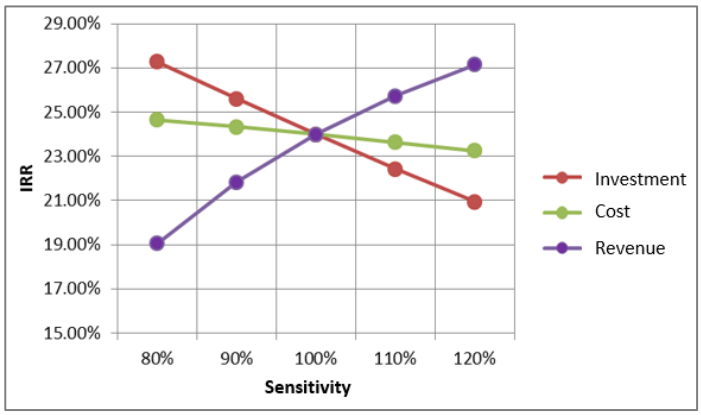

Figure 4:Graph of sensitivity to IRR

The graph of sensitivity to IRR in figure 4, shows a change in the value of the parameter resulting in a change in the lowest IRR value, which is 19%. The IRR value is still safe because it is still above the discount rate. Changes in the value of the most sensitive parameter are income, then changes in investment value with a change in value added of 20% make the IRR decrease from the normal value of 24% to 21%. This means that the components in the income and investment parameters have the greatest influence on the IRR.

Based on two sensitivity analyzes of the three parameters to changes in NPV and IRR, it shows that the parameter that has high sensitivity is income. This means that the feasibility of the project is highly dependent on the production of Bio-CNG and the market price. The higher the decline in the value of the income component, the lower the guarantee of business certainty. To perform other proofs, sensitivity analysis is calculated using the Switching Value method. This method is to perform an analysis by changing the NPV value to 0, then the percentage change in the value of the component that is closest to 0 is the component that is most sensitive to changes in value.

Table 11: Switching Value Analysis

NPV = USD 4,412,295	Initial Value	NPV = 0	% Change Switching Value
1st investment	2,480,000	8,926,748	260%
2nd year investment	1,935,000	9,203,709	376%
O&M	200,000	832,925	316%
Bio-CNG Production	4,852,224	2,385,275	-51%
Bio-CNG Price	0.39	0.19	-52%
Discount Rate	12.75%	31.39%	146%

The result of switching value analysis by changing NPV = 0, In the table 11 shown that the most sensitive component is the quantity of Bio-CNG production. Second, the sensitive component is the price of Bio-CNG. Switching value is a way to find the most sensitive variable by changing the NPV to 0, meaning that during the BEP (Break-Even Point) project, what is the value of the component at that time. The percentage of change that is at least or close to zero is the most sensitive component so that changes in the value of that component will greatly impact the feasibility of the project.

In addition to finding the most sensitive components, sensitivity analysis is also used as a factory or company operational control. So, the analysis of the switching value method gives the same results as the sensitivity analysis method with changes in growth. In this project, revenue is the parameter that has the highest sensitivity, where this revenue component consists of the quantity of Bio-CNG production and the price of Bio-CNG.

4. Conclusion and Recomendation

Based on the calculation of the cost and benefit analysis show that the NPV value is greater than 0 which is 4,412.295 USD. The IRR value is greater than the discount rate (12.75%), which is 23.99%, and the payback period is 6 years. So, the project to utilize POME into Bio-CNG as a substitute for HSD fuel in PLTD is feasible to run. The results of the sensitivity test showed that the variables that had the most influence on changes in NPV were the production of Bio-CNG and the price of Bio-CNG. If these two variables are not secured, it will reduce the feasibility of Bio-CNG as a substitute for HSD fuel in PLTD. The recommendations that can be given to stakeholders are:

1. The government, through the Ministry of Energy and Mineral Resources, must provide more socialization and research on the development of Bio-CNG, in order to create a Bio-CNG market in Indonesia.
2. The Ministry of Energy and Mineral Resources must make regulations related to Bio-CNG, in particular determining the selling price of Bio-CNG. Based on the sensitivity analysis, the price component of Bio-CNG is one of the most sensitive.
3. There needs to be encouragement from the government to support PLN in substituting fossil fuels for EBT by making cooperation programs with the private sector or state-owned enterprises.
4. Further research is needed for the use of Bio-CNG with other technologies and pipeline networks.

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