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The Association of Financial Inclusion and Multidimensional Energy Poverty in Indonesia

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Abstract

Financial service could reduce household energy poverty through fund transfer to encourage the ability to access modern energy. This study investigate the role of financial inclusion on household energy poverty in Indonesia. The energy poverty variable is measured by using multidimensional approach with five dimensions and six indicators which are cooking fuels, indoor pollution, lighting, ownership of household appliances, and supporting equipment for basic services such as education, entertainment, and communication. Financial inclusion is measured by using multidimensional approach based on household accessibility to financial institution such as banking, credit, and insurance services. Linear Probability Model (LPM) and Probit model was used to investigate the association between financial inclusion and energy poverty. The result finds that financial inclusion has a negative association with household energy poverty. It implicates strategy for reduce energy poverty by increase financial access such as bank agents, especially in areas which far from banks.

Keywords:

deprivation; financial inclusion; energy poverty; multidimensional energy poverty index

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INTRODUCTION

Ensuring the availability of affordable, sustainable, and modern energy is one of the important agendas in the Sustainability Development Goals (SDGs). This is because energy plays an important role in the development process. In household sector, energy is an important element which supports daily activities such as lighting, cooking, and transportation. However, several countries in the world still experience energy poverty. In 2016, around 1.1 billion people (around 14 percent of the world's population) lived without electricity access and more than 670 million people are predicted to live without electricity access by 2030. About 90 percent of them are in Sub-Saharan Africa and Developing Asia, and 85 percent of them live in rural areas. In addition, more than 2.8 billion people do not have access to modern energy for cooking. The International Energy Agency (2017) also predicts that around 2.3 billion people will still experience a lack of access to clean energy by 2030. As one of the second largest coal exporting countries and the fifth largest natural gas exporters in the world, Indonesia's energy poverty condition still needs more attention. In 2016, 41 million people lived without electricity access, and around 97 million people still used traditional energy for cooking. Compared to other countries such as Malaysia and China, the energy poverty condition in Indonesia is still alarming.

Lack of access to modern energy, especially for cooking fuel, is something that could not be ignored because it indicates a risk threatening health conditions. This is because household air pollution (HAP) caused by residues from traditional energy burning such as firewood and kerosene in the house that is not accompanied by good ventilation will cause the risk of acute respiratory infections (ARI) such as pneumonia, bronchiolitis, tracheobronchitis, and laryngitis, especially for household members under five year and the elderly. According to World Health Organization (WHO), indoor pollution has been the cause of 1.3 million deaths per year in low-income countries and the sixth highest risk factor for death (Eguino, 2015).

Lack of access to modern energy services, unreliable services, and unaffordable access indicate energy poverty. The study done by Pachauri & Spreng (2011) expands the concept of energy poverty by categorizing it into two aspects which are availability and affordability. In addition, household access to modern energy can also be categorized into physical access and economic access. From the aspect of affordability perspective, the ability of households to access modern energy is influenced by household income. Based on the Energy Ladder theory, as income increases, households are expected to abandon traditional energy use and switch to modern energy. Thus, it can be hypothesized that the higher household income, the smaller the chance of households experiencing energy poverty. Several studies have found that household income significantly affects gas consumption (Mashoodi, 2018), electricity consumption (Esmailimoakher et al., 2016), and total energy consumption (Khandker et al., 2012; Rahut et al., 2017; Rao & Reddy, 2007).

From the economic aspect (affordability), the problem of income inequality between regions in developing countries, such as Indonesia, causes energy poverty

in some areas. This is supported by the study result by Saputri (2020) which found that income is a determinant variable that significantly influences and has the greatest correlation with household energy poverty status. The study found that higher household income, the lower the probability of the household experiencing energy poverty. These results are in line with the result study of Sharma et al. (2019) which found that income has a negative impact on the probability of households experiencing energy poverty.

Currently, several studies have begun to focus on issue about the role of financial sector development as an effort to overcome poverty, including energy poverty. Financial sector development can affect the energy poverty through two channels which are the consumption (demand) and production (supply) lines (Nguyen et al., 2021). In theory, the development of financial sector is a channel for fund transfer and financial services that have a significant impact on energy poverty. From the consumption side, the development of financial sector could reduce energy poverty through fund transfer and provision to public to encourage the ability to access modern energy. Meanwhile, from the production side, financial development can provide funds for energy production activities which support energy supply.

Most studies on energy poverty are focused more on measurement issues and determinant factors, not many empirical studies have analyzed the impact of financial sector development on energy poverty. Using three dimensions of financial development (financial access, financial depth, and financial efficiency) and two sectors of financial development (institutional sector and market sector), Nguyen et al. (2022) prove that financial development plays a role in reducing energy poverty in low and middle-income countries as indicated by the increasing proportion of the population accessing electricity and modern fuels, both in rural and urban areas. In addition, the dimension of access to financial institutions has proven to be most important dimension in reducing energy poverty compared to other dimensions. The disappearance of household barriers to access financial services provided by financial institutions (banks, insurance companies, funding companies) becomes a pathway of fund transfer and provision to the community which will increase their ability to access energy. At household level, several studies also have analyzed the role of household access to financial services (such as saving, credit, and insurance) called as financial inclusion on household energy poverty. Koomson & Danquah (2021) prove that financial inclusion has a negative impact on multidimensional energy poverty in Ghana. By using different poverty measures, studies by Koomson & Danquah (2021) and Dogan et al. (2021) also prove that financial inclusion significantly reduces energy poverty in Turkey.

Several empirical studies on energy poverty in Indonesia so far have been conducted to determine the determinants of household access to modern energy, one of which is electrical energy (Zuhri et al., 2019), and the determinants of energy poverty (Saputri, 2020); analyze the impact of price change (Renner, et al., 2019); and exercise at the effectiveness of the LPG conversion program (Andadari et al., 2014). Another study was conducted to measure the impact of energy poverty on

welfare (Sambodo and Novandra, 2019). Studies on energy poverty in Indonesia also used single indicator such as the ratio of energy expenditure (Andadari et al., 2014; Saputri, 2020) or minimum energy consumption (Sambodo and Novandra, 2019). There was no empirical study that analyzed the role of financial inclusion on energy poverty in Indonesia and there are not many studies using a multidimensional approach in measuring energy poverty in Indonesia. Hence, it raises a question of whether or not the relationship between financial inclusion and multidimensional energy poverty in the context of Indonesia.

Based on the arguments above, this study aimed to investigate the relationship between financial inclusion and energy poverty in Indonesia. As a contribution, this study can be claim as the first empirical study to investigate the role of financial inclusion on multidimensional energy poverty in the Indonesian context. The results of this study are expected to complement the literature study on energy poverty in Indonesia. This study result is also expected to reference the government's consideration of financial inclusion strategy to overcome energy poverty problem.

METHODS

This study investigate how the condition of household energy poverty in Indonesia with a multidimensional approach using the Multidimensional Energy Poverty Index (MEPI). Furthermore, this study analyzes the role of financial inclusion on household energy poverty in Indonesia. We suspect the endogeneity from the potential reverse causality between household financial inclusion energy poverty status. The endogeneity is suspected to produce downward bias or inconsistent in the estimated relationship between financial inclusion and energy poverty. Instrumen variable is needed to overcome the endogeneity. Because of instrument variable (IV) availability, this study focus to analyzes the association of household financial inclusion and energy poverty. The initial hypothesis of this study is that financial inclusion has a negative association with household energy poverty in Indonesia. We explore yearly data from the National Socio-Economic Survey (SUSENAS) from 2016 to 2019 and the 2018 Village Potential Data Collection (Podes) conducted by the Badan Pusat Statistik (BPS). SUSENAS is a national-scale survey that provides information on the socio-economic characteristics of households, while Podes is a census at village (or equivalent) level, which provides information on socio-cultural potentials, economic, infrastructure conditions, and other important information.

This study uses the household energy poverty status variable as the dependent variable and the household financial inclusion status as the independent variable of interest. Meanwhile, the control variables in this study include the characteristics of head of household (age, gender, marital status, education, and employment status), household characteristics (household size and household location), and the dummy variable of electricity and modern energy availability, such as LPG.

Measuring Energy Poverty

Energy poverty status is measured by a multidimensional approach, where the measurement uses the concept of deprivation. Multidimensional Energy Poverty Index (MEPI) is composed of five dimensions and six indicators (Koomson & Danquah, 2021). These five dimensions are fuel for cooking (modern fuels & indoor pollution), lighting sources (electricity access), household appliances ownership (refrigerator ownership), educational support devices (laptops/computers), and telecommunications equipment such as mobile phones (see Table A1 for indicators and weights).

$$d_{i\text{ energy}} = w_1 I_1 + w_2 I_2 + w_3 I_3 + w_4 I_4 + w_5 I_5 + w_6 I_6 \quad (1)$$

Energy access deprivation score is calculated based on Equation 1, where I_k is the k -th indicator of the multidimensional energy poverty measurement and w_k is the weighting for each indicator (k -th indicator), with the condition that $\sum_1^k w_k = 1$. Meanwhile, $d_{i\text{ energy}}$ is the energy access deprivation score of the i -th household. The energy access deprivation score ($d_{i\text{ energy}}$) for each household will range from 0 to 1.

$$I_k = \begin{cases} 0, & \text{if household does not experience deprivation for the } k - \text{th indicator} \\ 1, & \text{if household experiences deprivation for the } k - \text{th indicator} \end{cases}$$

To determine the household energy poverty status, a certain *cut-off* or threshold is set. Referring to the study of Mendoza et al. (2019), the *cut-off* value used in this study is 0.5. Based on *cut-off* value, if a household has a score more than 0.5 then the household is categorized as poor and if it is less than 0.5 then it is categorized as not energy poor.

Multidimensional Energy Poverty

At the regional level, the Multidimensional Energy Poverty Index (MEPI) is the product of the headcount ratio (H) and intensity (A) (see Equation 2). The headcount ratio (H) measures the proportion of households that are in the energy poor category, while the intensity (I) measures how poor the households are in the energy poor group.

$$MEPI = H \times A \quad (2)$$

Headcount ratio (H) is the proportion of households classified as energy poor or the number of households classified as energy poor (q) divided by all households in an area (n). To get the headcount ratio (H), it can be calculated using Equation (3), where q is the number of households that fall into the poor category and n is the total number of households in an area. Meanwhile, intensity (A) is the average value of energy deprivation scores in energy poor households. To calculate the intensity (A) value, the formula in Equation 4 is used, where $C_i(k)$ is the value of energy deprivation experienced by energy poor households and k is the predetermined *cut-off* value.

$$H = \frac{q}{n} \quad (3)$$

$$A = \frac{\sum_{i=1}^n C_i(k)}{q} \quad (4)$$

Measuring Financial Inclusion

There are three dimensions used to build a multidimensional household financial inclusion index which are ownership of access to banking services (such as saving accounts), access to loan or credit services (except credit from individuals), and access to insurance services. Each dimension is equally weighted 0,33 (see Table A2).

The financial access deprivation score can be calculated based on Equation 5, where I_k is the k -th indicator of the multidimensional financial inclusion measurement, which is between 0 and 1, and w_k is the weighting for each indicator (k -th indicator), provided that $\sum_1^k w_k = 1$. While $d_{ifinancial}$ is the financial access deprivation score of i -th household. The financial access deprivation score ($d_{ifinancial}$) for i -th household will range from 0 to 1.

$$d_{ifinancial} = w_1 I_1 + w_2 I_2 + w_3 I_3 \quad (5)$$

$$I_k = \begin{cases} 0, & \text{if household does not experience deprivation for } k - th \text{ indicator} \\ 1, & \text{if household experiences deprivation for } k - th \text{ indicator} \end{cases}$$

To determine the financial inclusion status of a household, a certain *cut-off* is set. With reference to the study done by Churchill & Smyth (2020), the *cut-off* value used is 0.5. Based on the *cut-off* value, if the household has a financial access deprivation score more than 0.5 then the household is categorized as not inclusive and if it is less than 0.5 then it is categorized as inclusive.

Empirical Methods

In this study, the dependent variable, status of household energy poverty is a binary variable (where 1 = household energy poor, otherwise not). Likewise, the independent variable of interest, namely the status of financial inclusion is also a binary category (1 = inclusive in financial facilities, otherwise not). Therefore, to analyze the role of financial inclusion on household energy poverty, the Linear Probability Model (LPM) and Probit method are used to estimate the baseline model (see Equation 6), where y_i is the latent variable with a value of 1 or 0.

$$En_pov_i = \alpha + \beta Fin_inc_i + \lambda X_i + v_r + \mu_i \quad (6)$$

The probability of a household experiencing energy poverty ($En_pov = 1$) is formulated in Equation 7, where En_pov is status of household energy poverty (where 1 = energy poor, otherwise not). Fin_inc_i is a household financial inclusion status that is in a binary category (1= financially inclusive, otherwise not). X_i is a vector of control variables consisting of the characteristics of head of household (age, gender, education, marital status, employment status), household characteristics variables (number of household members or household size, household location), and a dummy variable for the availability of electrical energy and modern fuels, such as LPG.

$$P(En_pov = 1|X_i) = \gamma + \delta Fin_inc_i + \rho X_i + \lambda_r + \varepsilon_i \quad (7)$$

RESULT AND DISCUSSION

Descriptive statistical analysis

The Multidimensional Energy Poverty Index (MEPI) shows the condition of multidimensional energy poverty in a region. MEPI ranges from 0 to 1. The higher MEPI value, the greater proportion of energy poor households or more severe the level of energy poverty in an area. Thus, what distinguishes MEPI from other energy poverty measurement is that MEPI not only measures the proportion of households in an area that fall into the energy poor category but also measures how severe the poverty status of a household in the energy poor group is.

Based on Table 1, the Multidimensional Energy Poverty Index (MEPI) for the last four years, from 2016 to 2019, has decreased significantly. MEPI in 2016 was 0.178, decreased to 0.117 in 2019. By using different weights but with the same *cut-off* value, Indonesia's MEPI is relatively lower than the MEPI of neighboring countries, such as the Philippines. Indonesia's MEPI in 2016 was 0.178, while the Philippines' MEPI was 0.371 (Mendoza et al., 2019).

Based on Table 1, the Multidimensional Energy Poverty Index (MEPI) for the last four years, from 2016 to 2019, has decreased significantly. MEPI in 2016 was 0.178, decreased to 0.117 in 2019. By using different weights but with the same *cut-off* value, Indonesia's MEPI is relatively lower than the MEPI of neighboring countries, such as the Philippines. Indonesia's MEPI in 2016 was 0.178, while the Philippines' MEPI was 0.371 (Mendoza et al., 2019).

Table 1. Indonesia Multidimensional Energy Poverty Index (MEPI), 2016 – 2019

Indicator	2016	2017	2018	2019
Headcount (H)	0.257	0.213	0.201	0.173
Intensity (A)	0.692	0.689	0.683	0.679
MEPI (H x A)	0.178	0.146	0.137	0.117
Observation (household)	291,414	297,276	295,155	315,670

Source: SUSENAS 2016-2019, processed.

The large proportion of households that fall into the energy poor category or headcount ratio (*H*) over the last four years has also decreased, from 0.257 in 2016 to 0.173 in 2019. This means that the number of households in the energy poor category compared to the total number of households in Indonesia experienced a significant decrease from 25.7 percent in 2016 to 17.3 percent in 2019. This condition shows that one fifth of Indonesia's population still experiences energy poverty.

The downward trend for the proportion of households with energy poor status during 2016-2019 with a multidimensional approach is in line with the results of a study done by Saputri (2020), which measures the proportion of energy poor households using the consumption approach from Modi et al. (2005) and Sambodo & Novendra

(2019). The calculation of proportion of energy poor households using the amount of energy consumption indicator as a benchmark to determine household energy poverty status, also shows a downward trend from 2016 to 2019. The results of study done by Saputri (2020) found that the proportion of energy poor households using the approach done by Sambodo & Novendra (2019) showed a decline from 18 percent in 2016 to 11.5 percent in 2019. Meanwhile, the proportion of energy poor households using approach done by Modi et al. (2005) decreased from 13.5 percent in 2016 to 9 percent in 2019. In general, the calculation for the proportion of households with energy poor status calculated using a multidimensional approach shows different results and it is relatively higher than the calculation done by Modi et al. (2005) and Sambodo & Novendra (2019).

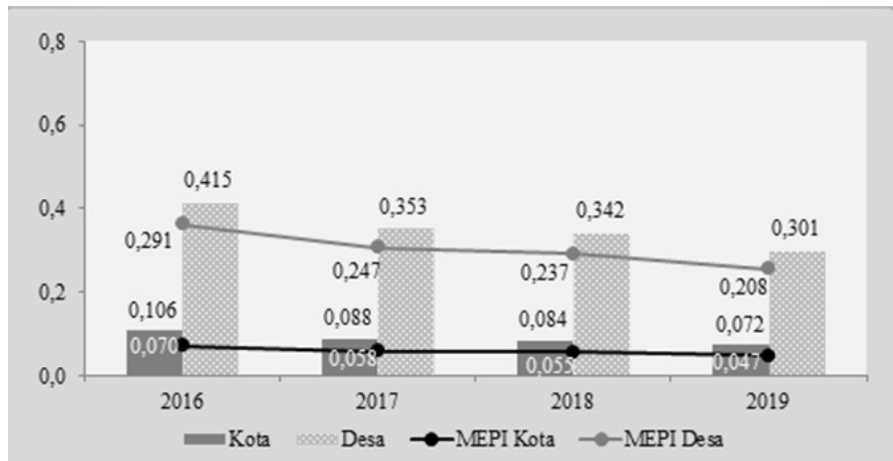
Then, based on the intensity value (I), the average deprivation score of energy poor households in Indonesia also decreased, from 0.692 in 2016 to 0.679 in 2019. This value shows that the average of deprivation score in the energy poor household group decreases and approaches the threshold value. The level of deprivation experienced by households has decreased, indicating that households in Indonesia have better access to modern energy and basic household services. When compared with the intensity (I) value in neighboring countries, such as the Philippines, the intensity (I) value in Indonesia in 2016 was relatively higher. The value of intensity (I) in the Philippines in 2016 was 0.533 (Mendoza et al., 2019) while the value of intensity (I) in Indonesia was 0.692. Although the proportion of energy poor households in the Philippines is higher than in Indonesia, energy poor households in the Philippines have relatively better access to modern energy and basic household services than energy poor households in Indonesia.

The calculation of the aggregate energy poverty index nationally often disguises the disparities occurring between regions. Therefore, the calculation of the energy poverty index in this study is carried out based on the status of rural and urban areas. Although the energy poverty index at the national level is relatively low and has decreased from year to year, the energy poverty index in rural and urban areas shows a fairly severe inequality. Figure 1 shows the difference in the energy poverty index in urban and rural areas. In 2016, the energy poverty index in urban areas was 0.070 while the energy poverty index in rural areas was 0.291. The disparity in the energy poverty index is contributed by the large proportion of energy poor households which are unequal between urban and rural areas. The proportion of energy poor households in urban areas was 10.6 percent, while the proportion of poor households in rural areas in 2016 was 41.5 percent. The high trend of energy poverty in rural areas is in line with the findings of a study by Khandker et al. (2012) which compares the condition of energy poverty between cities and villages in India.

The high proportion of energy poor households in rural areas in Figure 1 shows that most of the population in rural areas still lack access to modern energy as well as access to basic household services. From an economic perspective, the lack of access to modern energy in rural areas could be due to the low income per capita

of households in rural areas. Economic activities in rural areas, which generally rely on the agricultural sector, make household incomes in rural areas not as high as those in urban households, which generally rely on the industrial or service sectors. In addition, infrastructure development in rural areas which is not as advanced as in urban areas also makes rural households unable to access modern energy as easily as households in urban areas.

Figure 1. Proportion of Energy Poor Household and Multidimensional Energy Poverty Index (MEPI) by Rural and Urban Areas, 2016 – 2019

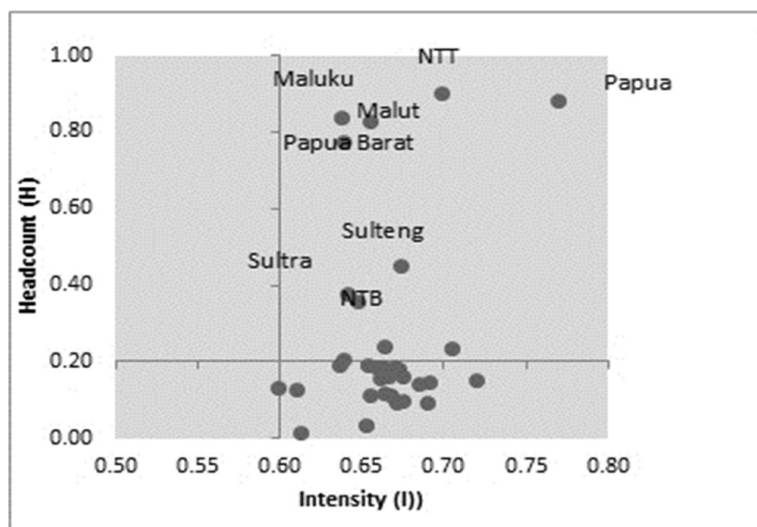


Source: SUSENAS 2016-2019, processed.

Furthermore, the calculation of the Multidimensional Energy Poverty Index (MEPI) in Indonesia is also carried out at the provincial level. The higher the MEPI value, the higher the proportion of households categorized as energy poor or the higher the level of energy deprivation experienced by households in an area. The higher level of energy deprivation indicates that households do not have access or are hampered in accessing modern energy. By province, the distribution of the multidimensional energy poverty index (MEPI) tends to be higher in the eastern part of Indonesia. In 2019, the three provinces with the highest energy poverty index scores were Papua (0.676), East Nusa Tenggara (0.629), and North Maluku (0.542). Meanwhile, the three provinces with the lowest energy poverty index scores are DKI Jakarta (0.007), East Kalimantan (0.020), and Banten (0.061).

Next, Figure 2 presents the condition of the province based on the percentage of the population experiencing energy poverty (H), and the intensity of energy poverty (I). Although the province of East Nusa Tenggara has the second highest poverty index with the highest percentage of energy poor, the intensity of poverty is relatively low compared to other provinces such as Papua, West Sulawesi and West Kalimantan. Likewise, even though West Kalimantan has a low percentage of energy poor households (which is lower than the national headcount), the intensity of poverty is relatively very high. This condition needs to get more attention from local government.

Figure 2. Distribution of Headcount and Intensity by Province 2019



Lack of access to modern energy and basic household services in several provinces in Indonesia, especially in eastern Indonesia, can be caused by several reasons. From the physical aspect or availability, the lack of progress in development in eastern Indonesia has resulted in the unavailability of adequate infrastructure to distribute modern energy to these areas. From the economic aspect or affordability, the problem will be the household income inequality. Households with low incomes tend not to have the ability to access modern energy to fulfill basic services.

There are several approaches used to test whether financial inclusion has an association with household energy poverty conditions, such as the Linear Probability Model (LPM) and Probit. Based on Equation 6, taking into account that the research objective is to investigate the association between the independent variables and the dependent variable, the Linear Probability Model (LPM) regression model can be used to estimate the association of financial inclusion and household energy poverty with the assumption that the model is linear. Because of the characteristics of the LPM regression model are the same as linear regression model, the Ordinary Least Square (OLS) method can be used to estimate the Equation 6.

The empirical result from OLS regression are presented in Table 2 (see Column 1 and 2). Table 2 show that the significance value of F-test obtained is $0.000 < 0.05$, which means that all independent variables together have a significant association with the dependent variable. Household financial inclusion status has a negative and significant association with energy poverty status with a coefficient of -0.088 . This means that households are inclusive of financial services, the tendency to be poor in energy has decreased by 0.088 or 8.8 percent. In addition to financial inclusion, the characteristic of the head of household such as age, education, employment status, position in work, and household size also have significant association with household energy poverty. Another factor that also has significant association with household energy poverty status is the location of the household and the availability of modern energy access. Households in

rural areas have a higher vulnerability to energy poverty than households in urban areas. The availability of access to electricity and modern fuels, such as LPG, in an area is an important factor which determines the probability of a household being categorized as energy poor.

Table 2. Estimation Results of Financial Inclusion Impact on Household Energy Poverty (*Baseline Model*)

En_pov	Coefficient (Robust)					
	LPM (OLS)		Probit			
	No Control	With Control	No Control	With Control	Marginal effects no control	Marginal effects with control
	(1)	(2)	(3)	(4)	(5)	(6)
Fin_inc	-0.199*** (0.003)	-0.088*** (0.002)	-0.594*** (0.010)	-0.398*** (0.08)	-0.194*** (0.003)	-0.085*** (0.002)
Age		0.049*** (0.003)		0.117*** (0.016)		0.025*** (0.003)
Gender		-0.007** (0.003)		-0.054*** (0.013)		-0.011*** (0.003)
Marital status		-0.010*** (0.003)		-0.048*** (0.013)		-0.010*** (0.003)
Education		-0.015*** (0.000)		-0.078*** (0.001)		-0.0017*** (0.000)
Employment status		-0.006*** (0.003)		-0.076*** (0.013)		-0.016*** (0.003)
Position in work		0.033*** (0.002)		0.257*** (0.014)		0.042*** (0.002)
Household size		-0.025*** (0.002)		-0.097*** (0.007)		-0.020*** (0.002)
(Household size) ²		0.002*** (0.000)		0.008*** (0.001)		0.002*** (0.000)
Electricity access		-0.004 (0.010)		-0.946*** (0.161)		-0.201*** (0.034)
LPG access		-0.210*** (0.008)		-0.675*** (0.023)		-0.143*** (0.005)
Location		-0.130*** (0.004)		-0.598*** (0.017)		-0.127*** (0.003)
Provincial fixed effect	No	Yes	No	Yes	No	Yes
Constant	0.391***	0.373***	0.278***	0.940***		
Observations	294,426	294,426	294,426	294,426	294,426	294,426
R ² /Pseudo R ²	0.0483	0.3870	0.0407	0.3626		
Prob (F-test/ Chi ²)	0.000	0.000	0.000	0.000		

*, **, *** indicates significance at the 10%, 5% and 1% levels

In line with the results in the LPM model, the Probit model also shows that financial inclusion has a negative association with household energy poverty. Besides financial inclusion, the characteristics of the head of the household such as age, gender, education, employment status, household size, and household location also have significant association with household energy poverty. The age of head of household has a positive and significant association with multidimensional energy poverty. These results are in line with the results of a study by Saputri (2020) which states that age of head of household is positively correlated with energy poverty as measured by the basic energy consumption approach by Modi et al., (2005). As the age of head of household increases, they will spend more time at home and less time working, which results in a decrease in household income, therefore reducing the ability of households to access modern energy and basic household services. What is interesting is the household size has a negative and significant association with energy poverty. This means that households with more members have a lower probability of being categorized as energy poor. These results are in line with the results of a study by Saputri (2020). However, the squared household size is positively related to household energy poverty. This means that to a certain extent, the greater household size, it increases the vulnerability of household to be categorized as energy poor. More number of household members who are not productive or do not work, the greater burden that must be borne which causes a decrease in the level of household welfare. To determine the magnitude financial inclusion and household characteristics effect on probability of household energy poverty, it is necessary to calculate the marginal effect value. Based on Table 2 Column 6, the marginal effect value of financial inclusion is -0.085 . This means that tendency of households which is financial inclusive to be categorized as energy poor condition is reduced by 0.085 or 8.5 percent.

In addition to financial inclusion, characteristic of head of household, such as age, gender, marital status, education, employment status, household size, and location, have significant association with household energy poverty status. The coefficient for age of head of household shows a positive and significant sign. The higher age of head of the household, the greater the vulnerability to experience energy poverty. One year increase in age will increase the probability of a household to be categorized as energy poor by 0.025 or 2.5 percent. The gender of head of household is negative and significant at -0.011 , meaning that the probability of female-headed household to be categorized as energy poor is lower than male-headed households. These results are in line with the results of study by Saputri (2020), which measures energy poverty using the consumption indicators by using the same approach done by Modi et al., (2005) and Sambodo & Nevandra (2019). They finds that male-headed households tend to have higher probability to be in energy poor condition.

Table 3. Estimation Results of Financial Inclusion Impact on Household Energy Poverty by Urban-Rural

En_pov	Coefficient (Robust)					
	OLS (Total)		OLS (urban)		OLS (rural)	
	No Control	With Control	No Control	With Control	No Control	With Control
	(1)	(2)	(3)	(4)	(5)	(6)
Fin_inc	-0.199*** (0.003)	-0.088*** (0.002)	-0.095*** (0.004)	-0.062*** (0.002)	-0.186*** (0.004)	-1.07*** (0.003)
Age		0.049*** (0.003)		0.027*** (0.004)		0.055*** (0.004)
Gender		-0.007** (0.003)		-0.003 (0.004)		-0.011** (0.004)
Marital status		-0.010*** (0.003)		-0.008*** (0.004)		-0.012*** (0.004)
Education		-0.015*** (0.000)		-0.011*** (0.000)		-0.018*** (0.000)
Employment status		-0.006*** (0.003)		-0.000 (0.003)		-0.021*** (0.004)
Position in work		0.033*** (0.002)		0.013*** (0.002)		0.052*** (0.003)
Household size		-0.025*** (0.002)		-0.017*** (0.002)		-0.026*** (0.003)
(Household size) ²		0.002*** (0.000)		0.001*** (0.000)		0.002*** (0.003)
Electricity access		-0.004 (0.010)		-0.128*** (0.015)		-0.002 (0.010)
LPG access		-0.210*** (0.008)		-0.135*** (0.0015)		-0.238*** (0.009)
Location		-0.130*** (0.004)		-		-
Provincial fixed effect	No	Yes	No	Yes	No	Yes
Constant	0.391***	0.373***	0.187***	0.422***	0.488***	0.365***
Observations	294,426	294,426	126,467	126,467	294,426	294,426
R ² /Pseudo R ²	0.0483	0.3870	0.0187	0.2879		
Prob (F-test/ Chi ²)	0.000	0.000	0.000	0.000		

*, **, *** indicates significance at the 10%, 5% and 1% levels

The results obtained in this study also support the results of previous studies which state that female-headed households have a major contribution to modern energy consumption, especially to meet cooking needs (Alem & Demeke, 2020; Hartono et al., 2020; Sharma et al., 2019). Female have a higher preference in the use of modern

energy sources in household and can be categorized as the main users of energy (Scholz, 2012). The availability of access to electrical energy and modern fuels, such as LPG, has a negative and significant association with the probability of households to be categorized as energy poor. Households, which live in areas where electricity and LPG are available, have a lower probability to be categorized as energy poor household. Overall, using both of LPM model and Probit model, the coefficient of financial inclusion are relatively higher than other factors such as characteristics of head of household and household size. The magnitude of impact of financial inclusion on energy poverty is relatively stronger when compared to the household characteristics factor but lower than the geographical location factor and the dummy variable of energy availability. The result shows that financial inclusion is one thing which needs to be considered in efforts to reduce energy poverty. These results are in line with Koomson & Danquah (2021) and Dogan et al. (2021).

The analysis of financial inclusion impact on energy poverty based on geographic location needs to be performed to see the effect in each location. Table 3 presents the different parameter in estimation results of financial inclusion association with energy poverty in rural and urban households (Columns 4 and 6). Based on the results, household financial inclusion status has a significant and negative association with energy poverty status in urban and rural areas. However, the magnitude is different in rural and urban areas. The parameter coefficient of financial inclusion in rural households (Column 6) was larger than urban households (Column 4), even national households (Column 2). This means that households which are financially inclusive and live in rural areas have a greater reduction of the probability to be categorized as energy poor. Therefore, the government could consider increasing financial inclusion in rural areas to reduce the number of energy poor households, for example by opening bank agents or increasing people knowledge about financial products.

In addition to financial inclusion, the characteristics of head of household (gender, marital status, education, employment status, and household size) have significant impact on energy poverty. Another factor that significantly influences household energy poverty status, both in rural and urban areas, is access to modern energy in the form of LPG. With easy access to LPG, households in rural and urban areas have a lower probability to be categorized as energy poor households.

Furthermore, besides analyzing the different on rural and urban areas, this study also analyzes the association of financial inclusion on energy poverty based on Java and non-Java regions. The result is shown in Table 4. Based on the parameter coefficients of financial inclusion, both in Java and non-Java, financial inclusion has a significant and negative impact on energy poverty. For Java region, the magnitude of impact of financial inclusion is 0.070 while the non-Java region is 0.096. These results indicate that household financial inclusion contributes to reducing the probability of household energy poverty in both Java and non-Java areas, but the reduction is greater in non-Java areas. This means that the government can consider the policy to increase financial inclusion in non-Java regions to reduce the probability of households to be categorized

energy poor in those regions. Overall, this study found evidence that financial inclusion have a negative and significant association with household energy poverty. However, some noticeable limitations were also highlighted in the present study. A better survey by considering endogeneity from reverse causality in relationship between financial inclusion and energy poverty, is needed for future study.

Table 4. Estimation Results of Financial Inclusion Impact on Household Energy Poverty by Java and Non-Java

En_pov	Coefficient (Robust)					
	Total		Java		Non-Java	
	No Control	With Control	No Control	With Control	No Control	With Control
	(1)	(2)	(3)	(4)	(5)	(6)
Fin_inc	-0.199*** (0.003)	-0.088*** (0.002)	-0.164*** (0.004)	-0.070*** (0.003)	-0.207*** (0.004)	-0.096*** (0.002)
Age		0.049*** (0.003)		0.125*** (0.005)		0.016*** (0.004)
Gender		-0.007** (0.003)		-0.003 (0.004)		-0.009** (0.004)
Marital status		-0.010*** (0.003)		-0.024*** (0.005)		-0.028*** (0.004)
Education		-0.015*** (0.000)		-0.014*** (0.000)		-0.015*** (0.000)
Employment status		-0.006*** (0.003)		-0.020*** (0.004)		-0.019*** (0.004)
Position in work		0.033*** (0.002)		0.017*** (0.003)		0.039*** (0.003)
Household size		-0.025*** (0.002)		-0.033*** (0.003)		-0.021*** (0.002)
(Household size) ²		0.002*** (0.000)		0.002*** (0.000)		0.002*** (0.000)
Electricity access		-0.004 (0.010)		-0.539*** (0.018)		0.001 (0.010)
LPG access		-0.210*** (0.008)		-0.042*** (0.0016)		-0.246*** (0.008)
Location		-0.130*** (0.004)		-0.188*** (0.005)		-0.098*** (0.005)
Provincial fixed effect	No	Yes	No	Yes	No	Yes
Constant	0.391***	0.373***	0.250***	0.541***	0.453***	0.529***
Observations	294,426	294,426	95,885	95,885	198,541	198,541
R ² /Pseudo R ²	0.0483	0.3870	0.0492	0.1948	0.0471	0.4175
Prob (F-test/Chi ²)	0.000	0.000	0.000	0.000	0.000	0.000

*, **, *** indicates significance at the 10%, 5% and 1% levels

CONCLUSION

The results of calculating energy poverty using a multidimensional approach which is the Multidimensional Energy Poverty Index (MEPI) show that energy poverty in Indonesia for the last four years has shown a downward trend from year to year. The decreasing value of MEPI indicates that there is a decrease in the proportion of households that are categorized as energy poor as well as reduced deprivation of households in accessing modern energy to meet basic household needs, especially for cooking and lighting. Although the energy poverty index shows a downward trend, the MEPI index based on geographical location (urban and rural) still shows a significant difference. The proportion of energy poor households in rural areas is relatively higher than the proportion of energy poor households in urban areas.

Based on estimation results of financial inclusion impact on energy poverty, it is known that in general, financial inclusion has a significant negative association with energy poverty. This means that financial inclusion is contribute to reduce the vulnerability of households experiencing energy poverty. If analyzed based on household location, the magnitude of financial inclusion impact on household energy poverty in rural areas is greater than in urban areas. Based on the area of residence, the relationship between financial inclusion and energy poverty is relatively stronger in Java region.

The results of this study could be an important note for policy formulation related to energy poverty. The government needs to consider financial inclusion instruments to reduce energy poverty in rural and non-Java areas. The alleviation of energy poverty is not only pursued by increasing the physical availability of modern energy but can also be done through increasing the affordability of households, one of which is through financial inclusion. The low level of financial inclusion, especially in rural and non-Java areas, needs attention. One thing that can be considered to increase household financial inclusion is to increase bank agents, especially in areas which far from banks. This will have an impact on households because it will be easier for them to access financial services.

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Socio-Economic Impact of Financing Facility on Low-income Communities and Developers in Indonesia

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Abstract

Housing financing is one of the essential solutions to make it easier for people to access the need for livable houses. One of the subsidy schemes from the government is the Housing Financing Liquidity Facility (FLPP) by BLU PPDPP. This study focuses on the socio-economic impact of FLPP at the micro level for low-income communities (MBR) and developers. Two econometric approaches are used to analyze: one-way t-tests and linear regression analyses. The analysis results show the impact of FLPP on the micro level for MBR and developers provides a better improvement in welfare. The developer company that distributes FLPP has an increase in welfare from various aspects such as demand for housing units, company image, and company assets. For MBR, there are improvements in terms of income, education, health, work, and other supporting infrastructure.

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INTRODUCTION

Everyone desires a decent house, but often there are still many people who are constrained due to accessibility issues. For most people, poverty is the main obstacle for a person or household to access a decent house. BPS data shows that households with access to adequate and affordable housing only reached 56.5% in 2019 and increased slightly to 59.5% in 2020. The inability of households, especially the poor to access decent housing, can have a wide spectrum of impacts. These impacts not only affect their productivity as individuals and as workers, but also have the potential to keep the poor in the vicious circle of poverty. This condition can also prevent the multiplier effect of the construction of livable houses and other supporting facilities from rolling out in the economic and social fields.

Housing finance support is a crucial service to support the community in accessing the basic needs for livable housing. According to a survey from Bank Indonesia (2021), housing loan facilities (KPR) are the main source of financing for consumers (75.31%) in purchasing residential properties. The importance of housing finance increases when the demand for housing tends to increase with the increase in population (Thompson, 1937) and the inelastic nature of demand (Malpezzi & Mayo, 1987; Tandoh & Tewari, 2016). But, on the other hand, the limited resources, both income and skills possessed by the community, often limit their ability to own a house.

The current orientation of housing and settlement development needs to focus on the problem of low financing. If low sources of financing are not yet available, people who have the ability to buy a house are not helped, especially people who are included in having low incomes. Delaying the purchase of a house makes people lose the opportunity to be able to buy a house and then from time to time due to inflation, their purchasing power decreases with house prices increasing. Thus, the priority of housing must start from improving the demand side to ensure that low-income people can actually have an effective purchasing power for the provision of houses (Juniarko et al., 2012; Liu & Ong, 2021). Therefore, government intervention in the form of subsidized Home Ownership Credit (KPR) using a housing finance assistance scheme is expected to be able to help people get the houses they need and live a more decent life.

One of the subsidy facility schemes offered by the government is the Housing Financing Liquidity Facility (FLPP) managed by the Public Service Agency (BLU) of the Housing Financing Fund Management Center (PPDPP), the Ministry of Public Works and Public Housing (PUPR). This program was launched by the government because of the low purchasing power of the community and the high rate of yearly inflation. People who receive FLPP assistance only need to pay a fixed interest rate of one digit throughout the loan period (fixed rate). FLPP funds originating from the State Revenue and Expenditure Budget (APBN) have the aim of creating cheaper housing finance, so that it is affordable for Low-Income Communities (MBR). This help is realized by housing finance with lower interest rates/margins when compared to market interest rates (People's Housing Regulation No. 3 of 2014).

Low-Income Communities (MBR) understand people who have limited purchasing power. Thus, it is necessary to get support from the government to obtain houses as stated in Law no. 1 of 2011 concerning Housing and Settlement Areas. According to the regulation No. 5/Permen/M/2007, MBR are people with income below two million five hundred thousand rupiah per month. By looking at this, it is difficult for people with this income to get a decent house because they are still struggling with their basic needs.

The urgency of increasing the accessibility to livable houses is partly due to its connection with national strategic projects. The government accelerates projects that are considered strategic and have high urgency for realization in a short time in order to increase economic growth through infrastructure development in Indonesia. This aspect is also in line with one of the sustainable development goals in the SDGs related to sustainable cities and settlements, making housing fulfillment crucial. In particular, the SDGs have a target of ensuring access for all to decent, safe, affordable housing, and basic services, as well as managing slum areas. The government is trying to overcome those challenges by ensuring access to safe and affordable housing, and improving slum settlements in urban areas. Therefore, through the housing finance assistance scheme, in particular FLPP, it is hoped that it will be able to support low-income families in obtaining livable houses and at the same time fulfilling one of the SDGs goals.

Several empirical studies in various countries show the socio-economic impact of the housing facility program in the long term, especially for the vulnerable population. These impacts include more stable children's education, a place to live closer to the workplace, improved health and welfare which have an impact on increasing productivity, connecting low-income communities with better economic opportunities, and encouraging job creation and economic growth (SGS Economics & Planning, 2020; CLPHA, 2018; Johnson & Hurter, 1999; MacDonald et al., 2007). The existence of a housing subsidy facility also provides flexibility for consumers to adjust the allocation of spending and consumption from their income (Laszek, 2013; Van Dijk, 2018; Onyekwelu et al, 2020). The reduced spending allocation for housing finance can be diverted to consumption for other important needs such as health and education.

Other studies mention that the link between housing and the economy and between housing and housing finance finds that the benefits of housing for individuals accrue in large part indirectly through better health, based on improved water and sanitation. Housing also generates large multiplier effects in terms of employment and output (Doling et al, 2013). The relationship between housing market financialization to increased housing (wealth) and social inequalities tend to be inferred from in-depth case studies researching diverse mechanisms in specific (urban) localities. Desmond & Gershenson (2016) and Fields & Uffer (2016) on eviction carousels by rent-seeking landlords in New York and Berlin, or Hulse & Yates (2017) on the mismatch between demand and supply of (urban) rental housing for different income groups in Australia. The research for Western-Europe has nonetheless established an association between housing market financialization and declined affordability of housing for low-income owners and private renters, mainly arising through increased housing costs (Dewilde & De Decker, 2016; Dewilde, 2018;

& World Economic Forum, 2019). Housing unaffordability may eventually spill over to other domains, such as creating financial stress, indebtedness or involuntary relocation to lower-quality properties or unattractive locations.

Housing finance is one of the factors that contribute in the overall economy growth of the country. The role of housing finance as a tool to boost the housing market is proven, especially during the economic crisis such as global financial crisis, pandemic covid-19, and other crises. The relationship between housing finance and housing market is dependent on each other. Expansion in the housing market means that there are more house buyers require financing. A strong housing finance will definitely give a positive impact to the country's economy. Furthermore, the impact of housing financing has an impact on society at all levels.

Economic theory predicts that recipients of public housing facilities will have a change in consumption and a response to the supply of labor. From the beneficiary's perspective, this will translate into changing economic incentives in two ways. First, by influencing the form of budget constraints, namely by obtaining housing facilities which can lead to changes in consumption decisions and labor supply. Second, the acquisition of housing facilities will encourage housing movement, which may bring new benefits and costs such as moving costs, changes in travel costs, changes in access to job opportunities, or social transfers (Van Dijk, 2018). Carozzi et al (2020) said that the UK's Help to Buy (HtB) as one of the housing lending facilities in UK increase construction numbers without affecting prices near the English/Welsh border, an area with less binding supply constraints and comparably affordable housing. HtB also led to bunching of newly built units below the price threshold, building of smaller new units and an improvement in the financial performance of developers.

According to SMF and ITAPS FEM IPB (2019), the direct economic impact of the interest rate subsidy policy (imposition of FLPP) in the housing sector in Indonesia has the largest impact on increasing production in the real estate services sector and residential building sector compared to other simulations. This result shows that the policy of imposing FLPP has effectively increased public accessibility to the housing sector so that in the end it encourages an increase in production in the real estate service sector and the residential building sector. For the community, changes in welfare are based on 6 aspects, namely physic, environmental comfort, independence, psychology, supporting facilities, and the economy. Respondents from the general public experienced changes in welfare after receiving FLPP funding assistance (KemenPUPR & FEM IPB, 2017).

Furthermore, this study focuses on the socio-economic impact of FLPP at the micro level, not only on low-income communities (MBR) as beneficiaries but also on developers as partners who play a role in providing housing. This condition is because the contribution of the housing sector will have a broad multiplier impact. These socio-economics impacts include aspects of income, education, health, quality of life, as well as other sectors such as employment, services, and related industries which are also affected by the construction of houses with all the activities that occurred before and after it.

In providing housing for society, especially for low-income people that is until now, they are still facing financing problems that make it difficult for them to access livable houses. This problem has implications for the insufficiency of their primary needs. Once their primary need is fulfilled, hence they can focus on fulfilling other aspects to improve their welfare such as health, education, and others. FLPP, as one of MBR's housing financing facilities, can potentially enhance MBR welfare. Similarly, developers can potentially increase trust and performance due to channeling FLPP in front of the public, especially for new developers. Therefore, housing financing schemes are essential to maintain to help both MBR and developers improve their welfare.

It is observed that though there are many studies worldwide and in Indonesia on how the housing lending facilities with all schemes have a significant impact to increase economics and welfare. Most of previous studies only analyzed socio-economic impacts at the macro level and MBR. In this study, using primary data from all provinces in Indonesia to analyze the impact of housing financing liquidity facilities (FLPP) by BLU PPDPP, not only for MBR but also for developers as well is a novelty in this study. The objective of this study is to analyze the impact of providing FLPP through BLU-PPDPP at the micro level on various socio-economic aspects for both MBR and developers.

METHODS

Analysis of the impact of FLPP at the micro level was carried out using primary data with data collection through surveys. The survey was conducted online through the Google Form platform on two groups of respondents, namely developers and MBR. The scope of the analysis is at the national level and the sampling of respondent selection is determined purposively. Some indicators that serve as reference for determining sampling include (i) FLPP that has been realized, (ii) proportionality of the number of developers in each province, (iii) proportionality of the number of MBR beneficiaries of the FLPP program between provinces, and (iv) representation of the western and eastern regions of Indonesia.

Data collection was carried out from June to September 2021. The number of developer respondents was 179 and 540 MBR respondents filled in. The distribution of the location of developer respondents who received FLPP was mostly in West Java Province (23 developers), followed by West Kalimantan (19 developers), Central Java (18 developers), South Sumatra (13 developers), and West Papua (12 developers). Meanwhile, MBR respondents came from all Indonesian regions, with representatives from each province. The 5 provinces with the most respondents are West Java (82 people), South Sumatra (61 people), South Kalimantan (49 people), East Java (37 people), and West Kalimantan (31 people).

Econometric models are used to analyze the socio-economic impact of FLPP assistance from BLU-PPDPP. Observations were made at the micro level, namely on developers and MBR who benefited from FLPP. Two econometric approaches were used to analyze the socio-economic impact, namely (1) one-tailed test on developer and MBR

respondent data, and (2) linear regression analysis on MBR respondent data to complete the results of the first analysis.

One-way test

The one-way test is used to answer the question of whether or not there is a change in welfare improvement after getting the FLPP, based on the perceptions of developer and MBR respondents. The questions asked were as many as socio-economic indicators that were observed, including absorption of field workers, absorption of professional workers, highly educated workers, total company assets, number of housing units sold, and company image for developer respondents. Developer respondents chose answers based on a Likert scale of 1-5 with the following explanation:

- 1 = significant decrease
- 2 = decrease
- 3 = similar
- 4 = increase
- 5 = significant increase

Furthermore, the hypothesis of the one-way test for developer respondents is:

$H_0: \mu \leq 3$ (no impact/change for developers)

$H_1: \mu > 3$ (there is an impact for/change to the developer)

As for MBR respondents, the socio-economic indicators used are related to education, health, employment, and income, as well as quality of life which is observed from the access to electricity, clean water, and internet network infrastructure. Respondents chose answers based on a Likert scale of 1-5 with the following explanation:

- 1 = Bad
- 2 = Worse
- 3 = Similar
- 4 = Better
- 5 = Much better

Meanwhile, the hypothesis of the one-way test for MBR is:

$H_0: \mu \leq 3$ (no improvement in welfare)

$H_1: \mu > 3$ (improvement in welfare)

The limitation of using the one-way test is that it only obtains perceptual information from respondents regarding changes/improvements in welfare, but cannot measure the quantity of the observed indicators. Therefore, on the data of MBR respondents, the

econometric approach of linear regression analysis was used to complete the results of the one-way test.

Linear Regression Analysis

The linear regression econometric approach using the ordinary least squares (OLS) method is used to predict the accuracy of the effect that occurs between the independent variable (X) and the dependent variable (Y). This analysis was conducted to identify the factors that influence the socio-economic conditions of MBR on the income aspect of MBR. The proxy used is the monthly average household expenditure.

As for the independent variables in a number of these regression models, there are several aspects that are directly related to the characteristics of FLPP such as the duration of getting FLPP, the value of FLPP installments per month, the distance from the house to the city center, and the duration of the tenor. The model also includes a number of control variables for the characteristics of the respondents, including the number of family members, the occupation of the head of the family, whether or not the husband and wife works, and ownership of motorized vehicles.

The linear regression model in this study is as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + \varepsilon_i \dots (1)$$

where:

Y_i : average household expenditure per month as income proxy (Idr)

X_{1i} : length of time to get the FLPP (Month)

X_{2i} : FLPP monthly installment (Idr)

X_{3i} : distance to the city center (km)

X_{4i} : duration of the installment (year)

X_{5i} : number of family members (person)

X_{6i} : dummy of household head occupation sector. 1 = formal sector, 0 = informal sector

X_{7i} : dummy of whether or not the husband and wife work. 1 = yes, 0 = no (only one)

X_{8i} : dummy of the ownership of motorized vehicles (for transportation). 1 = have, 0 = not

An analysis was also carried out on the sub-sample by disaggregating respondents into two groups based on the average monthly family expenditure (a proxy for income or income) to enrich the results of the analysis on MBR respondents. Tier 1 is the average monthly expenditure of less than Rp. 2 million and Tier 2 is the respondent with the average monthly expenditure of more than Rp. 2 million. Consideration of the use of a threshold of IDR 2 million is because this figure is close to the estimated family poverty line. According to BPS, the poverty line in March 2021 was Rp.472,525/capita/month. Then on average, one Indonesian household has 4 to 5 family members.

RESULTS AND DISCUSSION

Social and Economic Impact of FLPP PPDPP on Developers

This section presents a summary of survey results on FLPP beneficiary developers through BLU PPDPP. There were 179 developers who filled out the online questionnaire. The characteristics of developer respondents can be seen from the length of time the company was founded and the length of time they joined the FLPP program. The developer respondents who distributed the most FLPP were companies that had only been established for less than 10 years about 145 developers (81%). Furthermore, the next largest developer respondents are developers who have been around for 11-25 years (24 developers). Meanwhile, respondents who have been established for more than 25 years were only 10 developers (6%). The duration of the establishment of a development company has more value than a new company related to the credibility and image of the company in the eyes of consumers.

Furthermore, based on the developer's affiliation with BLU PPDPP in distributing FLPP, the most respondents who distributed FLPP in this survey were respondents who started distributing FLPP from 2015 to 2019, which were 124 developers. Meanwhile, companies that have distributed FLPP since 2015 and 2020 were 30 and 25 developers, respectively. Although FLPP is a program that aims to reduce the housing backlog that occurred in 2010 (reaching 13.6 million units); the number of developers who have just started to join in distributing FLPP from 2015 is a follow-up impact of the government's policy regarding the One Million Houses Program for MBR launched in 2015.

Table 1. The Impact of Joining in Distributing FLPP for Developers

No	Indicators	Average	p-value	Conclusions
1	Employment of field workers	3,65	0,000***	After the developer joins the FLPP, there is an increase in the absorption of field workers
2	Professional employment	3,47	0,000***	After developers join FLPP, there is an increase in professional employment
3	Highly educated workers	3,30	0,000***	After developers joined the FLPP, there is an increase in highly educated workers
4	Total company assets	3,69	0,000***	After the developer joins the FLPP, there is an increase in the number of company assets
5	Number of houses sold	3,89	0,000***	After developers joined FLPP, there is an increase in the number of housing units sold
6	Company image	3,96	0,000***	After the developer joined the FLPP, there was an increase in the company's image

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

Table 1 shows the results of the t-test on all observed socio-economic indicators. The results show that there is a significant impact of FLPP on developers at the 1%

level of significance (all the indicators P-value less than 1%). Thus, it can be concluded that the existence of FLPP has an impact in particular in the form of an increase in the absorption of field workers, the absorption of professional workers, the average number of highly educated workers, the number of company assets, the number of housing units sold or under construction, as well as the image of the company.

The length of time a company is founded is certainly one of the considerations for people who want to buy a house. The track record of developing companies building houses with good quality is one of the main considerations for the community. If viewed based on the age grouping of companies that distribute FLPP, development companies in the 11-25 years range on average have a relatively higher perception rating compared to other age groups of companies. Developers in this age range of the company are not considered new or have been around for a while, but they already have experience and a good image from the community. By distributing FLPP, both the company's image and the number of units sold to companies aged 11-25 years have a value of 4.12 which is quite high compared to other indicators. The complete results can be seen in Table 2.

Table 2. Impact of Joining in Distributing FLPP for Developers by Company Age

No.	Indicators	Average (<i>pvalue</i>)		
		0 – 10 year (n=145)	11 – 25 year (n=24)	> 25 year (n=10)
1	Employment of field workers	3,65 (0,001)***	3,79 (0,000)***	3,30 (0,217)
2	Professional employment	3,45 (0,000)***	3,62 (0,001)***	3,10 (0,406)
3	Highly educated workers	3,26 (0,001)***	3,58 (0,002)***	3,20 (0,278)
4	Total company assets	3,66 (0,000)***	3,87 (0,000)***	3,80 (0,043)***
5	Number of houses sold	3,86 (0,000)***	4,12 (0,000)***	3,70 (0,066)*
6	Company image	3,92 (0,000)***	4,12 (0,000)***	4,10 (0,020)**

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

Furthermore, Table 3 shows that the duration of joining FLPP (since 2020) has a relatively higher average perception of the impact of changes compared to companies that have long joined in distributing FLPP. In 2019 and 2020, there was an adjustment in house prices that had not increased for the last 5 years (2014). This condition creates an incentive for companies that have just joined and have received subsidized housing prices that are ready to be marketed to MBR at a fairly high price. The adjustment of the selling price of subsidized houses in 2019 and 2020 which increases by 10 million rupiah is expected to improve welfare for developers and become an incentive for developers to continue to provide subsidized housing for low-income households in order to realize the government's one million houses program.

Table 3. Impact of Joining in Distributing FLPP for Developers based on Length of Joining

No.	Indicators	Average (<i>pvalue</i>)		
		Before 2015 (n=30)	Since 2015 (n=124)	Since 2020 (n=25)
1	Employment of field workers	3,67 (0,008)***	3,61 (0,000)***	3,80 (0,000)***
2	Professional employment	3,50 (0,000)***	3,44 (0,000)***	3,56 (0,000)***
3	Highly educated workers	3,47 (0,007)***	3,26 (0,002)***	3,28 (0,045)***
4	Total company assets	3,70 (0,000)***	3,69 (0,000)***	3,72 (0,000)***
5	Number of houses sold	3,70 (0,004)***	3,92 (0,000)***	3,96 (0,000)***
6	Company image	3,83 (0,000)***	3,98 (0,000)***	4,00 (0,000)***

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

Social and Economic Impact of FLPP PPDPP on Low-Income Communities

In this section, the findings from a survey of low-income communities (MBR) will explain the impact of FLPP obtained on a number of social and economic aspects of MBR. The initial identification of the social and economic impacts of providing FLPP through the PPDPP was analyzed using a one-sample t-test approach. Respondents were asked to rate according to their perspective, how their social and economic conditions were after obtaining the FLPP. The socio-economic conditions in question include income, education, health, employment, as well as several quality of life measures that include access to electricity, access to clean water, and internet infrastructure.

Based on the results of the t-test on the 7 socioeconomic indicators studied in the aggregate, there are improvements in each of these indicators (see Table 4). This condition is indicated by the p-value which indicates the decision to reject H₀, meaning that there is a significant improvement in welfare. Given that the respondents who answered, the scale used in the assessment, and the statistical hypothesis were the same, then the average value of the respondents' answers could be compared and ranked. The higher the average in a socio-economic aspect, the more respondents perceive that there is an improvement in welfare. The highest average was found in family health (3.62), followed by access to electricity (3.61), family education (3.52), family income (3.50), access to clean water (3.47) and internet infrastructure (3.25).

Health aspect increase higher than other indicators because more and better housing increases the welfare of housing occupants, especially in health. Access to affordable housing, therefore, can enable families to spend more on food and health care, which can improve health outcomes. The evidence points specifically to improved health conditions, but there are other benefits such as less stress and increased security, especially for children and women (Doling et al, 2013). Study from Glupker & Ogura (2021); Meltzer & Schwartz (2016) shown that an eased household budget constraint reduces food insecurity and increases spending on health care, with evidence of improved shortterm health. While the long-term impact on education is

also likely, strong evidence exists mostly for families that become able to move to better neighborhoods. Children in low-income families that receive housing subsidies are more likely to have access to an adequate amount of nutritious food and to have a good or excellent health, than children in similar families on the waiting list for housing assistance.

Tabel 4. t-test Result on 7 Socio-economic Indicators from MBR

No.	Social-economic aspects	Average	t value	p- value	Conclusions
1	Income family	3.50	14.93	0.000	There is an improvement in welfare in the aspect of family income
2	Family education	3.52	16.29	0.000	There is a fix well-being in terms of family education
3	Health family	3.62	18.91	0.000	There is an improvement in welfare in the aspect of family health
4	Work family	3.48	15,17	0.000	There is an improvement in welfare in the aspect of family work
5	Access electricity	3.61	18.43	0.000	There is a fix well-being in terms of access to electricity
6	Access to clean water	3.47	11.10	0.000	There is a fix well-being in terms of access to clean water
7	Internet infrastructure	3.25	5.92	0.000	There is a fix well-being in terms of internet infrastructure

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

Affordable housing and the housing lending facilities initiatives typically include funding for new construction or redevelopment. In this study, the existence of FLPP shows that there is an improvement in welfare in the aspect of family income. This result in line with Glupker & Ogura (2021) by using regional multipliers to estimated for every \$1 million spent on construction, there would be a \$1.5 million increase in local economic output, a \$0.5 million increase in labor earnings, and support for 10 jobs in Kent and Ottawa Country, Michigan.

The benefits obtained from FLPP include the existence of this subsidy that allows the community to allocate a larger portion of their income for other purposes such as health, education, and other important needs. This condition of course can have a positive impact on the welfare of the FLPP recipient community, which is reflected in, among other, the opportunity to improve the quality of family education, family work, and has implications for family income. Housing facilities also need to have housing quality standards, for example from the availability of access to electricity and clean water so that they are habitable with a healthy environment.

Data disaggregation is then carried out based on a number of criteria to deepen the results of the socio-economic impact analysis at the micro level. The disaggregation is carried out based on 3 criteria, namely: (i) how long it takes to get the facility,

(ii) the distance from the location of the subsidized house to the city center, and (iii) the level of expenditure (a proxy of income). Based on the old criteria for getting facilities, respondents were divided into three groups, namely respondents who received the earliest FLPP, namely before 2015, respondents who had received FLPP since 2015, and respondents who had received FLPP since 2020. Based on the criteria for distance from home to the city center, respondents were also divided into three groups, namely: the distance to the city center is less than 10 km, the distance to the city center is between 10 and 20 km, and the distance to the city center is more than 20 km. Based on the expenditure level criteria, respondents are divided into two groups, namely Tier 1 (expenditure below IDR 2 million) and Tier 2 (over IDR 2 million per month).

Table 5. t-Test Results based on Disaggregation by Length of Getting Facilities

No.	Socio-Economic Aspects	Average (<i>pvalue</i>)		
		Before 2015 (n=8)	Since 2015 (n=183)	Since 2020 (n=349)
1	Income family	3.75 (0.001) ***	3.52 (0.000) ***	3.49 (0.000) ***
2	Family education	3.62 (0.025) **	3.55 (0.000) ***	3.50 (0.000) ***
3	Health family	3.87 (0.003) ***	3.56 (0.000) ***	3.64 (0.000) ***
4	Family work	3.75 (0.010) ***	3.50 (0.000) ***	3.46 (0.000) ***
5	Access to electricity	3.50 (0.000) ***	3.50 (0.000) ***	3.68 (0.000) ***
6	Access to clean water	4.00 (0.004) ***	3.34 (0.000) ***	3.53 (0.000) ***
7	Internet infrastructure	3.12 (0.401)	3.20 (0.000) ***	3.28 (0.000) ***

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

Based on the disaggregation, according to the length of time needed to get the facility, the majority of respondents were classified as having just received the FLPP, namely 349 people (64.6%) started to receive the facility since January 2020, the remaining 183 people (33.9%) started to receive the facility since January 2015 and only 8 respondents (1.5%) received the facilities before 2015 (see Table 5). The results of the analysis showed that in all categories and all aspects, there was a significant improvement in welfare. In the main socio-economic aspects such as income, education, health, and employment, the average rating of respondents who obtained the FLPP earlier tended to be higher. This in line with the study from Indarto & Rahayu (2015) about the indicators of community welfare can be seen from an economic and social perspective, the variables include: income level, amount of monthly expenditure or expenditure or consumption, production level, and investment. The result from this study indicates that a stable and continuous increase in welfare occurred along with the length of time people get FLPP.

Furthermore, in terms of quality of life related to housing facilities such as access to electricity, clean water, and the internet, the pattern appeared to be just the opposite, namely the average rating of respondents who had just obtained FLPP tended to be higher. This pattern could occur because people who had just received FLPP mostly occupied housing that was already better in terms of facilities, compared to people who have participated in the subsidized housing program earlier. The construction of livable housing is expected to provide improvements to the environmental conditions of the community. Environmental changes from the slum environment should improve the community's economy as indicated by the existence of new jobs that will increase people's income (Manurung et al., 2019). As a form of development, every regional economic development is expected to increase employment opportunities and increase people's income (Teja, 2015; Olugbenga et al., 2017).

Based on the disaggregation by distance to the city center in Table 6, the majority of respondents occupied houses that were less than 10 km away from the city center, namely 377 people (69.8%). The remaining 100 people (18.5%) lived in houses that were 10-20 km away from the city center, and 63 respondents (11.7%) lived in houses that were more than 20 km away from the city center. The results of the analysis showed that in all categories and all aspects there was a significant improvement in welfare, except for the internet infrastructure aspect for respondents whose houses were more than 20 km from the city center. This result indicated that internet access was still limited and unequal, especially in areas far from urban areas.

Table 6. Results of t-test based on Disaggregation by Distance Between House and City Center

No.	Socio-economic Aspects	Average (<i>pvalue</i>)		
		<= 10 km (n=377)	10.1 - 20 km (n=100)	> 20 km (n=63)
1	Income family	3.53 (0.000) ***	3.41 (0.000) ***	3.48 (0.000) ***
2	Family education	3.52 (0.000) ***	3.54 (0.000) ***	3.46 (0.000) ***
3	Health family	3.67 (0.000) ***	3.44 (0.000) ***	3.60 (0.000) ***
4	Work family	3.53 (0.000) ***	3.33 (0.000) ***	3.40 (0.000) ***
5	Access electricity	3.65 (0.000) ***	3.51 (0.000) ***	3.56 (0.000) ***
6	Access to clean water	3.54 (0.000) ***	3.21 (0.042) **	3.48 (0.000) ***
7	Internet infrastructure	3.26 (0.000) ***	3.31 (0.003) ***	3.08 (0.276)

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

The general picture in all aspects assessed was that the average rating tended to be higher for respondents whose houses were closer to the city center. This finding was in line with the issue in the distribution of subsidized mortgages raised in the 2020-2024 RPJMN where MBR houses were increasingly moving away from the city center with minimum supporting infrastructure such as clean water, electricity, and internet.

As one solution, the construction of flats can be carried out so that the settlements built remain close to the city center and have an adequate facility. This solution in line with Nugroho & Satriavei (2015) study stated that many people in Solo City are interested in buying flats with housing credit facilitation as one of the solutions for housing development that is getting farther from the city center. However, the existing housing financing is still not optimal, so massive socialization is very necessary. This solution in line with Arieffiani (2014) that stated in his research about the Surabaya City Government's policy in land use and the realization of good residential development is the development of Flats and Apartments because it has effectiveness that involves the actors and the environment. Demand for flats has continued to grow throughout recent years due to the inability of low-income families to afford standard housing, an insufficient supply of public housing units, and a lack of residential construction (Dwan et al, 2013).

Based on the disaggregation by household expenditure level in Table 7, 274 respondents (50.7%) had an average monthly expenditure of less than IDR 2 million (Tier 1 group) and 266 respondents (49.3%) had an average monthly expenditure of more than IDR 2 million (Tier 2 group). Expenditure in this study was used as a proxy for income. The results of the analysis showed that in all categories and all aspects, there was a significant improvement in welfare. A consistent pattern could be seen, namely the average rating of the Tier 1 group was higher than that of the Tier 2 group in the seven socio-economic aspects assessed. These results indicated that the greater benefits of FLPP were felt by lower income groups. The existence of a subsidy meant a reduction in spending on mortgage payments, and this certainly had a bigger impact on people with lower incomes.

Table 7. T-Test Results based on Disaggregation by Average Monthly Expenditure

No.	Socio-economic aspect	Average (<i>p value</i>)	
		Tier 1 <= IDR 2 million (n=274)	Tier 2 > IDR 2 million (n=266)
1	Income family	3.53 (0.000) ***	3.47 (0.000) ***
2	Family education	3.53 (0.000) ***	3.51 (0.000) ***
3	Health family	3.65 (0.000) ***	3.59 (0.000) ***
4	Work family	3.54 (0.000) ***	3.41 (0.000) ***
5	Access to electricity	3.68 (0.000) ***	3.54 (0.000) ***
6	Access to clean water	3.59 (0.000) ***	3.35 (0.000) ***
7	Internet infrastructure	3.33 (0.000) ***	3,16 (0,003)***

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

Factors Affecting the Socio-Economic Condition of MBR

The next discussion is an in-depth study of the factors affecting the socioeconomic conditions of the MBR as measured by expenditure (as a proxy for the measure of income welfare), in terms of FLPP variables and a number of control variables in the form of respondent characteristics. The approach used was linear regression analysis. The independent variables of FLPP characteristics included were the length of the FLPP, the monthly installments, the distance from the house to the city center, and the duration of the installment. Meanwhile, the independent control variables from the characteristics of the respondents included were the number of family members, type of work (formal or informal), husband and wife workers (yes or no), and motorized vehicle ownership (yes or no). There were 3 regression equations, namely the model for all respondents and disaggregation based on the level of expenditure into 2 categories (tiers). The results of the regression analysis on the three models are presented in Table 8.

Table 8. Regression Analysis of Factors Affecting Household Expenditure Level

Free Variables	Coefficient (p-value)		
	Total (n=540)	Tier 1 (n=274)	Tier 2 (n=266)
How long have you been getting FLPP?	0.276 (0.000) ***	0.334 (0.000)***	0.019 (0.387)
the size installment per month	0.798 (0.000) ***	0.801 (0.000)***	0.273 (0.000)***
Distance to the center city	0.019 (0.718)	0.097 (0.262)	-0.038 (0.075)*
Duration of installments	0.062 (0.683)	0.124 (0.638)	0.040 (0.532)
Number of family members	0.103 (0.339)	0.009 (0.959)	0.038 (0.392)
Head of household Job Dummy (1=formal, 0= other)	0.190 (0.094) *	0.489 (0.014)**	-0.022 (0.598)
Working husband and wife dummy (1=yes, 0=no)	0.187 (0.087) *	0.062 (0.742)	0.113 (0.008)***
Vehicle ownership dummy (1=yes, 0=no)	1,772 (0.000) ***	3,324 (0.000)***	-0.060 (0.633)
F	22.79 (0.000)***	19.06 (0.000)***	4.62 (0.000)***
R ²	25.56%	36.52%	12.58%

Description: ***, **, * indicate significance at 1%, 5%, 10% significance levels.

Source: Surveys' data (2021)

The results of the regression analysis showed that the factors that had a significant effect on household spending (on all respondents) were the length of time they received the FLPP, the monthly installments, type of work, husband and wife workers, and ownership of motorized vehicles. The duration of the respondent to get the FLPP had a positive and significant effect on the level of household expenditure. This result was in line with the findings in the t-test analysis, that a stable and continuous increase in welfare occurred as the community got FLPP. Furthermore, when disaggregated, this significant effect tended to be found in groups of people with lower expenditures. This

also confirmed the results of the t-test that the greater benefits of FLPP were felt by lower-income groups of people.

The higher the monthly installment value, the higher the household expenditure for housing needs. This result was consistent with the fact that this installment was part of routine household expenses. Furthermore, when disaggregated, this positive and significant effect was found in both categories of expenditure levels. An interesting fact is that the coefficient value (elasticity) of this variable was higher in the group with lower expenditure (Tier 1). The proportion of expenditure on installments to total expenditure would be higher when the total expenditure (the denominator) was smaller, indicating a greater impact on people with lower incomes. There were even indications that these low-income people who were proxies for low expenditures (Tier 1) were late in paying their housing installments. The findings of the MBR survey results showed several reasons for the delay in house installments including sudden needs (medical fees, school fees, and so forth), late salaries and the effects of the covid pandemic (economic conditions, layoffs, and bankruptcy).

Research conducted by PPDPP and FEM IPB (2017) showed that there were several factors influencing the chances of a debtor to be in arrears in paying credit installments. These factors included the value of installments, percent of installments to total income, occupation (factory workers and self-employed), house area, motorbike ownership, and AC ownership. The study also stated that debtors who were in arrears in paying installments have certain reasons. Respondent debtors in previous studies stated that delays in paying installments were due to a sudden need, late paychecks, forgotten payment schedules, and sluggish business. Therefore, in general, it could be concluded that, debtors having a low percentage of installments (towards income), high income, definite employment (PNS/Private Employees, TNI-POLRI), large house area, and ownership of vehicles and housing facilities (AC, so forth) tended to never be in arrears. This information could be useful for mitigating PPDPP in minimizing defaults, especially the need for a special strategy for MBR with informal jobs. The implementation of the FLPP Strategy in The Emphasis of Credit Risk at PT Bank Tabungan Negara (Persero) Tbk (Asep, 2014), it is concluded that there are 4 strategies to implement the management and control of housing financing credit risk with the FLPP BTN scheme, one of which is increasing the distribution of subsidized housing financing with the FLPP scheme with transparency, right value, and right on target.

Furthermore, the regression results showed that the distance to the city center variable was not significant in all observations. It was only significant (at =10%) for the group with higher expenditure (Tier 2). The insignificant effect on the lower spending group, as well as the negative and significant effect on the higher spending group, indicated that the Tier 2 group tended to have higher mobility so that the closer it was to the city center, leading to suppression or reduction of spending.

The next discussion relates to the employment status of the head of the family, whether formal or not. The results of the analysis showed that employment status only

had a significant effect on groups of people with lower expenditures (Tier 1). This result indicated that in the Tier 1 group, the level of expenditure in families with heads in formal employment was higher than in families with heads in informal work. This condition could be illustrated in the comparison between workers (formal) and unskilled workers (informal). This situation was not seen in the group with higher expenditure (Tier 2), meaning that in the Tier 2 group, the level of welfare was relatively balanced between those who work in the formal and informal sectors.

Husband and wife's working status had a significant effect on expenses in the Tier 2 group, while in Tier 1 it was not significant. This condition was because Tier 2 groups tended to have more husbands and wives working together compared to Tier 1, and thus, resulting in higher family expenses (or income).

The effect of motorized vehicle ownership on expenditures was significant in the Tier 1 group but not significant in the Tier 2 group. This condition was because in the Tier 2 group almost all of them owned a motorized vehicle, so the comparison between owning and not owning a vehicle was irrelevant. On the other hand, in Tier 1, not all had vehicles to support their activities, so there was a difference that those who own vehicles tended to spend more than those who do not.

CONCLUSIONS

The conclusions from the results of the analysis of the social and economic impacts of the provision of FLPP through the BLU-PPDPP at the micro level for the developer and MBR showed that the FLPP (housing financing liquidity facility) has a positive impact on both. Through participation in the distribution of FLPP, the developers feel a significant change, especially in the number of housing units sold and under construction, the company's image, and the number of assets owned by the company. The track record of developers in building houses with good quality is one of the main considerations for the community. The positive impact or improvement of the socio-economic conditions of the MBR from the FLPP program is reflected through aspects of family income, family education, family health, family work, access to electricity, access to clean water, and internet infrastructure. The existence of a subsidy in the form of FLPP allows the community to allocate a larger portion of their income for other important needs such as health and education. The positive impact of the FLPP program tends to be greater on communities that have been receiving these benefits for a longer time, for people whose houses are closer to the city center, and for communities with lower levels of expenditure.

To maintain performance in existing conditions, a strategy is needed to minimize defaults, especially for MBR with informal jobs. To avoid overlapping land use between sectors and encourage the construction of vertical houses for low-income households and idle land use. Centralized Big Data that was integrated between the stakeholders is needed to involved would bridge various information in order to increase MBR's access to decent and quality housing. Among them was the use of the SiKasep application to bridge and provide information for people who were interested in owning subsidized

housing by ensuring that they could see in detail the housing being developed. Meanwhile, with the SiKumbang application, the community would also receive a guarantee that the existence of the housing project could be accounted for. It is necessary to increase the carrying capacity of the budget for housing development for MBR because it has a multiplier impact on all sectors. The budget for housing lending facilities including from BUMN/BUMD in the provision of housing dan utilization of contractual saving funds as a source of long-term funds as well as secondary market development for housing finance.

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The Impact of Economic Openness on Economic Growth in Aceh Province

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Abstract

Economic openness is part of the demands that impact the entire region on economic development. This research aimed to analyze the impact of Economic Openness on Economic Growth in Aceh Province. The data used in this research was time-series data from 2005-2019. The variables used were exports, imports, domestic credit such as investment credit, consumer credit, working capital credit, and foreign investment (FDI). The data analysis tool used was a dynamic model with a specific approach to Autoregressive Distributed Lag (ARDL) model. The results of this research showed that in the long term, export, import, consumer credit, and working capital credit significantly affected Aceh's economic growth. Then, the estimation results in the short term showed that import and consumption credit directly affect economic growth. Likewise, the result of Foreign Direct Investment (FDI) in the short term had a significant impact on Aceh's economic growth. The government must strive to improve Economic openness because the impact is interrelated to national income and affect Aceh's economic growth.

Keywords:

autoregressive distributed lag (ARDL); domestic credit; economic openness; financial openness; trade openness

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INTRODUCTION

Expanding economic openness is part of the demands that cannot be separated from the effects of globalization. Economic openness is intended to describe the disappearance of trade barriers, both in the form of tariffs or non-tariffs and the increasingly smooth mobility of capital between countries (Purwanto, 2011). In the last few decades, conditions of economic openness have led to various fundamental changes in the world economic order. The debate about the impact of economic openness on economic growth in the literature has begun to emerge as a conclusion that economic openness does not entirely bring positive impacts on economic growth but also negative things (Abbas et al., 2016). This phenomenon makes economic openness become one of the critical variables that need to be taken into account in responding to challenges of current economic growth, both openness in foreign trade and openness in the financial sector.

Salahuddin & Gow (2015) showed a positive relationship between economic openness and economic growth. However, the research by Bibi et al. (2014) saw the opposite. The result showed that the trade balance deficit as a result of trade activities made economic openness not affect economic growth. On the other hand, Dreher (2006) showed that the benefits received by each country from economic openness did not show the same pattern and magnitude. For some developing countries, openness harmed economic growth, but for developed countries, it has a positive impact if they optimized their openness to trade (Novitasari et al., 2015).

Several studies about economic openness with some indicators were conducted by other researchers, namely trade and financial openness in developing countries. They conclude that economic openness influences developed countries most (Febrianty, 2014; Baltagi et al., 2008). However, it does not rule out the possibility for developing countries that economic openness is also a driving factor in improving the economy. It is in line with the research which is conducted by Lawal et al. (2016). The result showed that there was a two-way relationship. It means that open economic policies encourage financial and trade openness to encourage economic growth. Similarly, the research that was conducted by Herawati (2016) and Kartikasari (2017) found that economic openness affected economic growth.

Indonesia's open trade has changed the economy's structure from agriculture to industry. Openness in trade encourages liberalization that accelerates the modernization process of a country so that it is synonymous with industrialization (Novitasari et al., 2015). Several Indonesian studies on economic Herawati conducted assessing the role of trade openness on economic growth. Wiguna & Panennungi (2019) showed that trade openness did not cause income inequality in Indonesia. Yuda's research (2013) showed that credit, export, and import variables impacted GDRP growth. Several other studies showed that economic openness had a negative impact. Based on Novitasari et al. (2015), trade openness had a negative impact on the added value of manufacturing due to the high import of Indonesian machinery and technology. The research conducted by Astuti & Ayuningtyas (2018) found that an increase in imports would reduce net exports and subsequently reduce domestic economic growth.

Researches that analyze the impact of trade and financial openness on economic growth in developing countries at the provincial level are still rare. Several studies in the province, namely Akhirman (2012), proved that trade openness is the variable of exports and investment that affects economic growth at the provincial level. Chandrasekar et al. (2018) stated a long-term relationship between trade openness and growth. This research is different from Kartikasari's research in 2017, which showed that export and import variables did not affect economic growth. Danlami et al. (2018) stated that trade openness did not contribute to growth.

The Indonesian government is committed to accelerating the achievement of national economic development. One of the things the government has done is to prepare an area with economic and geo-strategic advantages. The area is prepared to maximize Indonesia's industrial, export, and import activities. The development of Special Economic Zones (SEZ) in Indonesia emphasizes the establishment of SEZs that focus on accelerating regional economic growth, as well as encouraging the creation of SEZs that can build added value for mastery of technology and human resources. This is realized through developing SEZs for Health, Education, and Digital Economy and SEZs for Maintenance, Repair, and Overhaul. The government's program to build SEZs until 2022 targets 19 SEZs in Indonesia.

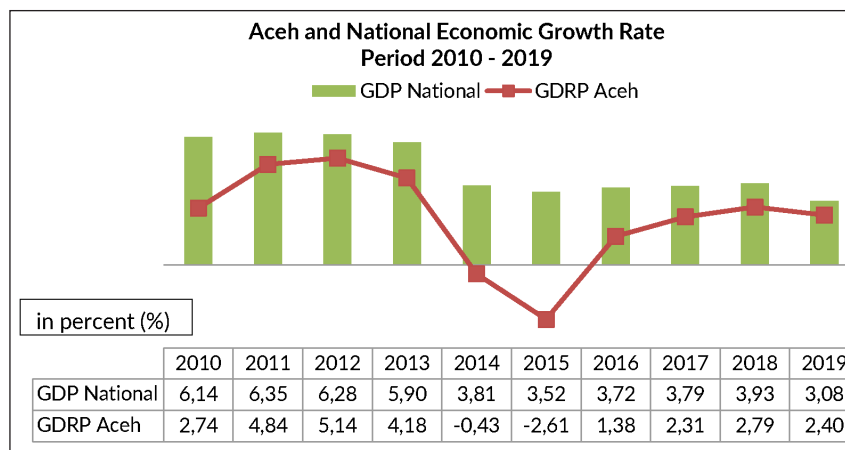
The main objective of SEZ development is to encourage economic growth, equitable development, and increase competitiveness. SEZ has focused according to the conditions and situations of the area. SEZ development targets consist of several things. First, increase investment by preparing areas with geo-economic and geo-strategic advantages. Second, optimizing export, import, and other economic activities with high economic value. Third, accelerate regional development through the development of new centers of economic growth to balance development between regions. This SEZ is aimed at specific areas that have special development needs, one of which is the Aceh area which is the location for development, namely the Arun Lhoksumawe SEZ. Previously the area was the largest oil exporting area in Aceh. The development of this area is under the consortium of the Regional Development Company for Aceh and three state-owned enterprises, namely Pertamina, Pelindo I, and PIM. The development of this SEZ aims to increase investment and equitable development.

The Head of the Investment Coordinating Board (BKPM) said the presence of the Arun Lhokseumawe Special Economic Zone (SEZ) was a significant development for the economy in Nanggroe Aceh Darussalam Province. The presence of SEZs is expected to build economic capability and competitiveness at the national level through value-added and value chain industries and tourism. With the existence of the Arun Lhokseumawe SEZ, investment in Aceh is increasingly attractive. For decades Arun has been the main LNG export terminal in Indonesia. However, in the past few years, LNG gas production in Aceh has started to decline. The economic growth of Aceh province has never exceeded the national economic growth and experienced its lowest point in 2015 because one of the PT LNG in Aceh stopped producing. This phenomenon affected the achievement of the economic growth target, which was the reconstruction period of Aceh after the

earthquake and tsunami disaster. The economic growth of Aceh from 2010-2019 is shown in Figure 1.

Based on Figure 1 shows that in 2015, there was an intense contraction. It was caused by Aceh's oil and gas exports stopping production at one of the mainstay companies of oil and gas exports abroad, and also imports that increased at that time due to the need for technology and machinery for infrastructure development. Based on BPS data (2019), the level of trade openness, as measured by Aceh's exports in 2012, was 3.85%. There was a drastic decline and continued until 2015, only 0.8%. In this case, exports should be a driver for increasing economic growth, in line with research conducted by Astuti & Ayuningtyas (2018). It showed that exports play a role in GRDP growth in the short and long term. Likewise, the research conducted by Purwanto (2011) and Widyawati (2017) showed that international trade openness was related to economic growth and economic growth was necessary because every country always tries to increase its economic growth and make economic growth an economic target and the economic success of a country in the long run.

Figure 1. Aceh and National Economic Growth of 2010-2019



Source: Bank Indonesia (2019)

In an area, the economy will develop when the financial sector provides a significant stimulus to increase the total number of provincial production in the real sector. Furthermore, empirical reviews have shown that the financial sector has a vital role in encouraging the economic growth of a country. Currently, bank loans still dominate total loans to the private sector, with an average of 85% (BI 2019). In line with Lianti et al. (2013), the research showed that the Acehnese economy was significantly influenced by bank credit. According to Salahuddin & Gow (2015), financial developments have a positive effect on GRDP in the long term.

In general, credit growth tends to increase from year to year. However, in this case, it can be seen that the distribution of consumptive credit in Aceh province reaches 60%, which is considered unfavorable for Aceh's economic growth. Therefore, it is hoped that there will be efforts to focus on the role of finance and increase trade openness in

Aceh. In the future period, it will not only increase the percentage of annual economic growth but also improve the investment climate, can touch increase employment, increase per capita GRDP, and decrease unemployment and poverty. In turn, it can improve the welfare of society as a whole. In line with the research of Lawal et al. (2016), which explained that to achieve economic growth, policymakers must pursue substantial financial developments and increase trade openness. This statement was also supported by Febrianty (2014) who showed that domestic credit, banking, and trade were the most influential in developing countries.

Based on the theory, it can be observed from previous research that the relationship between financial sector variables on economic growth has obtained several differences in the analysis results at the national, provincial, and regional levels. For example, previous research on a provincial scale (Sanjaya et al. 2017; Kartikasari 2017; Akhirman 2012) showed that trade openness had a positive and significant effect on economic growth in both the short and long term. Furthermore, Yuda (2013) shows on a national scale that financial variables had no impact on GRDP growth. On a regional scale, domestic banking credit and trade were the most influential in developing countries (Febrianty, 2014).

Studies analyzing the impact of trade openness and financial openness on economic growth have been carried out in developed and developing countries. However, similar research is still lacking in Indonesia. Previous research was conducted at the national level (Yuda, 2013; Astuti & Ayuningtyas, 2018). However, the current research is carried out at the provincial level, because, in general economic growth is determined by each regional or provincial growth. Similar studies related to economic openness, especially for the province of Aceh, are not yet available if there is only partial research on the effect of the variable of economic openness, such as the research which was conducted by Faiziah & Sofyan (2014) using the variables of labor, exports, investment, and banking credit on the GRDP of the agricultural sector of Aceh province.

Unlike previous studies, this research used Autoregressive Distributed Lag (ARDL) method to identify the impact of economic openness, as well as the factors that influenced it, which had never been done in Aceh province. Based on the previous explanation, this research aimed to analyze the impact of economic openness as measured by trade openness and financial openness on economic growth in the Aceh province.

METHODS

The data used in this research was secondary in the form of time series data that included quarterly data from Aceh Province for 15 years from 2005 to 2019. Secondary data were obtained from Bank Indonesia (BI), Central Statistics Agency (BPS), and Investment Coordinating Board (BKPM) Aceh Province. The variables used in this research were GRDP which was proxied for economic growth data as the dependent variable and six independent variables, namely financial development data that was proxied is data on the ratio of domestic bank loans to GRDP, where there were working capital loans,

investment loans and consumer loans, and investment, also Foreign Direct Investment (FDI). Meanwhile, data on trade openness was data on exports and imports of GDRP.

The analytical method used in this research consisted of descriptive analysis and quantitative analysis. Descriptive analysis is using to provide an overview of the role and performance of trade openness and financial openness in Aceh Province. In addition, to determine the impact of trade and financial openness on economic growth in Aceh Province, a quantitative analysis was carried out. Furthermore, a quantitative analysis of the dynamic model with a time series data approach was carried out using the Autoregressive Distributed Lag (ARDL) method to see the effect of exports, imports, domestic credit, and FDI on economic growth in Aceh Province.

ARDL was a regression model that includes variable values by explaining the present value or past value (lag) of the independent variable in addition to the model that included the lag value of the dependent variable as one of the explanatory variables, which was Autoregressive Distributed Lag (ARDL) model. ARDL method had several advantages in its operation; namely, it could be used on data with small samples. ARDL method also did not require a pre-estimated classification of variables so that it was directly applied to variables $I(0)$, $I(1)$, or even a combination of both. The cointegration test was by comparing the F-statistic value with the F table value (Pesaran, et al., 2000). Another advantage was ARDL could capture the effects of shock factors and random shocks in the short and long term.

ARDL model was used in this research because the research data was time series data which was stationary in level and first different. In choosing the right time series model it was important to test. First, the selection of regression model was carried out through a stationarity test using Augmented Dickey-Fuller (ADF) method. Second, the determination of optimum lag was determined based on the basic value of Akaike Information Criterion (AIC). Third, Cointegration Bound Test approach also was used in this research.

The regression model specification used referred to the studies by Lawal et al. (2016), Salahuddin & Gow (2015), Keho (2017), and Danlami, et al. (2018). Thus, the model specification used to answer the question about the effect of trade openness and financial openness on economic growth in Aceh Province was obtained. Mathematically, the model was written as follows.

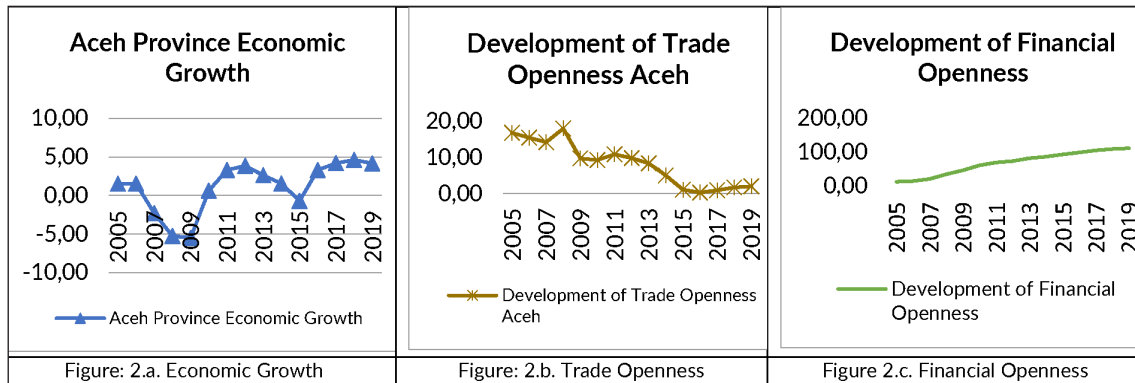
$$\Delta LOG(PDRB_t) = \beta_{01} + \sum_{i=1}^{n1} \beta_{11} \Delta LOGPDRB_{t-i} + \sum_{i=0}^{n2} \beta_{12} \Delta LOGXM_{t-i} + \sum_{i=0}^{n3} \beta_{13} \Delta IM_{t-i} + \sum_{i=0}^{n4} \beta_{14} \Delta DCI_{t-i} + \sum_{i=0}^{n5} \beta_{15} \Delta DCC_{t-i} + \sum_{i=0}^{n6} \beta_{16} \Delta DCM_{t-i} + \sum_{i=0}^{n7} \beta_{17} \Delta FDI_{t-i} + \varepsilon_t$$

ARDL analysis was carried out using the Eviews 10 program. The testing stages done were the unit root test or stationary test, lag length test, bound-test cointegration test, model stability test, and finally ARDL estimation in the short and long terms.

RESULTS AND DISCUSSION

Economic growth was an important point in assessing the growth conditions of a region, where a high economic level describes the independence of a region. Likewise with the Province of Aceh, as seen in the 2005-2019 period, the Development of Economic Growth Performance, Trade Openness and Financial Openness of the Aceh Province can be seen in Figure 2.

Figure 2. The Performance Development of Economic Growth Trade and Financial Openness



Source: BPS Indonesia 2019 (processed)

Figure 2a describes that the economic growth of Aceh Province shows a fluctuating increase. Although in 2008 and 2014 there was a decline in GRDP due to Aceh's oil and gas lifting. The highest economic growth occurred in 2018 of 4.61% and the lowest decline of -5.49% in 2009 after the monetary crisis. Furthermore, Figure 2b shows that the trade openness of Aceh Province shows a fluctuating and declining development. It can be seen from 2005-2019 experienced a downward trend. A drastic decline from 2012 to 2019, where the sharpest decline of up to 78% occurred in 2015. This decline occurred in line with the phenomenon of a decline in exports and an increase in imports which resulted in the low openness of trade-in Aceh.

In addition, the condition is inversely proportional to the financial openness of Aceh Province as shown in Figure 2c. Financial openness continued to increase from 2005 to 2019, which was the reconstruction period for Aceh after the earthquake and tsunami disaster. The average growth rate of financial openness over the last 15 years has reached 8.88%, this indicates that financial openness in Aceh can have a positive impact, meaning that it will increase Aceh's economic growth.

Autoregressive Distributed Lag (ARDL) estimation results in the long term showed that export, import, consumer credit, and working capital credit have a significant effect on economic growth in Aceh Province. Meanwhile, in the short term, it showed that the variables of import, consumer credit, and FDI have a significant impact on Aceh's economic growth. The determinants of long-term economic growth were shown in Table1.

Based on Table 1 on the long-term estimation in each case, the calculated F statistical value exceeds the critical value at the 5% significance level. The results showed that the

export variable statistically had a positive and significant relationship to GRDP. This means that if exports increase, it would affect the trade balance, thereby increasing economic growth in Aceh Province. This was in line with the theory of economic growth which stated that exports could encourage increased economic growth. It was also in line with the theory of international trade. If exports increase, it will increase net exports so that national income increases and encourages economic growth. This result also supported by Astuti & Ayuningtyas (2018) that stated that in the long-term exports had a positive effect on economic growth.

Table 1. Determinants of Economic Growth in Long Term

Variable	Coefficient	Std. Error	t-Statistic
LOG(EXPORT)	0.028634	0.013735	2.084739**
IMPORT	-0.120017	0.036711	-3.269230**
INVESTMENT	0.004315	0.007284	0.592420
CONSUMPTION	0.013329	0.003319	4.016258***
CAPITAL_WORKER	-0.015133	0.004387	-3.449627***
FDI	-5.270008	3.53E-08	-1.494832
C	17.09193	0.038074	448.9176

***), **), and *) Significant at significance levels of 1%, 5%, and 10%

Source: Data processing

Furthermore, the import variable statistically Imports showed a negative and significant relationship to Aceh's GRDP. This means that if imports increase, the trade balance would decrease, resulting in a decline in Aceh's economic growth. On the other hand, if imports decline, Aceh's economic growth would increase. An increase in imports would reduce net exports, when net exports fall, national income would fall and had an impact on a decline in economic growth. The results of this research were also in line with research conducted by Supiyadi & Anggita (2020) that stated that in the long term imports had a negative effect on economic growth.

The consumption credit variable in the long term statistically gave a positive and significant contribution to Aceh's GRDP. This means that if consumption credit increases, economic growth would also increase. The results of this research were not in line with the initial theory and hypothesis where consumer credit had a negative effect on economic growth. However, this research also supported by Rachman & Sriyanto (2010) that there was a positive influence of consumer credit on economic growth. This indicated that consumer credit had a multiplier effect; an increase in consumer credit could increase the purchasing power of the people who ultimately increase the production of goods. Thus, it may be that initially consumption credit was consumptive, but through the multiplier effect with forwarding linkage, indirectly the credit would be productive, namely increasing the production of goods and services purchased by debtors.

The working capital credit variable in the long-term estimation results had a negative and significant contribution to Aceh's GRDP. This means that if working capital credit had increased, it would make economic growth decline. This result was in contrast to the initial theory and hypothesis that stated that the result should increase working capital credit to make the economy better. This could happen because when working capital had been distributed but its use was not realized properly, and the effect on capital and labor decreases, it had an impact on national income falling so this was what makes economic growth decline. The results also supported by Tahang et al. (2017) and Rachman & Sriyanto (2010) that stated that working capital credit had a negative effect on economic growth.

This means that the developing sectors were oil and gas, electricity, and mining. Some of the construction sectors that occurred were said to be able to increase imports, so when working capital credit was given but what developed was a sector that required imported raw materials such as machinery and heavy equipment, this credit was considered unable to increase economic growth.

The investment credit variable did not contribute to Aceh's GDRP. This means that the increase in investment did not have an impact on Aceh's economic growth. Thus, although the increase in investment credit continued to increase every year, it was still unable to have an impact on economic growth. The cause of investment credit did not have an impact on economic growth because investment credit issued by banks for the purchase of capital goods do not run out in one business cycle. It means that the process of disbursing cash and returning it to cash would require a long period. It took a quite long time after going through several rounds. In addition, the use of investment credit that had not been well targeted was also a result of the lack of impact of increasing credit on Aceh's economic growth. This result was also in line with Suharno, et al. (2020) that stated that investment credit not affect economic growth, this was because banks were very careful and selective in providing loans to creditors.

Finally, the variable of foreign direct investment as a proxy for financial disclosure in the long term did not statistically contribute to Aceh's GRDP. This means that the increase in FDI every year had not been able to fully contribute to increasing Aceh's economic growth. Based on the theory of endogenous growth, economic growth was not only influenced by the amount of capital but other factors were also important, namely human resources and technology. The results of this research were also supported by research by Mentari et al. (2017) that stated that in the long term FDI did not affect economic growth.

In the case of Aceh, it was found that FDI was not significant. It means that so far it had explained and reinforced the criticism that globalization was not necessarily good for all. Based on FDI data itself, Aceh was quite volatile, namely in 2015 foreign direct investment was around 4T rupiahs. In 2016 it fell to 2T rupiahs, and suddenly continued to drop to 7 Billion rupiahs in 2017. It experienced a slight increase in 2018 to 9 Billion rupiahs. This means, imagine that in recent years the nominal FDI had

fluctuated tremendously from 4T to 9 billion rupiahs. Another reason why it was not significant was because for now, p FDI in Aceh was concentrated in the electricity, gas, water, oil and gas, and energy sectors so that it was not affected by economic growth here. That was because when FDI entered Aceh, especially in the oil and gas energy sector, they also bought or used highly imported raw materials, such as machinery, heavy equipment, which did increase imports.

Several projects that had been seen investing in Aceh are investors from South Korea, PT Golden Daru Utama, who entered Nagan Raya Regency (Antara news, 6 August 2019). An investor from Singapore, Globalports PTE LTD entered West Aceh in the field of developing energy-efficient electricity. Investors from Beijing China through PT My Vision Indonesia entered West Aceh for hydropower generation and mining. This phenomenon was also expected to increase imports.

The purpose of this way is foreign investment will directly have an impact on economic growth. This sector will develop to create jobs and later increase output that can be exported. It is just that at this time if we look at the energy sector it is a high capital-intensive sector. This sector does not absorb much labor so that currently the Aceh government can take efforts to invite investors to sectors that absorb more manpower, which is currently being pursued, for example, tourism. For example in energy, this is the same case with the province of West Java and others. Each power plant needs a local workforce of 30-60 people. Because all of them already use machines, and even then it requires workers with the highest skills. This is why the FDI is not significant. Furthermore, the estimation results obtained in the short term on Aceh's economic growth shows in Table 2.

Table 2. Determinants of Economic Growth in Aceh Province in the Short Term

Variable	Coefficient	Std. Error	t-Statistic
LOG(GDRP(-5))	0.570146	0.139689	4.081522***
LOG(EXPORT)	0.008268	0.005170	1.599072
IMPORT(-3)	-0.008715	0.003808	-2.288581**
INVESTMENT(-5)	0.006057	0.003526	1.717701*
CONSUMPTION(-5)	0.010190	0.002097	4.859479***
CAPITAL_WORKER(-1)	-0.002840	0.001790	-1.586562
FDI(-5)	-2.700009	1.090009	-2.467767**
ContEng(-1)*	-0.288735	0.036400	-7.932366***
R-squared	0.9877990	F-statistics	65.80893
Adj R-squared	0.972977	Prob(F-stat)	0.000000

***), **), and *) Significant at significance levels of 1%, 5%, and 10%

Source: *Data processing*

Based on table 2, it can be seen that the short-term estimation results obtained that the imported variable has a negative and significant effect. This means that the increase in

imports even in the short term will have a very bad impact on Aceh's economic growth, where increased imports will make net exports decline and reduce national income which has an impact on low economic growth. The results of this research are in line with Handoyo et al. (2020) that state that in the short-term imports that occur in a country can weaken the country's economic growth.

Financial openness through consumption credit in the short term has a positive and significant impact on Aceh's economic growth. This means that if consumption credit increases, economic growth will also increase. The meaning is that increased credit will increase capital and labor thereby increasing national income and growing the economy. Because indirectly the credit will be productive, namely increasing the production of goods and services purchased by the debtor. The results of this research are also consistent with research conducted by Rachman & Sriyanto (2010) that states that consumer credit has a positive and significant effect on economic growth in East Java province. The results of this research also support previous consumer credit research conducted by Sari & Abundanti (2016).

The variable of foreign direct investment or FDI in the short term has a negative and significant effect on Aceh's economic growth, which means that if there is an increase in FDI it will create economic growth and if FDI decreases it will increase economic growth. This condition is certainly inversely proportional to the theory that should state that FDI has a positive influence on economic growth. However, this condition occurs based on the fact that investment in Aceh is very volatile. Even Aceh has not become a priority as a place to invest capital for foreign investors.

In addition, the performance and potential inflows of foreign investors are also in the low category. The many barriers to entry for foreign investors, inefficient bureaucracy, and inadequate infrastructure are some of the reasons why Aceh is less attractive to foreign investors. Therefore, the decline in FDI needs to be observed as an important warning for the government to pay more attention to policies in this sector to encourage a better improvement in the economy. FDI plays an important role to promote economic growth (Febiyansah, 2017). However, investment policy will be directly related to industrial, trade, and other non-economic policies. The results also in line with research conducted by Kholis (2012) and Dinh et al. (2019) that state that foreign direct investment has a negative effect on economic growth in the short run. So the goal of improving economic growth highly is accepted.

CONCLUSION

Though partially, the estimation results showed that not all variables significantly impact economic growth. Based on the analysis results, the economic growth of Aceh Province can be said to improve Post Tsunami seen from Aceh's financial sector has increased significantly, although consumptions loans still dominate it. Then export and import are still very volatile due to Aceh's drastic decline in oil and gas commodities, and the non-oil and gas commodities have been unable to take over the situation. Meanwhile,

Foreign Direct Investment does not yet have a direct impact on Aceh's economic growth because the contribution of Foreign Direct Investment is still relatively unstable. Overall, Through the ARDL model approach, it can be seen that economic openness significantly impacts Aceh's economic growth both in the long and short term.

The macro-economic indicators need to be improved to improve the economic growth of Aceh Province, such as trade openness that greatly stimulates economic growth. The government must be more progressive in increasing Aceh's export by improving the quality of an institution and expanding foreign markets. Furthermore, for financial openness, the government of Aceh must play a more active role in implementing the required monitoring in improving policies for economic activities so that it can run optimally. The government also is expected to establish clear rules regarding the credit classification system because, so far, credit classification has only been based on the internal policies of each bank, and there are still weaknesses.

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The Link between Economic Growth, Electricity Consumption, and CO₂ Emissions: Evidence from Indonesia

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Abstract

This study investigates the relationship between economic growth, electricity consumption, and CO₂ emissions in Indonesia. The data utilized time series for 1971-2020 obtained from the WDI database 2021. The method utilized the ADRL and VEC models. The findings indicate that in the long run, economic growth and electricity consumption positively affect CO₂ emissions. The short-run effect that occurs from economic growth is significant and negative, while the lag of CO₂ emission is positive on CO₂ emissions. There is a two-way causality between economic growth and electricity consumption in the short run. There is a unidirectional causality flowing from CO₂ emissions to economic growth. A significant ECT coefficient has confirmed that the long-run relationship between variables in the model used is valid. The policies offered are applying emission taxes, encouraging energy conservation to control emissions, and encouraging efficient and sustainable electricity supply.

Keywords:

electricity consumption; cointegration; CO₂ emission; economic growth

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INTRODUCTION

The supply of electricity is one of the factors driving economic growth in every country. The need for electricity has become a significant element in the life of every household. This sector provides a vital role in influencing all activities of economic actors, especially in economic activities. On the other hand, power plants in Indonesia are still very dependent on coal fuel. According to records, coal is the primary energy source for electricity generation in Indonesia; 58 percent of the fuel for power generation in Indonesia is coal. Coal is an inaccessible natural resource with high selling value in international trade. The challenges and problems that arise due to a large amount of coal disaster can produce carbon dioxide (CO₂) emissions which worsen environmental quality. This condition is essential when renewable energy is not widely used as an alternative energy source for electricity generation. Another challenge is that the efficient exploitation and development of a country's energy resources are crucial for economic progress and the welfare of society in a sustainable manner.

Inadequate development in Indonesia and inefficient energy sector management have created a demand for supply, especially in unreached rural areas. Electricity supply is one of the country's most popular energy sources. On the other hand, the shortage of electricity supply due to high demand has suppressed the fulfillment of electricity consumption in this country. This electricity supply deficit has left many households and companies operating in the country with electricity generated from the consumption of coal and petroleum fuels. The effect of meeting electricity needs can directly impact climate change and an increasingly massive climate, releasing large amounts of CO₂ emissions. Globally, among several pollutants that contribute to climate change, CO₂ emissions account for more than 75 percent of greenhouse gas emissions, with about 80 percent being generated by the energy sector (Akpan & Akpan, 2012).

Environmental problems become very important when there is massive climate change. As proposed by many previous studies, it is not uncommon for every country to try to increase economic development by using fossil energy technology. This effort encourages economic growth in the country, but each country still reports the impact on the quality of the environment in that country. In addition, energy is the backbone of the production process because it converts raw materials into goods, and production leads to international trade.

The theory of modernization of development is the basis of previous studies that the impact of development can increase greater energy consumption; this can directly increase CO₂ emissions. This theory also explains that human activities are closely related to development. This condition is also a basic Kuznets theory that is analogous to the environmental hypothesis of the Kuznets curve (EKC) that explains the relationship between welfare and the environment. The transformation of development through several stages, such as the first stage, economic development, is known as the pre-industrial economy, the second stage is called the industrial economy, and the third stage is known as the post-industrial economy (service economy). It is assumed that this movement

will increase the use and management of natural resources, which will decrease the environment's quality. After that, industrialization can expand its role in increasingly stable domestic product orders. The existence of foreign investment has also driven the economic transformation from the agricultural sector to the industrial sector. Increasing the role of the industrial sector in improving a country's economy will have a direct impact on increasing pollution in that country (Panayotou, 2003).

The direction of causality between economic growth, electricity consumption, and CO₂ emissions can provide an analogy that can state that the higher the demand for electricity supply is assumed to affect domestic economic growth. This causality can also be done by expanding by implementing policy policies. In addition, the need for electricity can lead to more significant CO₂ emissions (Cowan et al., 2014). On the other hand, tremendous economic growth can lead to higher demand for electricity supply. Investigating the direction of causality between these variables is crucial because the implications of energy demand policy can be different for each direction. The existence of a two-way causality between electricity consumption and economic growth can be analogized as feedback. This condition implies that electricity consumption and economic growth together can support a conservative energy policy, which can have a negative impact on economic growth (Cowan et al., 2014). The unidirectional relationship between electricity consumption and economic growth can be analogized as growth. This relationship means that the country can be provided with energy so that electricity consumption can have a direct or indirect effect on economic growth. The growth hypothesis implies that any conservative energy policy will have a negative impact on economic growth (Cowan et al., 2014; Shahbaz et al., 2016).

However, if the causality goes from economic growth to energy consumption which can be analogized as a conservation hypothesis, the economy is less dependent on energy, and energy policy policies can be implemented with little or no adverse effects on economic growth (Bashir et al., 2019; Cowan et al., 2014; Wolde-Rufael, 2014). The absence of a causal relationship between economic growth and electricity consumption can be analogized as a neutrality hypothesis. This condition raises the question that there is no long-run relationship between the two variables and that any consumption policy, either expansive or conservative, has no effect on economic growth (Cowan et al., 2014; Wolde-Rufael, 2014).

Seeing the current condition, the economic growth rate in Indonesia during 1985-2017 grew positively, with an average growth of 5.07 percent. In the same period, the trend of primary energy consumption was 5.26 percent, and CO₂ emissions grew by 5.90 percent: which increased the economy and CO₂ emissions in Indonesia (Bashir et al., 2021). Likewise, in 1998 and 2008, there was a phenomenon of the global financial crisis. Countries in the world mostly felt this crisis. Not only Indonesia, but economic activity experienced a sluggishness, resulting in negative economic growth. Moreover, the political situation in Indonesia is not conducive.

The role of electricity consumption in economic growth has been carried out intensively but the evidence so far is contradictory and inconclusive (Ozturk & Acaravci,

2010; Shahbaz et al., 2014). The essence of hope is whether electricity consumption encourages, inhibits, or is neutral to economic growth. The literature has identified four possible hypotheses regarding a causal relationship between electricity consumption and economic growth (Menyah & Wolde-Rufael, 2010). The first growth hypothesis postulates that a one-way Granger causality goes from electricity consumption to economic growth. This postulate means that policies that reduce electricity consumption can lead to economic growth. The second is the conservation hypothesis, which implies a one-way causality from economic growth to electricity consumption, where economic growth encourages higher electricity consumption. Based on this hypothesis, policy consideration is given because a strategy to reduce electricity consumption may not have a negative impact on economic growth. After all, it allows a reduction in electricity consumption without economic growth (Gielen et al., 2019). While the primary fuel for electricity generation in this country is dominated by fossil fuels, in the literature, it is recorded that 58 percent is coal fuel; the rest is fuel oil and steam energy. In addition, the large number of land uses with the use of chemicals and industrial activities that use large amounts of fossil fuels also cause environmental degradation (Akil et al., 2020; Rajaguru & Khan, 2021).

This study refers to several studies, such as the study conducted by Hirsh & Koomey (2015), explaining changing trends in the relationship between growth in economic activity and electricity use, and finds that these new trends require utility system stakeholders to rethink old assumptions and prepare to face the new reality of lower electricity consumption growth rates. The study conducted by Atchike et al. (2020) investigated the relationship between electricity consumption, foreign direct investment, and economic growth and found evidence of a unidirectional causality of electricity consumption for economic development and foreign direct investment and a long-run relationship with an adjustable rate of 60.72 percent. The study by Bah & Azam (2017) explored the causal relationship between electricity consumption, economic growth, financial development, and CO₂ emissions, and found that there is no causality between electricity consumption and economic growth. This condition indicates that the neutrality hypothesis holds for South Africa throughout the study period.

In addition, there is unidirectional causality from CO₂ emissions to electricity consumption and unidirectional causality from financial development to CO₂ emissions. In addition, a study conducted by Rahman (2020) found a long-run relationship between these variables; electricity consumption and economic growth positively and significantly affect CO₂ emissions in these countries. On the other hand, globalization has a significant negative impact on CO₂ emissions that has implications for improving environmental quality. A study by Thaker et al. (2019) found that electricity consumption positively affects economic growth. In addition, there is a unidirectional Granger causality from electricity consumption to real GDP but not vice versa. A different study by Akil et al. (2020) found that perception is critical for increasing EEA utilization rates and improving user habits to save electricity. The information presented is helpful as a reference for energy policy planning for the housing sector in Indonesia.

This study is still very rarely carried out in Indonesia. A different perspective from this study shows that using electrical energy and economic growth have various effects on increasing CO₂ emissions. Challenges Indonesia is currently faced with increasing energy consumption and GDP, which is a significant challenge in the context of environmental quality. As a result, the current study can assist policymakers in pursuing more pragmatic planning and maximizing decision-making regarding increasing CO₂ emissions in general and in Indonesia. This study also offers some significant contributions to the existing literature and provides more detailed information that can be used for various purposes, such as designing more sensible energy conservation policies or electricity saving programs in Indonesia. It investigates the impact of electricity consumption and economic growth on CO₂ emissions in Indonesia. In addition, this study uses an auto-regressive distributed lag approach and vector error correction model to see the short and long-run relationship between variables. In addition, we can see the relationship between variables in the study for the benefit of future policy.

METHODS

This study focuses on the relationship between economic growth, electricity consumption, and CO₂ emissions and investigates this relationship in the long or short-run. The variables used in the study include economic growth (real GDP per capita), electricity consumption (kWh per capita), and CO₂ emissions (metric tons per capita). This study used time-series data, the observation period 1971-2020. The data source is obtained from the official World Bank. The descriptions of the operational variables in this study are shown in Table 1.

Table 1. Data, Description, and Sources

Variable	Description	Unit	Source
CO ₂	CO ₂ emissions	Kiloton per capita	World Bank
GDP	Real GDP per capita	US\$, constant 2010	World Bank
ELEC	Electricity consumption	kwh per capita	World Bank, CEIC

The unit root tests are available in applied economics to determine the nature of the variable stationarity. Unit root testing of each time series data is using the Augmented Dickey-Fuller test (ADF-test) criteria. This test detects whether time series data contain the unit root or not. If the data contains a unit root, then an appropriate estimation method is the autoregression vector, but the data cannot be separated from the unit root. The next step is determining how long the optimal lag is proper in the causality model. Determination of the optimal lag length is vital in modeling causality. If the optimal input lag is too short, it is feared that it cannot explain the overall model dynamics. However, too long an optimal lag will result in an inefficient estimate due to reduced degrees of freedom (minimal sample models). Therefore, looking at the optimal lag before doing the causality estimation model is necessary.

The Johansen cointegration test is used to see the long-run equilibrium relationship of several variables. One of the methods of cointegration test is the Johansen method. The procedure begins with identifying data, testing data, testing data, testing the degree of integration, and testing cointegration with the Johansen method. The Johansen cointegration test uses two statistical tests: the trace statistic and the maximum-eigenvalue. The method used in the Johansen cointegration test compares the calculated value in the critical value test statistic. If the calculated value of the statistical trace test statistic and the maximum eigenvalue are more significant than the critical value, there is cointegration (Johansen, 1988).

The next approach is to test the ARDL model developed by Pesaran et al. (2001) to investigate the cointegration for the long-run relationship between economic growth, electricity consumption, and CO₂ emissions in Indonesia. The various cointegration approaches have been applied to test the existence of cointegration between variables in various studies. The approach based on the equations developed by Engle & Granger (1987) and Johansen (1996) requires that all equations be integrated. The ARDL model testing approach is more appropriate than other cointegration approaches. This approach is more suitable after the variable is found to be stationary at $I(1)$ or $I(0)$. The ARDL boundary testing approach will provide efficient and consistent empirical evidence for small sample data (Narayan & Smyth, 2005). This approach investigates the short-run and long-run parameters instantly. The infinite error correction model (ECM) version of the ARDL model in this study is presented as follows

$$\ln\text{CO}_2_t = \alpha_1 + \alpha_2 \ln\text{CO}_2_t + \alpha_3 \ln\text{ELEC}_t + \alpha_4 \ln\text{GDP}_t + \sum_{i=1}^m \beta_i \Delta \ln\text{CO}_2_{t-i} + \sum_{j=0}^n \gamma_j \Delta \ln\text{ELEC}_{t-j} + \sum_{k=0}^o \eta_k \Delta \ln\text{GDP}_{t-k} + \text{ECM}_{t-1} + \varepsilon_{1t} \quad (1)$$

Where: t is the time period ($t = 1, \dots, t$) and shows the lag of each variable; $\ln\text{CO}_2$ indicates pollution emissions; $\ln\text{ELEC}$ is electricity consumption; and $\ln\text{GDP}$ is GDP real per capita; and ε_{1t} , ε_{2t} and ε_{3t} assuming the error rate in the model (error-term).

The second model to reveal the direction of the causality between economic growth, electricity consumption, and CO₂ emissions, it is investigated by applying the VECM Granger causality approach after confirming the cointegration between variables. According to Granger (1969) the vector error correction model (VECM) is more appropriate to check the causality between the series if the variables are integrated in $I(1)$. The VECM is a finite form of the autoregressive indefinite vector and restrictions are imposed if there is a long-run relationship between the circuits. The error correction model (ECM) system uses all series endogenously. This system allows the predicted variable to explain itself both by its own lag and the indolence of the force variable as well as in error-correcting terms and in terms of residual. The VECM equation is presented as follows:

$$(1-L) \begin{bmatrix} \ln\text{GDP} \\ \ln\text{ELEC} \\ \ln\text{CO}_2 \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} + \sum_{i=1}^p (1-L) \begin{bmatrix} \alpha_{11i} & \alpha_{12i} & \alpha_{13i} \\ \beta_{21i} & \beta_{22i} & \beta_{23i} \\ \gamma_{31i} & \gamma_{32i} & \gamma_{33i} \end{bmatrix} x \begin{bmatrix} \ln\text{GDP}_{t-i} \\ \ln\text{ELEC}_{t-j} \\ \ln\text{CO}_2_{t-k} \end{bmatrix} + \begin{bmatrix} \delta \\ \rho \\ \varphi \end{bmatrix} \text{ECT}_{t-1} + \begin{bmatrix} \rho_{1t} \\ \rho_{2t} \\ \rho_{3t} \end{bmatrix} \quad (2)$$

The long-run relationship between these variables is further confirmed by the statistical significance of the lagging error correction term (ECT_{t-1}). The ECT_{t-1} estimate

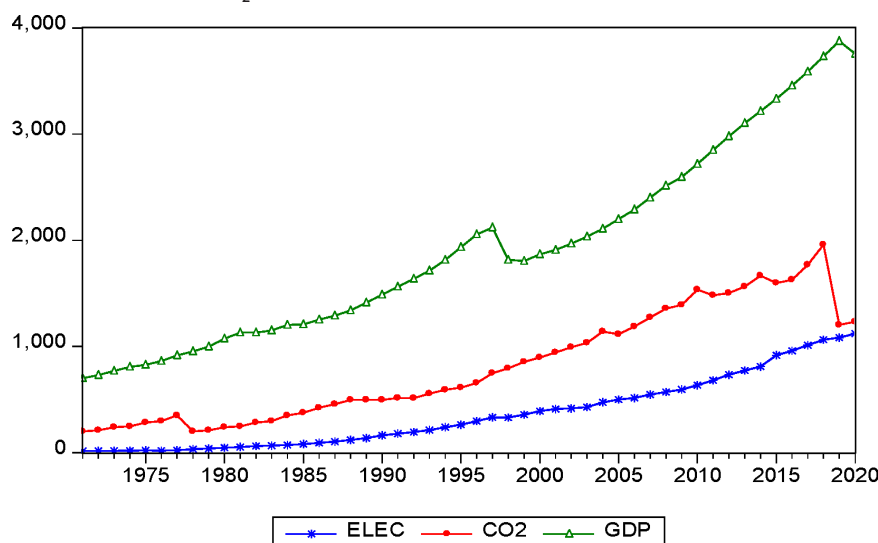
also shows the velocity of convergence from the short run to the long run equilibrium path. The vector error correction method is appropriate to test the causality between co-integrated variables and the causality in at least one direction. The VECM also distinguishes causality between the short and long run. The VECM is also used to detect causality in the long-run and short-run respectively. The term lagging error t-test is ECT_{t-1} with negative sign was used to test the long-run causal relationship and the X^2 combined statistical significance of the first difference estimate of lagging independent variables was used to investigate short-run causality. Granger's economic growth causes carbon emissions if $\alpha_{12,i} \neq 0 \forall_i$ are found to be statistically significant.

RESULTS AND DISCUSSION

The development of CO₂ emissions in Indonesia is currently showing a positive trend, CO₂ emissions produced by Indonesia in 2020 have reached 1120 million tons, with an average of 364 million tons, and the growth rate is 3.78 percent during the 1971-2020 period. Most of the CO₂ emissions produced by Indonesia come from illegal logging or peat forest fires which always occur during the dry season (Santika et al., 2017). In addition, CO₂ emissions are also generated from burning fossil fuels for energy in the industrial and transportation sectors. Economic development in Indonesia directly impacts the growth of other economic sectors.

The development of electricity consumption in Indonesia during the 1971-2020 period showed a positive trend throughout the year (Figure 1). The growth in average electricity consumption during the study period reached 9.30 percent. It cannot be denied that Indonesia is the world's fifth-largest coal producer and the world's tenth-largest producer of coal reserves. In addition, 58 percent of the primary energy source for electricity generation in Indonesia still uses coal. The increase in electricity consumption in Indonesia has worsened industrial development, and the population's production activities can directly increase electricity consumption.

Figure 1. Trends in CO₂ Emissions, Electricity Consumption, and Economic Growth



Economic growth seen from per capita income (purchasing power parity) from 1971-2020 showed a positive trend. Figure 1 shows that it is 3.49 percent. The main factor driving Indonesia's economic growth is still dominated by domestic demand, especially in household consumption, investment, and government consumption. Despite this, Indonesia's economic growth has slowed in the last five years. This condition is related to the relatively limited export performance in line with the weakening trend in world trade because of pressure from external turmoil.

Table 2. Descriptive Statistics Results

Descriptive	lnCO ₂	lnELEC	lnGDP
Mean	6.469	5.246	7.448
Median	6.451	5.634	7.504
Maximum	7.579	7.021	8.262
Minimum	5.296	2.664	6.552
Std. Dev.	0.719	1.356	0.489
Skewness	-0.155	-0.517	-0.088
Kurtosis	1.660	1.999	1.978
Jarque-Bera	3.940	4.314	2.237
Probability	0.139	0.115	0.326
Observations	50	50	50
Correlation			
lnCO ₂	-	-0.657	-0.724
lnELEC	-0.657	-	0.632
lnGDP	-0.724	0.632	-

Table 2 also reports the correlation matrix between the independent variables, indicating that the relationship matrix between the independent variables in this study has medium and low categories. Thus, this study model does not have multicollinearity statistical assumptions, which means that the study model can display the following stages.

Table 3. The Unit Root test

	Unit root test				
Variable	Critical (%)	value	level	ADF-test	first difference
			t-stat		t-stat
ln CO2	1%		-3.571		-3.574
	5%		-2.934	-1.396	-2.924
	10%		-2.529		-2.599
ln ELEC	1%		-3.643		-3.446
	5%		-2.922	-3.018	-2.978
	10%		-2.599		-2.592
ln GDP	1%		-3.573		-3.546
	5%		-2.829	-1.127	-2.927
	10%		-2.593		-2.592

Note: ***1%, **5%, *10% at significant level

Table 2 shows a statistical description of the study data for each variable. According to the results of the descriptive statistics, it can be interpreted that the central tendency of the variable is relatively good. The standard deviation results show a relatively small value. This result means that the standard deviation or dispersion is still relatively average. The Jarque-Bera results also show that the study's data were normally distributed with an observation period of 50 years.

Based on the study results on the variables presented in Table 3, it shows that in the stage testing, all variables contain unit roots, which means they are not stationary, meaning that at this stage, this study variable cannot be made in the next stage. Based on the alpha value of 5 percent in the test in the first stage, all variables do not contain a unit root. It is found that the time series data used is stationary. Thus, the variables that can be used in the study are in the first stage.

Table 4. Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	172.557	-	7.54e-08	-7.886	-7.763*	-7.841
1	185.727	23.890	6.22e-08	-8.080	-7.588	-7.899
2	198.638	21.618*	5.23e-08*	-8.262*	-7.402	-7.945*
3	206.832	12.576	5.52e-08	-8.224	-6.996	-7.771
4	209.861	4.226	7.53e-08	-7.947	-6.349	-7.357
5	220.024	12.763	7.53e-08	-8.001	-6.035	-7.276
6	224.003	4.441	1.03e-07	-7.767	-5.432	-6.906

* Indicates lag order selected by the criterion

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

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The results of the optimal lag length test on the time series data presented in Table 4 reports the optimal lag criterion in the data is lag two, this can be seen from the LR, FPE, AIC, SC, and HQ criteria which show that statistically, it supports lag two, variable This is tested with a distributed lag model. The cointegration relationship can only be formed by integrated variables to the same degree.

Table 5. Johansen cointegration test

Hypothesis	Trace test	Prob.**	Max-Eigen test	Prob.**
$r = 0^*$	36.798	0.006	24.466	0.016
$r \leq 1$	12.331	0.141	6.543	0.544
$r \leq 2^*$	5.788	0.016	5.788	0.016

Trace and Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

*Denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 5 shows the results of the cointegration test. This test is to obtain long-run relationships between variables in modeling. This test is done as a starting point to avoid false regression. If the linear combination between variables is stationary or $r = I(0)$. This result means that even though the variables used are not stationary, in the long run, these variables tend toward balance. Therefore, the linear combination of these variables is called cointegration regression, and the resulting parameters are called long-run coefficients. The test results presented in Table 5 report that the variables of economic growth, electricity consumption, and CO₂ emissions in Indonesia are co-integrated from the two tests through Trace and Max-Eigen. The trace statistical test indicates that three equations have cointegration at a significance level of 5 percent. While the Max-Eigen statistical test also shows three co-integrated equations at the 5 percent significance level. From 1990-2018, Indonesia's fourth economic growth variable, electricity consumption and CO₂ emissions have a positive long-run balance.

Table 6. Error correction representation of the selected ARDL model

Dependent Variable: $\ln\text{CO}_2$				
Long-run result				
Regressors	Coefficient	S.E.	t-stat	Prob.*
Intercept	0.380	1.677	0.227	0.821
$\ln\text{GDP}$	0.291	0.107	2.719	0.009***
$\ln\text{ELEC}$	0.611	0.299	2.043	0.046**
$R^2 = 0.926$; $\text{Adj.}R^2 = 0.923$; $F\text{-stat} = 29.005^{***}$; $\text{DW-stat} = 2.295$				
Short-run result				
Regressors	Coefficient	S.E.	t-stat	Prob.*
Intercept	0.080	0.014	5.714	0.000***
$\Delta\ln\text{GDP}$	-0.497	0.112	-4.437	0.000***
$\Delta\ln\text{ELEC}$	-0.162	0.253	0.640	0.525
$\Delta\ln\text{CO}_{2,t-1}$	0.135	0.064	2.109	0.041**
ECM_{t-1}	-0.522	0.127	-4.110	0.000***
$R^2 = 0.745$; $\text{Adj.}R^2 = 0.721$; $F\text{-stat} = 31.421^{***}$; $\text{DW-stat} = 1.994$				
Diagnostic test	χ^2 - test			
Serial correlation	0.485 [0.619]			
Heteroscedasticity	0.892 [0.477]			
Normality	3.765 [0.796]			

Notes: ***1%, **5% and *10% at significant levels respectively.

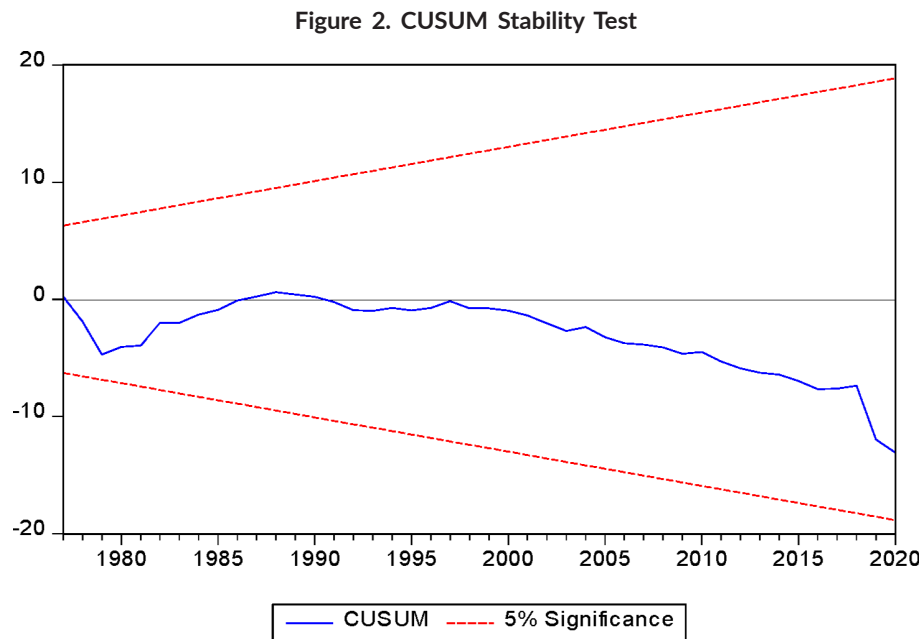
Table 6 reports the estimation results of the ARDL model showing that the estimated parameters are exogenous in the long run. The intercept value is 0.380, it is developed that statistically CO₂ emissions automatically increase by 0.380 percent with the assumption that other factors are constant. The parameter value for economic growth of 0.291 that

can be increased by 1 percent in economic growth will increase CO₂ emissions by 0.291 percent. Statistically, economic growth has a positive sign and a significant effect on CO₂ emissions with other assumptions being constant. These findings support the results of a study conducted by Bashir et al. (2021); Baydoun & Aga (2021); Lin et al. (2018); Majewska & Gierałowska (2022); and Rahman (2020). On the other hand, contrary to the results of a study conducted by Aye & Edoja (2017); Chontanawat (2020); and Osadume & University (2021).

Likewise for electricity consumption that has a parameter value of 0.611 that means that electricity consumption increases by 1 percent will increase CO₂ emissions by 0.611 percent assuming other factors are constant. These findings empirically can be interpreted that an increase in economic activity and electricity demand in the long run directly increases CO₂ emission (Khan et al., 2020; Osobajo et al., 2020). These policy changes in the long run have not been effective in reducing CO₂ emissions, this has an impact on the balance and carrying capacity of nature which in turn causes environmental changes and increased pollution (Manisalidis et al., 2020). Not only that, but other impacts are natural disasters such as floods and other natural disturbance (Davidsson, 2020). The use of energy, especially in the electricity sector, is still relatively large in Indonesia, which can encourage an increase in the concentration of CO₂ emissions. In the ecological theory, all energy sources have an impact on the environment, especially fossil fuels such as coal, oil, and natural gas are far more dangerous than renewable energy sources by most actions, including air and water pollution, damage to public health, full of wildlife and habitats, global water use, land use, and emissions. These findings are in line with and support the study results Arouri et al. (2012), Fauzi (2017), Shahbaz et al. (2013), and Wang et al. (2011) which also found evidence that energy consumption for electricity has a significant and positive influence on the environment.

Table 6 also reports the estimation results in the short run. The intercept value is 0.080, which indicates that CO₂ emissions can increase independently by 0.080 percent, assuming other factors do not change. The value of the GDP variable parameter in the short run is -0.497. This result indicates that an increase in the economic growth of 1 percent can reduce CO₂ emissions is -0.497 percent assuming other factors are constant, which means that economic growth negatively affects CO₂ emissions. This indicates that the government can still control environmental risks due to increased economic activity through standard policies in the short run. Likewise, the negative parameter value of electricity consumption is -0.162 but has no significant effect on reducing CO₂ emissions.

Meanwhile, the lag of the CO₂ emission parameter is 0.135, which means that a 1 percent increase in CO₂ emissions from the previous year can increase CO₂ emissions is 0.135 percent. This result indicates that last year's CO₂ emissions were positive and had a significant effect on CO₂ emissions. As anticipated, the error correction model (ECM) is negative (0.522), which indicates that corrections made in the previous period can be corrected in the next period.



In theory, economic growth means an increase in real output created from production and consumption activities, in the short run an increase in economic activity can still be controlled by standard policies and an increase in electricity demand in the short run does not have a significant effect on increasing CO₂ emissions in Indonesia. These findings are in line with and support the study results by Bargaoui et al. (2014); Liu et al. (2016); and Wang et al. (2017) found evidence that economic growth has a significant effect on increasing CO₂ emission in various developing countries.

Figure 2 shows the Cumulative Sum of Recursive Residual (CUSUM) stability test, which shows that the model used is stable because the CUSUM line is still between the 5 percent significant line. Thus, the emission of CO₂ emissions changes economic growth and increases electricity consumption in Indonesia.

The results of the Granger causality test in the short term are presented in Table 7; there is evidence of a unidirectional relationship that runs from CO₂ emissions to economic growth, this relationship occurs when uncontrolled CO₂ emissions control freely stimulates economic growth. The findings are unavoidable considering that policies in promoting economic growth have not been in line with controlling the impact of pollution. This finding confirms the results of a study conducted by Azam et al. (2016), Issaoui et al. (2015), Osobajo et al. (2020), and Saidi & Hammami (2015). A unidirectional relationship from economic growth to CO₂ emissions was found in the study conducted by Adom et al. (2012), Kim et al. (2010), Radmehr et al. (2021), and Shikwambana et al. (2021). These findings contradict the study conducted by Kasperowicz (2015), and Odugbesan & Rjoub (2020) found that there is no causality between economic growth and CO₂ emissions.

Table 7. VECM Granger Causality test

Dependent Variable	Causality test			Log-run ECT _{t-1}
	Short-run			
	$\Sigma \Delta \ln \text{CO2}_{t-1}$	$\Sigma \Delta \ln \text{GDP}_{t-1}$	$\Sigma \Delta \ln \text{ELEC}_{t-1}$	
$\Delta \ln \text{CO2}_t$	-	0.576 (0.749)	3.102*** (0.001)	-0.117*** [-3.179]
$\Delta \ln \text{GDP}_t$	-3.039** (0.042)	-	0.917 (0.632)	-0.122** [-2.181]
$\Delta \ln \text{ELEC}_t$	0.635 (0.728)	6.238** (0.004)	-	-0.045*** [-4.672]

Note: *10%, **5% and ***1% at significant levels respectively; () probability; [] t-stat

Government policies encourage increased economic activity directly impacting household electricity needs, especially in urban areas. There is also evidence of the direct unidirectional relationship between economic growth to electricity consumption. These findings support the results of a study conducted by Bayar & Özel (2014), Cowan et al. (2014), Rahman (2020), Shengfeng et al. (2012), Thaker et al. (2019), and Thapa-Parajuli et al. (2021). The results of the study which also got the opposite result were carried out by Altunbas & Kapusuzoglu (2011), Atchike et al. (2020), Bildirici (2012), Shengfeng et al. (2012), and Thaker et al. (2019) found a unidirectional relationship from electricity consumption to economic growth. The results contradict this study conducted by Bah & Azam (2017), and Ibrahiem (2018) found no causal relationship between economic growth and electricity consumption.

The policy of meeting the increasing electricity demand is the main factor causing the increase in coal consumption in Indonesia, which directly increases CO2 emissions. Therefore, it is necessary for the role of all parties to encourage energy savings to maintain energy security and reduce the increase in CO2 emissions in this context. Likewise, there is a unidirectional relationship between electricity consumption and CO2 emissions at a significance level of 5 percent. This finding supports the results of a study conducted by Al-Mulali & Che Sab (2018), Bildirici (2012), Chontanawat (2020), and Rahman (2020). Conflicting findings from the results of a study by Bah & Azam (2017), and Rahim et al. (2018).

The cointegration estimation results show that the error correction adjustment coefficient in this equation shows evidence of a speed of convergence towards a long-term balance between economic growth, electricity consumption, and CO2 emissions in Indonesia at a significant level of 5 percent. The error correction term (ECT) coefficient of $\ln \text{CO2}$ is negative and statistically significant at 5 percent with a speed of convergence towards equilibrium of 11.7 percent. Therefore, it is assumed that in the short run, $\ln \text{CO2}$ will be adjusted by 11.7 percent of last year's deviation from equilibrium. Furthermore, $\ln \text{GDP}$ is negative and statistically significant at 5 percent with a speed of convergence towards balance adjustment of 12.2 percent. Therefore, it is assumed that in the short

run, $\ln GDP$ will be adjusted by 12.2 percent of last year's deviation from equilibrium. Likewise, the error correction term coefficient for $\ln ELEC$ is negative and significant at the 5 percent level with the speed of convergence towards balance adjustment of 4.5 percent. Therefore, it is assumed that in the short run, $\ln ELEC$ will be adjusted by 4.5 percent of last year's deviation from equilibrium. This finding is in line with the results of studies conducted by Bah & Azam (2017); Khan et al. (2020); Rahim et al. (2018); Salahuddin et al. (2015); Soytaş et al. (2007); and Thaker et al. (2019).

The variance decomposition test aims to measure the contribution and composition of the effect of each variable on the endogenous variables over the following ten periods. Table 8 reports that the standard deviation shocks caused by economic growth and electricity consumption in period 10 contributed 6.27 percent and 23.88 percent, respectively, to CO_2 emissions. The composition of the prohibition on electricity consumption is relatively dominant in Indonesia's economic growth of CO_2 emissions. However, this finding predicts that the contribution of electricity consumption and economic growth to environmental damage in Indonesia is still relatively low compared to the contribution of the CO_2 emission variable over the next ten years.

Table 8. Forecast error variance decomposition analysis

Variable	Period	S.E.	$\ln CO_2$	$\ln GDP$	$\ln ELEC$
$\ln CO_2$	1	0.113	100.000	0.000	0.000
	5	0.161	87.917	5.580	6.503
	10	0.183	69.855	6.268	23.877
$\ln GDP$	1	0.033	0.0215	99.979	0.000
	5	0.080	5.298	94.693	0.009
	10	0.093	11.115	87.118	1.767
$\ln ELEC$	1	0.071	13.424	3.723	82.853
	5	0.170	11.707	11.584	76.709
	10	0.221	9.504	14.484	76.011

Cholesky Ordering: $\ln CO_2$, $\ln GDP$, $\ln ELEC$

The decomposition variance of the existing energy consumption variable, the standard deviation of shocks originating from the CO_2 emission variable, and electricity consumption on economic growth contributed 11.12 percent and 1.77 percent in the following ten periods. This result shows that CO_2 emissions have a more dominant influence on economic growth than electricity consumption, but during the early to the late period, electricity consumption shows an increasing trend towards economic growth as the effect of CO_2 emissions. This finding assumes that CO_2 emissions occur because of more efficient energy consumption. Meanwhile, electricity consumption shows a positive influence on economic growth. This condition is related to the relative slowdown in Indonesia's economic growth from the previous year due to the global economic contraction.

The results of the decomposition of the electricity consumption variable variance, the influence of standard deviation shocks originating from the CO₂ emission variable, and economic growth contributed 9.50 percent and 14.48 percent, respectively, to electricity consumption in the following ten periods. This result shows that economic growth has a more dominant effect on electricity consumption for ten periods. Then the electricity consumption variable contributes to the electricity consumption by 76.01 percent. This condition shows that electricity consumption in Indonesia has led to an increase in electricity consumption itself, even though these developing countries need to control energy consumption for electricity optimally and efficiently because energy consumption that exceeds the limit can have a negative impact on environmental, economic, and social sustainability.

CONCLUSION

Based on the research findings, the conclusions of this study are as follows. First, evidence from the ARDL model shows that economic growth and electricity consumption significantly affect CO₂ emissions in the long run. In contrast, in the short run, economic growth is negative, emission lags CO₂ is positive and has a significant effect on CO₂ emissions, while electricity consumption does not affect CO₂ emissions in Indonesia. Second, evidence from the VECM Granger causality shows that in the short run, there is unidirectional causality from economic growth to electricity consumption. Besides that, there is unidirectional causality from electricity consumption to CO₂ emissions and a unidirectional causality flowing from CO₂ emissions to economic growth. In contrast, evidence from the ECT coefficient value on the Granger causality VECM, in the long run, shows a speed of convergence towards a balance adjustment from the short to the long run in the equations of economic growth, electricity consumption, and CO₂ emissions.

Unexpectedly, electricity consumption increases CO₂ emissions, and economic growth increases electricity consumption, and CO₂ emissions drive economic growth because pollution control is less than optimal in the short term. The implications of the study model can be the basis and source of information in environmental policy improvement policies, this country needs to implement development policies that prioritize pollution control, emission taxes, and energy conservation on electricity consumption, such as the use of renewable energy consumption can be an alternative to CO₂ emission control. The policy offered in this study is to encourage the implementation of emission taxes and energy conservation, especially in the provision of efficient and sustainable electricity, to increase the productivity of energy-efficient project implementation to achieve GDP growth.

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Do Education Investment and Welfare of Labor Affect Productivity Growth in Indonesia?

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Abstract

Increasing the education budget in Indonesia has become the focus of economic politics because it is a fundamental issue. Education, as a significant component of labor productivity, plays a vital role in driving the welfare of the workforce due to the increase in the Total Factor Productivity (TFP). This paper aims to test the quality of tertiary education by using World Bank and APO data. This paper provides an overview of tertiary education that influences TFP when juxtaposed with several other control variables and uses the ARDL (Autoregressive Distributed Lag) test. The results show that TFP growth is significantly positively affected by the improvement of tertiary education quality and production capital but is significantly affected by the welfare of the workforce. This study implies that the government must allocate an adequate budget to improve education quality in Indonesia.

Keywords:

tertiary education investment; total factor productivity; labor welfare; ARDL model

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INTRODUCTION

As a country with an adequate number of populations, Indonesia continues to carry out human development to improve the quality of life of its people. The consensus of the founders of Indonesia has given some perspectives about the nation's management through education. The spirit from the Indonesian founders was realized by including a piece of the phrase in the opening of its constitution that states "to educate the life of the nation and advance public welfare."

The progress of the nation's education quality reflects in the rapid progress of science and technology. According to the economic development proposition, increasing the quality of education will have an impact on increasing a country's economic growth. Empirical facts influence this proposition that high economic growth is determined by physical capital and the quality of human capital. In turn, the advancement of education must be a factor in increasing labor productivity because it is the driving force for economic growth that leads to the welfare of the country's population (Nafziger, 2012; Reza & Widodo, 2013). Marquez-Ramos & Mourelle (2019) conclude that secondary and tertiary education matters for economic growth.

The purpose of education itself directs the relationship of education with economic growth and welfare (Reza & Widodo, 2013; Al Arif, 2014; Marquez-Ramos & Mourelle, 2019; Ziberi et al., 2022). Knowledge is a means to educate individuals so that individuals can increase their productivity (Levedinski & Vanderberghe, 2014). Increasing individual productivity will be an input in the development of a country. Education can add value to spending in the economy and income. However, someone with the same income can benefit from education because he can read, communicate, refute, and choose choices with better knowledge and can be considered by others (Todaro & Smith, 2009).

Human capital refers to labor investments in education and training to improve workforce quality (Qu & Cai, 2011). Given the same amount of time and capital equipment, the number of workers who have been trained and become skilled will produce a more significant output than the number of untrained and unskilled workers. The average product of labor is increasing because of investment in human capital, which positively impacts productivity. Many studies show that investment in human resources to improve the quality of economic labor has the same effect as an investment in physical capital that increases the supply of tools in production.

All countries in the world experience practical struggles with education investment, both developed and developing countries. Inevitably, Indonesia also experienced the same building dynamics as other countries worldwide. The benchmark of education investment in Indonesia can be shown from the Ranking of the Human Development Index, at least in Southeast Asia (ASEAN). Educational investment defines as a form of expenditure in order to improve education. Todaro & Smith (2009) argue that formal and informal education is considered one form of investment in the quality of human capital other than health and migration. Education will

increase labor productivity and result in increased income and the welfare of those workers (Setyonaluri & Amanulah, 2018).

One of the mirrors of education investment issued by the community is the size of the average length of school life in a country. This condition becomes crucial in measuring government expenditure to develop the quality of human resources. The achievements of the Indonesian government in increasing the ranking of the Human Development Index (HDI) are certainly reflected in the state budget allocation policy for education. Table 1 provides an overview of the Indonesian Human Development Index compared to other ASEAN countries.

Table 1. Ranking of Human Development Index

Countries	Human Development Index (HDI)			
	2014	2015	2016	2017
Singapore	0.928	0.929	0.930	0.932
Brunei Darussalam	0.853	0.852	0.852	0.853
Malaysia	0.790	0.795	0.799	0.802
Thailand	0.735	0.741	0.748	0.755
Philippines	0.689	0.693	0.696	0.699
Indonesia	0.683	0.686	0.691	0.694
Vietnam	0.678	0.684	0.689	0.689
Laos	0.586	0.593	0.598	0.601
Cambodia	0.566	0.571	0.576	0.582
Myanmar	0.564	0.569	0.574	0.578

Source: World Bank (2018)

The problem of education in Indonesia is inherently arising because of the main underlying problem of the population in poverty. These problems include the causes of the rapid investment in education in Indonesia. The issue of poverty in Indonesia looks acute and wrapped around many residents. This fact can be seen in the data on the number of poor people in Indonesia. Moreover, the gap occurs between the city's population and the village's population. Table 2. explains the percentage of the poor in Indonesia.

The poverty gap between regions in Indonesia has caused a lack of equal investment in education. Equitable development that has not been resolved will undoubtedly hinder the pace of investment in each district or province in Indonesia. The reason for this is that people experience natural poverty by the condition of open access to resources. Community access to natural, human, and development resources is less accessible openly than others. The community is also involved in the development mechanism but has role limitations. They are only involved in being cheap workers or unskilled workers.

Discussing the conditions of economic inequality, Indonesia continues to make improvements. In 1999 a new chapter began. Indonesia Central Bureau of Statistics (BPS) increases the standard used in determining the poverty line and recalculates the poverty rate used in 1996, which then changes it using the new standard method. This new standard method resulted in higher figures obtained during the economic crisis. When the 1996 crisis, the poverty rate was 17.3%. The new standard method reduced the poverty rate to 23.4% in 1999.

Although initially, there were steeper differences between calculations using the old standard methods and new standard methods, in the end, the method succeeded in correcting poverty in the coming years to be more equitable. As a result of the implementation of this method, it showed in 2002. It is illustrated that the Indonesian poverty rate increased to 18.2%, although it fell to 17.4% the following year. The next phenomenon explains Indonesia's poverty rate in 2006, the data for that year illustrates that Indonesia experienced an exceptional condition because the poverty rate increased to 17.8%. This condition is due to the government's policy to increase the price of fuel oil. The increase in National Oil Prices is extreme at around 120 percent of the original price. After a period of rising oil prices, Indonesia continued to experience poverty levels gradually. Even in 2009, the impact of the increase in oil prices remained a factor in poverty, so Indonesia's poverty rate reached 14.2%.

Table 2. Number and Percentage of Poor Population in Indonesia

Year	Number of Poor People (Million People) Urban + Rural			Percentage of the Poor			Poverty Line (IDR/Kapita/Month)	
	Urban	Rural	Urban + Rural	Urban	Rural	Urban + Rural	Urban	Rural
2000	12.31	26.43	38.74	14.60	22.38	19.14	91632	73648
2005	12.40	22.70	35.10	11.68	19.98	15.97	165565	117365
2010	11.10	19.93	31.02	9.87	16.56	13.33	232989	192354
2015	10.62	17.89	28.51	8.22	14.09	11.13	356378	333034
2016	10.49	17.28	27.76	7.73	13.96	10.70	372114	350420
2017	10.27	16.31	26.58	7.26	13.47	10.12	400995	370910

Source: Indonesian Central Bureau of Statistics (2017)

In general, the education sector has significantly developed, especially after the reform era. This fact can see in the development of educational data from time to time in the government. As an illustration of the data, in the period 1990-2010, BPS noted that at the age of 19 years and over the population of Indonesia had completed the level of education at junior high level and above as well as high school level. Interestingly,

the data released by the IFLS explains that the 1997 economic crisis and its impact on per capita income also impacted education development. However, the IFLS data showed that 94.1% had completed primary education (Wicaksono & Witoelar, 2019). Table 3 explains the number of school enrollments in Indonesia.

The facts certainly affect the poor because these conditions cause them not to fulfill their basic needs and the need for school fees for their families. Theoretically, this also impedes economic development. Gherghina & Duca (2013) illustrate that economic development is contributed by education and human development, with the main focus on education spending and the level of employment to reduce a country's poverty level. There is a significant relationship between economic development and human development contributing to labor productivity (Mat, 2015).

This study aims to look at the impact of education investment on the productivity and welfare of workers in Indonesia. This study emphasizes the aspect of education through the level of tertiary education enrollment, the proxies of labor productivity using total factor productivity as well as production capital and GDP as the level of labor welfare. This study follows the solo growth theory, where human capital is included in economic development.

Table 3. Explain the Number of School Enrollment in Indonesia 1994-2016

Gross Enrollment Rate	Elementary School	Junior High School	Senior High School	College
(GER)	(SD/MI)	(SMP/MTs)	(SMA/SMK/MA)	(PT)
1994	107.13	64.36	43.04	10.14
1996	107.19	70.46	44.87	10.37
1998	107.60	73.14	47.17	10.64
2000	107.68	77.62	50.22	10.26
2002	105.99	79.81	48.00	10.54
2004	107.13	82.24	54.38	10.73
2006	109.96	81.87	56.69	12.16
2008	109.41	81.38	57.42	14.42
2010	111.63	80.35	62.53	16.35
2012	104.15	89.26	68.32	18.92
2014	108.87	88.63	74.26	25.26
2016	109.31	90.12	80.89	27.98

Source: Indonesian Central Bureau of Statistics (2018)

Talking about educational investment in human capital becomes a framework of thinking as the basis of research concepts for improving educational competitiveness. The

acute problem of Indonesian education is not in education but in the problem of human resource development. In the first step in reviewing the literature review of this study, the author would like to present the results of the latest research from the Indonesian Educational Monitoring Network (JPPI). In 2017, this institution conducted research on the right to education. His research aims to measure the fulfillment of the right to education in the country. The research was conducted in 14 randomly selected countries: Britain, Canada, Australia, Philippines, Ethiopia, South Korea, Indonesia, Nigeria, Honduras, Palestine, Tanzania, Zimbabwe, Congo, and Chile. The results obtained in the Right to Education Index (RTEI) study state that the quality of Indonesian education is still below the Philippines and Ethiopia.

Human capital measures education, capacity, and workforce attribute that affect production capacity and labor income potential. Concerning the Underlying assumptions of the theory of human capital, the theory explains that a person can increase income through education. It can be illustrated just as every workforce gains an additional one year of school, meaning that on the one hand, it is hoped that the person will improve their work capacity and increase their level of income. However, on the other hand, he will delay receiving income for one year because of attending school. Knowledge and externalities of human resources are important factors to explain differences between countries in growth rates, as expressed by Klenow (2005) and differences in regional development (Lucas, 1988; Moretti, 2004; Wantchekon et al., 2015; Woessmann, 2016). The social benefits of human capital are only partly reflected in personal outcomes for education (Wantchekon et al., 2015).

Economic literature also explains that human capital is essential in total factor productivity (TFP) growth. The theory of total factor productivity (TFP) is determined by the average level of produced human capital. Economists have elaborated on this opinion in a literature review that supports this theory. Contemporary economists continue to strengthen their studies, such as Wei & Hao (2011) and Aggrey et al. (2010), which describe the role of education outside physical capital. However, human capital development through education greatly supports total factor productivity (TFP) through technology transfer facilities (Qutb, 2017). Likewise, education causes increased productivity because of the correlation between education and increased wages (Bokana & Akinola, 2017).

Furthermore, Barro (1991) provides empirical evidence to support the endogenous growth theory. His study concludes that the growth rate of Gross Domestic Product (GDP) per capita is positively related to human capital. Qutb (2017) also highlights the new endogenous growth theory of the ability of labor to increase productivity. Strengthens the theoretical basis that the primary key of human capital causes an increase in economic growth. Human capital has an impact on the welfare of the workforce through education, training, and experience. This theory assumes that investment in human capital through education has internal and external effects on labor productivity.

The condition of countries that experience a higher percentage of school enrollment will increase per capita income. This condition is because the trend of increasing school enrollment significantly strengthened productivity (Bils & Klenow, 2000; Ali & Jabeen, 2015). Higher education strongly influenced economic growth in France from 1899-1986, Japan from 1885-1975, Sweden from 1910-1986, British from 1999-1987, Australia from 1906-1986, and Italy from 1885-1996 (Yusuf & Zakariya, 2009). The scientific descriptions have been corroborated by Nafziger (2012), which explains their results about the average school year for both men and women in secondary and higher education, significantly correlated with the GDP growth rate per capita.

Measuring the relationship between school enrollment ratios and literacy rates has been focused on (Mankiw et al., 1992), but this data is not enough to measure the aggregate stock of human capital available together as input for production (Barro & Lee, 2010). Concerning the school enrollment factor that is a factor of per capita income, of course, this is a proxy as an effort to measure approaches in empirical studies.

Although many studies have discussed the effect of education on productivity levels, limited studies have been conducted over a reasonably long period. This study looks at the impact of education on welfare and productivity levels in Indonesia from 1981 to 2015. Therefore, this study aims to examine the effect of education on welfare levels and productivity levels in Indonesia.

METHODS

The data used in this study is time series data, sourced from World Bank and APO data. The data taken includes several variables that can represent (proxy) variables that can explain the purpose of this study. The main focus is the measurement of Total Factor Productivity (TFP). Total Factor Productivity (TFP) are associated with production factors such as production capital to measure production inputs and also encourage innovation in production equipment because of educational output (Barro & Lee, 2010). Then the size of the tertiary school enrollment ratio is taken as a proxy for higher education. This is used in Lubis's research (2014), data with similar education variables have also been used by Barro & Lee (2010). Ali & Jabeen, (2015), besides using education variables in the form of registration numbers also uses GDP, as a proxy for economic welfare.

After getting to know the variables that were made the proxy in this study, the author will move to the data processing section with Autoregressive Distributive Lag (ARDL), through a co-integration approach. This determines the existence of the relationship between the variables examined, also determines the pattern of relations of the variables studied. The ARDL approach is chosen because it can accommodate a large number of variables. Then this model also allows for long-term forecast conclusions that are not possible for other co-integration procedures. Furthermore, The next step is to examine the existence of long-term relationships between variables and as a final test is to test the short-term relationship between variables.

The first step begins by testing the nature of the time series. This test serves to see data stationary conditions. This test also determines the order of integration between variables that functions to detect long-term model relationships. The root test unit with Dickey-Fuller (ADF) can be seen from the following general equation:

$$\Delta Y_t = \alpha + \beta_t + \gamma \Delta Y_{t-1} + \delta_1 \Delta Y_{t-1} + \dots + \delta_p \Delta Y_{t-p} + \varepsilon_t \quad (1)$$

Equation can be interpreted that Y is a time series variable, α is a constant and β is a time coefficient (t), then p is a sequence of lag from the autoregressive process and ε_t is an error. After doing the unit root test, it is then building a long-term relationship between variables. This approach is useful for testing the limits of co-integration Shin et al. (2001), then followed by the Autoregressive Distributed Lag (ARDL) boundary test approach of co-integration.

$$\Delta Y_t = \alpha + \delta_t + \rho Y_{t-1} + \gamma_1 \Delta Y_{t-1} + \dots + \gamma_{p-1} \Delta Y_{t-p+1} + \theta X_{t+\omega 1} \Delta X_t + \dots + \omega_q \Delta X_{t-q+1} + e_t \quad (2)$$

Equation (2) shows the method of co-integration. ARDL in this area has the benefit of conducting a bivariate co-integration test. Multivariate co-integration also applies to large but unreliable samples for small samples. Besides that, using ARDL Co-integration will benefit from testing for the existence of relationships between integrated variables in first order, l (1) and sequence l (0) or mutual integration. Referring to the literature above, the following functions are obtained

$$\ln TFP = F(\ln GDP, \ln CP, \ln EN3)$$

Therefore, the ARDL model form will be as follows:

$$\begin{aligned} \Delta TFP_t = & \alpha_0 + \alpha_1 \ln TFP_{t-1} + \alpha_2 \ln GDP_{t-1} + \alpha_3 \ln CP_{t-1} + \alpha_3 \ln EN3_{t-1} + \\ & \beta_0 \Delta \ln TFP_{t-1} + \beta_1 \Delta \ln GDP_{t-1} + \beta_2 \Delta \ln CP_{t-1} + \beta_3 \Delta \ln EN3_{t-1} + \beta_4 \Delta \ln DGP_t + \\ & \beta_5 \Delta \ln CP_t + \beta_6 \Delta \ln EN3_t + U \end{aligned} \quad (3)$$

Equation (3) shows that independent variable (dv) ΔTFP_t represents total factor productivity growth. Then for the independent variable (dv) $\ln GDP$ is showing GDP growth while $\ln CP$ is tertiary education capital productivity and enrollment. The Independent variable is expected to have an impact on TFP in Indonesia and this model is able to capture the condition of tertiary level investment in Indonesia (1981-2015).

The next step is the co-integration procedure on ARDL that must be taken in two stages. The first procedure is testing the existence of a long-term relationship between the variables studied and the expected results are the significance numbers of each variable. The method is to compare the value of F statistics from the Bound test. Stepping into the second procedure is estimating long-term relationships with short-term variables.

RESULTS AND DISCUSSION

The long-term relationship between TFP and Independent variables is examined using ARDL. Table 4 explains that all the variables studied (TFP_t, GDP_t, CP_t and En3_t) show stationary at level d (1). After that followed by regression analysis. Table 5 shows the co-integration test between variables. The result states that the F-statistic value exceeds the critical value of the limit at the level of 5% (4.35). So, the null hypothesis that there is no co-integration is rejected (rejected), so it is concluded that there is a long-term co-integration relationship between variables.

Table 4. Results of the ADF and PP Tests for Root Test at Level and First Difference

Variable	ADF				PP			
	Level		First Different		Level		First Difference	
	I(0)		I(1)		I(0)		I(1)	
	Intercept	Intercept And Trend	Intercept	Intercept and Trend	Intercept	Intercept and Trend	Intercept	Intercept and Trend
Ln_TFP	-2.24	-2.31	-4.33	-4.23	2.28	2.12	4.28	-4.17
Prob.	0.196	0.416	0.002	0.011	0.183	0.517	0.000	0.012
Sig.	(0)	(0)	***	**	(0)	(0)	***	***
Ln_GDP	-0.54	-2.75	-6.66	-6.48	-0.52	-2.99	-6.63	-6.49
Prob.	0.870	0.222	0.000	0.000	0.874	0.149	0.000	0.000
Sig.	(0)	(0)	***	***	(0)	(0)	***	***
Ln_CP	-1.79	-1.97	-3.97	-3.92	-1.69	-1.76	-3.91	-3.86
Prob.	0.379	0.594	0.005	0.023	0.425	0.702	0.005	0.026
Sig.	(0)	(0)	***	**	(0)	(0)	***	**
Ln_EN3	-1.40	-2.64	-6.66	-6.48	-1.40	-2.64	-6.67	-6.96
Prob.	0.571	0.268	0.000	0.000	0.571	0.268	0.000	0.000
Sig.	(0)	(0)	***	***	(0)	(0)	***	***

Notes : The number in parentheses represents the length of lag utilized in the ADF test (ad determined from the set of SIC to a maximum of 7) for the rejection of serial correlation in the residual.

** and *** indicate significance at the 5% and 1% levels, respectively.

After going through the stage of confirmation of the co-integration relationship with F-statistics, then it can be seen the diagnostic test of the ARDL Model with a long-term model. The ARDL method shows that the level of total factor productivity in the long term is significantly positive affected by the improvement of the quality of education at the tertiary level (EN3) but with a lower coefficient, wherein the amount of 1 million

workers with higher education will only add TFP of 0.03%. Further information shows in table 6.

This result means that only 0.03% of tertiary-level workers are adding TFP growth from the drive for innovation and imitation. The positive aspect of long-term growth is the production capital factor, in which capital input production and technology positively affect TFP at a value of 18%. While GDP has a negative contribution to TFP, it can be seen that the welfare proxies of workers experience inequality. This result can be interpreted as unequal labor income distribution experienced in Indonesia.

Tabel 5. F-Statistik of Cointegration Relationship

Dependent Variable : LnTFP			
F-Statistik = 7.0383 K = 3			
Kritikal Value			
Significal Level	Lower Bound I(0)	Upper Bound I(I)	Remarks
1%	2.72	3.77	Cointegrated
5%	3.23	4.35	Cointegrated
10%	4.29	5.61	Cointegrated

Note: Number of independent variable (k) = 4

The next step is to find the stability model of the ARDL model by looking at the plot of the recursive cumulative residue (CUSUM) as given in Figure 1. Short-term dynamic stability and long-term balance parameters of TFP growth are shown that CUSUM squared remains at the 5% critical limit represented by two straight line in figure 1.

Table 6. ARDL Results

ARDL (1, 1, 0, 0) Dependent Variable is LnTFP				
Variable	Coeffisien	Standart Error	t-Statistik	Probability
C	1.485739	0.494926	3.001942	0.0057
LN_TFP(-1)*	-0.196146	0.076074	-2.578359	0.0157
LN_CP(-1)	0.187217	0.050858	3.681181	0.0010
LN_EN3**	0.039208	0.014394	2.723985	0.0112
LN_GDP**	-0.335708	0.106828	-3.142510	0.0040
D(LN_CP)	0.893362	0.043587	20.49592	0.0000

*and ** indicate significance at the 5% and 10% levels, respectively

The diagnostic test will be shown in table 8 below. A diagnostic table is a functional form of several tests: residual serial correlation (LM test), Reset Ramsey Test, residual normality (Histogram: Jarque-Bera normality test), and heteroscedasticity test. The test values are listed in Table 7.

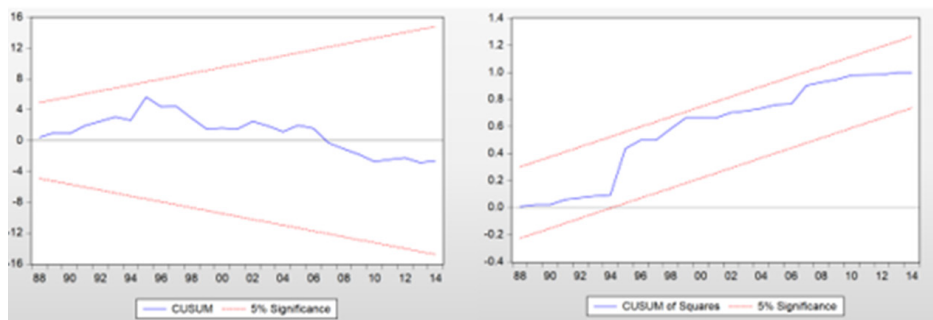
Tabel 7. Diagnostic Test of the ARDL Model

Breush-Godfrey serial correlation LM test	f-statistics 0.926 prob (0.41) Chi-square prob (0.32)
Heteroscedasticity test : Breush-pagan-Godfrey	Chi-square prob(0,28) f-statistik prob (0.31)
Ramsey (RESET) test	f-statistik (0.22)

P Values in paranthese

This paper attempts to unravel the relationship between Total Productivity Factors, welfare, and education investment in Indonesia. The results show that workers with tertiary level education have a positive impact on TFP. Likewise, production input factors such as production capital. However, GDP, which is a proxy for labor welfare, contributes to TFP. This fact shows that the income gap in Indonesia is significantly sharp. The income gap shows that income inequality will affect education investment and have implications for the Total Factor Productivity (TFP) because inequality affects the accumulation of human capital. However, at the same time, inequality affects growth. This study has explicitly the same findings as the research findings from Lee & Lee (2018). Inequality in welfare will affect spending on education. Though public education spending helps reduce educational inequality. Likewise, the findings from Gregorio & Lee (2002) confirm that the Kuznets Invested-U Curve explains that government social expenditure contributes to a more even distribution of income. Hence, the empirical facts in his research say that education and distribution achievements more equitable education related to income distribution is proven.

Figure 1. Plot of Cumulative Sum of Recursive Residuals



Productivity can be understood as a measure that can illustrate the extent to which physical capital, natural resources, technology, and humans are used correctly and can achieve specific desired outcomes. The meaning of productivity is a measure of how far inputs can produce output, both quantitative and qualitative, according to the standards applied (Antarwati, 2018). Higher productivity levels are influenced by increased hours of work, training, education, rewards, labor guarantees, and safe and comfortable working conditions. The important role of human capital in large productivity growth is also much

explained in the economic literature (Van Lottum & Van Zanden, 2014; Mate, 2015). The theory of human capital still rests on the assumption that education is a factor that can increase the marginal physical product of workers. However, the introduction of resource input stalled until the 1980s, and eventually, economists appeared like human capital (Ziberi et al., 2022). Human capital accumulation can sustain long-term growth (Aggrey et al., 2010).

In a study that looked at the gap between GDP in Latin America concerning the USA, Daude & Fernández-arias (2010) explained that disparities in capital per worker, human capital, labor participation, and productivity factors. The research showed low economic growth rates in America due to the low productivity growth compared to the low production factors. Likewise, the results of the research conducted by Mcmillan (2011) looked at labor productivity based on sectors in developed and developing countries. They carried out treatment as a hypothesis where the labor supply in developing countries is assigned to sectors following patterns in developed countries. The result shows that labor productivity needs to be increased through investment in human resources and technology within the industry. They are called internal components, and then he moves labor from the low productivity to high productivity sectors called structural elements (Caceres & Caceres, 2017).

The concept of Total Factor Productivity (TFP), defined as the ratio between output and real input factors, can undoubtedly be traced back to the theoretical source (Solow, 1956). This was explained clearly by van Zanden & Marks (2012). Solow's theory parses the answer to the question of a proposition about documented economic growth that can be linked between growth in the stock of capital and labor growth. In economic theory, it is referred to as the calculation of growth. The calculation is still initiated using the Cobb-Douglas production function formula.

In Indonesia, the statement was also supported by Prabowo (2015), which stated that the Indonesian government tended to experience a level of income inequality. This is evident when examining data on income inequality in Indonesia between 1992-1997 and 1998-2013. The research findings tend to justify the change in political leadership in Indonesia, which has implications for the policy of increasing fuel prices that occurred in 2005. In 2008-2009 there was also a world financial crisis.

Furthermore, this research is also relevant to Prabowo (2015), which answers the empirical facts to the findings of our results, namely, GDP becoming a negative factor in TFP growth. The empirical facts described by Prabowo (2015) explain that Indonesia experienced an upward trend in the industrial sector, with evident growth occurring in the industrial sector. This fact means that industry revenues tend to rise, but this is followed by a rise in this coefficient and no significant improvement in poverty-level changes. The same thing is said by Castello & Dome (2002) that inequality of human capital gives a more decisive result than the measurement of income inequality in estimating changes and investment equations.

CONCLUSION

This study aims to examine the effect of education on productivity levels in Indonesia. The results show that education, especially at the tertiary level, will be able to increase the productivity of workers in Indonesia. Increased productivity will be able to increase the rate of economic growth in Indonesia. Improving the quality of education will indirectly be able to reduce the income gap that occurs in Indonesia.

Therefore, several policy recommendations are given based on this study's empirical findings. First, the government must increase education spending to reduce educational inequality in Indonesia. Besides that, the government must also improve the education quality in Indonesia. Finally, the government must improve the quality of teachers and lecturers. In addition, we should also increase the level of welfare of teachers and lecturers.

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Indonesian Market Concentration on The Non-Oil and Gas Commodity Before and During Covid-19 Pandemic

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Abstract

The economic growth of a country is inseparable from the balance of trade, mainly the export and import activity. Globalization urges a country to actively socialize and provide infrastructure and facilities to support productivity and improve competitiveness in the international market. Increasing commodity export value affects the balance of trade to reach surplus, and increasing import value causes the balance of trade deficit. This study aims to analyze Indonesia's non-oil and gas commodity market concentration. Trade Specialization Ratio (TSR) result shows a tendency for Indonesia's non-oil and gas commodities to be both exporters and importers before and during the COVID-19 pandemic. The strategic plan to increase the product competitiveness in the international market can be in the form of increased productivity and quality; cooperating with several parties such as central and regional government, private parties, and also the general public in the planning for differentiating products and export destination, compliance with international product certification standard, tariff policy, and strengthening the economic institutions within the trade activity. Those efforts are taken to achieve national economic growth and decrease regional economic disparities.

Keywords:

export; import; non oil and gas; trade specialization ratio

How to Cite:

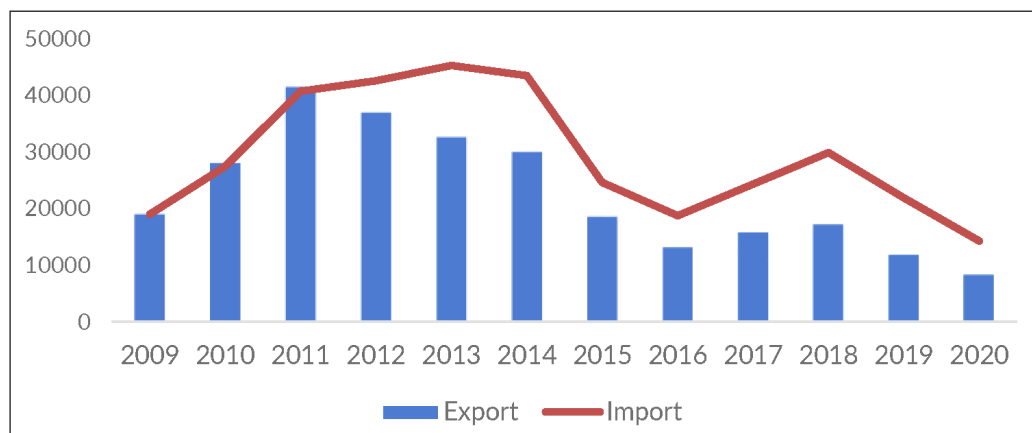
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INTRODUCTION

International trade bridges the good or service exporter and importer. Products in the international market have undergone several certifications to prove their liability to compete. Economic transactions in the international market involve various parties with applicable provisions and regulations. Numerous excellent commodities are being traded in the market by involving parties going through several trading processes such as trade agreements, price deals, and regulation fulfillment in the respective exporter or importer country (Liang et al., 2020; Ren et al., 2014). Commodities traded in the international market are selected products with the best quality and high bargaining power, directly influencing the country's economic growth (Ariyani et al., 2018).

Indonesia's export activities consist of oil and gas and non-oil and gas commodities, and the trade activities can conduct product excellence specialization and maintenance based on the product specification (Ardiyanti, 2015; Salsabila, 2021). The non-oil and gas export growth also supports Indonesia's economic growth rate. Non-oil and gas commodities include agriculture, forestry, fishery, manufacturing, and mining. Indonesia is still dominated by the manufacturing industry, such as palm oil, iron/steel, textile, and vehicle. Thus, the government continuously improves its efforts to increase the competitiveness of non-oil and gas product export, especially in agriculture. The growth of Indonesia's imports and export is as follows.

Figure 1. The Growth of Indonesia's Non-Oil and Gas Import and Export (Million US\$)



(Source: Central Bureau of Statistics Indonesia, 2022)

The value of Indonesia's non-oil and gas exports and imports in the last decade fluctuated. Higher export value than the import shows that there was a surplus in the trade. However, if the import value is higher than the export, it means the opposite. Non-oil and gas trade balance tends to show the stability of the non-oil and gas commodities market from 2009 until 2011 when the export and import value had the relatively same growth. However, after 2011, Indonesia's balance of trade, especially for the non-oil and gas commodities, tended to show a deficit that was proved by the smaller export value than the import. One of the factors that caused this condition was the slow growth of non-oil and gas commodities, such as manufacturing industries and agriculture.

The global economic uncertain condition has become one of the biggest challenges for Indonesia since it will influence trade activities, economics, and politics. COVID-19 is one of the global phenomena which significantly affects the global economy and creates an immense shock to economic stability. Indonesia's economy declined until touching the negative value (-2,07%) starting from the second quarter until the fourth quarter of 2020. This condition was caused by the decreasing performance of the whole business sector as the fundamental element of GDP. Hence, anticipative and productive strategies are needed in managing national economics. One of the objectives is to seek a balance of trade and sustainable surplus. Besides, each commodity's performance shall be controlled eventually to determine product competitiveness in the international market or by observing the export product's market concentration.

Market concentration assessment aims to determine the market specialization – whether the destination country specializes as an importer or exporter. Several of Indonesia's commodities have been used to determine the market concentration, such as by Radityo et al. (2014), who studied rubber commodities. The study showed that Indonesia's natural rubber remained stable as the world's natural rubber exporter, with a value of 1.0. The analysis result was supported by the productivity and the harvest area width, while the international factor was caused by other countries' market share, such as Malaysia and Vietnam. Meanwhile, Lindung & Jamil (2018) found that the world's rubber market structure tends to aim at the oligopoly market and showed that Indonesia's natural rubber has comparative and competitive excellence. Safitri (2011) studied the tobacco commodity, and the result showed that during the research period (2000-2009), the tobacco export development value was close to one based on the TSR result. This result indicated that Indonesia's tobacco was still in the export development process. While for the nickel commodity, the study of Haryadi & Yunianto (2017) mentioned that the international trade of Indonesian nickel had not yet significantly impacted the national and regional economics. Another study by Nursodik et al. (2021) explained that Indonesia's tea commodity had powerful comparative competitiveness and a tendency to be the tea exporter for the international market.

An empirical study in association with the non-oil and gas commodity analyzed by Khairina & Syahputra (2021) found that the coal commodity export was not quite spread and concentrated only in a single country. Indonesian coffee commodity in 2009-2018 was also not concentrated and specialized only in a specific region, as explained in the study of Kusmiati & Windiarti (2011). The sea products commodities also showed the specialization value close to one point that it tends to be the exporter, as mentioned in the study of Riniwati et al. (2017). Multazam (2018) explained that Indonesia's non-oil and gas export strength was supported by the size of export volume and the utilization of Bonded Logistics Center to support either export or import cost efficiency. Meanwhile, one of the weaknesses of Indonesia's export is the low competitiveness and inadequate infrastructure, especially in several regions, as well as the export sector that is still dominated by large industries rather than small and medium enterprises (SMEs).

Indonesia will experience growth in the export sector if they increase productivity, product quality, and product diversification. Modern international trade theory eased many classical assumptions concerning perfect competition by proposing the concept of monopolistic

competition and product differentiation (Dowling, 2008). Besides product differentiation, the modern trade theory emphasizes the importance of economic scale and technology as the additional factor in determining the international trade pattern. This result is in line with the globalization development and has become one of a country's determining factors in competing in the global market (Dowling, 2008; Meinen & Raff, 2018). The international trade activity also discusses the comparative advantage theory proposed by David Ricardo. The comparative advantage determines the international trade specialization; a commodity with a comparative advantage will have economic efficiency (Saleh & Widodo, 2010). Based on the previous studies and the supporting theory, this study aims to observe Indonesia's non-oil and gas market concentration. The novelty of this study is that the research object focused on the 63 non-oil and gas commodities in Indonesia by involving the COVID-19 pandemic phenomena that have become one of the factors of global economic uncertainty.

RESEARCH METHOD

This research is descriptive and quantitative study by involves Indonesia's non-oil and gas commodity export value and non-oil and gas commodity import value as variables. 63 non-oil and gas commodities become the focus of this study (Table 1, Table 2, and Table 3). This study took the period before and during the COVID-19 pandemic (2018 until the second quarter of 2021). This study used secondary data from time series taken from the Central Bureau of Statistics Indonesia.

The approach used to see the market concentration index is by calculating the Trade Specialization Ratio (TSR). It was used to determine the relative condition of certain commodity competitiveness in the global market to identify its existence and performance. The TSR method was initially used by Kaneko & Yanagi (1988) to calculate the competitiveness of commodity X with the product life cycle, which later concluded the competitiveness of a commodity in the global market. Trade Specialization Ratio (TSR) is an analysis tool for comparative competitiveness which shows if a country acts more as an exporter or importer (Nursodik et al., 2021). If the TSR value is positive, the country tends to act as an exporter, and the commodity has strong competitiveness. On other hand, if the TSR value is negative or around, the country tends to act as an importer.

The following is the formula for calculating the TSR of a commodity:

$$TSR_i = \frac{E(i) - M(i)}{E(i) + M(i)}$$

Where it is explained as:

E(i) is the export value of commodity i in US\$

M(i) is the import value of commodity i in US\$

RESULTS AND DISCUSSION

Indonesia's international trade performance fluctuated yearly, especially the oil and gas and non-oil and gas commodities. The decreasing export performance was due to the government's lateness in diversifying export destination countries and the lack of export product diversification. Based on the analysis using Trade Specialization Ratio (TSR)

calculation, the result showed that several non-oil and gas commodities exported to the international market varied in terms of global market concentration from the pre-pandemic until the pandemic during 2018 until the second quarter of 2021.

Table 1. Results of TSR Analysis ($0 < \text{TSR} \leq 1$)

No	Commodity	2018	2019	2020	Q2 2021
1.	Shrimp	0.9001	0.8807	0.9258	0.8839
2.	Coffee beans	0.7045	0.8833	0.9577	0.9206
3.	Fish and others	0.7452	0.7556	0.7708	0.7705
4.	Herbs and spices	0.5837	0.7422	0.8285	0.6830
5.	Tea	0.6253	0.5538	0.6524	0.6492
6.	Vegetable ingredients	0.9588	0.9581	0.9394	0.9348
7.	Resin and resin	0.9611	0.9661	0.9837	0.9476
8.	Palm oil	0.9999	0.9938	0.9999	1.0000
9.	Textiles and textile products	0.2139	0.2187	0.2500	0.2273
10.	Processed rubber	0.5882	0.6132	0.6746	0.6426
11.	Paper and paper goods	0.3405	0.3302	0.3833	0.2537
12.	Processed food	0.0724	0.1912	0.2892	0.1051
13.	Processed wood products	0.8294	0.7602	0.8295	0.8138
14.	Footwear	0.7433	0.6686	0.7765	0.7942
15.	furniture	0.5423	0.5408	0.5884	0.5685
16.	paper material	0.3521	0.4368	0.5186	0.4934
17.	Fatty acid	0.8412	0.8651	0.9610	0.9672
18.	Bath and washing soap	0.4456	0.4456	0.4769	0.4586
19.	Sports equipment	0.0895	0.1127	0.1869	0.1750
20.	Margarine and other fats	0.9230	0.9160	0.9567	0.9535
21.	Items of precious metal	0.9663	0.9649	0.9811	0.9699
22.	Cement	0.9863	0.9803	0.9901	0.9817
23.	2 and 3 wheel motor vehicles	0.8582	0.9067	0.9269	0.9010
24.	Wickerwork	0.8942	0.8809	0.9751	0.9835
25.	Processed rattan	0.9985	0.9981	0.9421	0.6721
26.	Glycerol and alkaline solution	0.9982	0.9858	0.9982	0.9991
27.	Mining results	0.8453	0.8085	0.7510	0.7423
28.	Coal	0.9276	0.9075	0.8814	0.8994
29.	Copper ore	0.9997	0.9989	0.9998	0.9995
30.	Bauxite	0.9830	0.9941	0.9610	0.9946

Source: Results of TSR Calculation (2021)

The analysis results in Table 1 showed a positive TSR value ($0 < \text{TSR} \leq 1$) in the period before and during the COVID-19 pandemic until the second quarter of 2021. The TSR positive value showed that the country tends to act as the exporter of the commodity and has powerful competitiveness in the international market. Those commodities that have positive TSR value shows in Table 1. Nursodik et al. (2021) supported this study result mentioned that tea, as one of the non-oil and gas commodities, had a strong comparative competitiveness and tend to be the exporter country to the international market on the stage of expanding export. Furthermore, previous research has revealed that coal commodities

(Khairina & Syahputra, 2021) and furniture commodities (Elysi et al., 2018) also have strong comparative competitiveness in the international market. The TSR calculation result of Riniwati et al.(2017) , also explained that fish and others commodities have TSR value close to 1. Another study by Kusmiati & Windiarti (2011) showed that the plantation business in Indonesia were not concentrated and specialized only to one region.

Table 2. Results of TSR Analysis (-1 TSR < 0)

No	Commodity	2018	2019	2020	Q2 2021
1.	Agricultural product	-0.2559	-0.2592	-0.1138	-0.2887
2.	Cacao bean	-0.7540	-0.7545	-0.6273	-0.8297
3.	Fruits	-0.5452	-0.5827	-0.6752	-0.4949
4.	Vegetables	-0.7937	-0.7666	-0.5734	-0.8410
5.	Natural rubber	-0.4725	-0.4661	-0.5484	-0.7226
6.	Other agricultural products	-0.8278	-0.8329	-0.7433	-0.8128
7.	Electrical, measuring and optical equipment	-0.4165	-0.3860	-0.3464	-0.3453
8.	Chemical material	-0.3490	-0.3071	-0.2566	-0.2093
9.	Artificial resin, plastic material	-0.5516	-0.5526	-0.4415	-0.5471
10.	Ships and the like	-0.7923	-0.5594	-0.7122	-0.7138
11.	Machine parts	-0.5514	-0.5448	-0.4917	-0.4268
12.	Computers and parts	-0.3608	-0.3660	-0.2399	-0.2394
13.	Essential oil and more	-0.2957	-0.2646	-0.1918	-0.1901
14.	Glass and glassware	-0.1379	-0.1923	-0.0020	-0.1384
15.	Fertilizer	-0.6485	-0.4428	-0.3332	-0.3418
16.	Ceramic products	-0.3009	-0.2811	-0.2535	-0.3309
17.	Cattle fodder	-0.5851	-0.5342	-0.4532	-0.4900
18.	Pharmaceutical products	-0.2316	-0.2028	-0.2622	-0.7274
19.	Leather and leather goods	-0.4366	-0.4442	-0.4929	-0.4787
20.	Germicidal preparations	-0.2818	-0.3226	-0.3378	-0.3362
21.	Aircraft and its parts	-0.7809	-0.6477	-0.8082	-0.7520
22.	Synthetic organic dyes	-0.5028	-0.4307	-0.4674	-0.4755
23.	Container	-0.9521	-0.8567	-0.8113	-0.8648
24.	Other industrial products	-0.4413	-0.4739	-0.3988	-0.3600
25.	Granite	-1.00000	-0.9969	-1.00000	-1.0000
26.	Other mining products	-0.7078	-0.5957	-0.8804	-0.7693

Source: Results of TSR Calculation (2021)

The negative TSR result of Indonesia's non-oil and gas commodities were shown at Table 2. The calculation result in this study also showed several commodities which had weak competitiveness and tend to act as importer as confirmed by the negative value until close to 0. Those commodities which acted as importer and had low competitiveness during 2018 until the second quarter of 2021 shows in Table 2. This study showed different result compared to the study of Lindung & Jamil (2018) that showed during the 1996-2016 period, natural rubber commodity would have a more concentrated market structure and be able to increase its competitiveness.

Several non-oil and gas commodities also had positive export value in a certain year while gaining negative value in other certain year (Table 3). For example, tobacco had

positive value close to 0 up to 1 in 2018, 2020, and the second quarter of 2021 which confirmed that in those years tobacco had strong competitiveness in the international market and tended to act as exporter. Meanwhile, in 2019, tobacco was considered as having weak competitiveness and tended to act as importer, where this result was in line with the study of Safitri (2011). Beside tobacco, industrial products commodity and the basic metal commodity also acted as exporter with strong competitiveness in 2020 and the second quarter of 2021 supported by the TSR positive result. There was also the 2 and 3-wheel motor vehicles commodity that had positive TSR value between 0-1 in 2019, 2020 and the second quarter of 2021. It confirmed that the commodity had strong competitiveness in the international market and acted as exporter. Nickel ore and other traded goods also became the strong competitive commodities and acted as exporter in the international market in 2018 and 2019 which was confirmed by the positive TSR value between 0-1. The framework convention on tobacco control makes a number of recommendations aimed at restricting the marketing of tobacco products (Savell et al., 2014). Lee et al. (2016) conclude that this expanded and interdisciplinary research agenda provides the potential for fuller understanding of the dual and dynamic relationship between the tobacco industry and globalization.

Table 3 Results of TSR Analysis (Fluctuative)

No	Commodity	2018	2019	2020	Q2 2021
1.	Motorized vehicles with 4 wheels and more	-0.0298	0.1879	0.5437	0.2499
2.	Tobacco	0.0142	-0.1704	0.0981	0.0048
3.	Industrial output	-0.0716	-0.0531	0.0808	0.0673
4.	Base metal products	-0.2405	-0.1862	0.1513	0.1524
5.	nickel ore	1.0000	0.9921	-1.00000	-0.9920
6.	Other merchandise	0.0412	0.1311	-0.9193	-0.1327
7.	Vehicle parts	-0.2399	-0.2651	0.0036	-0.1317

Source: Results of TSR Calculation, 2021

The industrial products and basic metal products commodities also acted as importer in 2018 and 2019 with negative TSR value between -1 up to 0 as well as having the weak competitiveness. Other commodities such as 2 and 3-wheel motor vehicles were having weak competitiveness in 2018 with negative TSR value. Besides, nickel ore and other traded goods also acted as importer with weak competitiveness in 2020 and the second quarter of 2021 that confirmed by the negative TSR value between -1 up to 0. Study from Haryadi & Yunianto (2017), also explained that Indonesia's non-oil and gas commodities such as nickel has not yet given an optimum impact to the country's economic in which one of the factors is the low competitiveness in the international market.

Resources owned by Indonesia would possibly crate an opportunity for development and cultivation by keep on maintaining the quality as proven by the trade specialization index value. The analysis result concluded that most of the commodities such as plantation, fishery, chemical products, furniture, mining products, etc. were able to fulfill the market demands. The market concentration index for those commodities before pandemic tended

to act as exporter. The conditions are still same although the pandemic hit and only slightly decrease as the result of shock caused by the global economic uncertainty.

Companies and industries in Indonesia rely on the human resource quality in terms of productivity as the country is highly populated. However, the globalization era requires effective and efficient production acceleration that many industries adopt technology incorporated with the human labor that later increases the import of technology. In an international trade, each country faces a condition where they have commodities with large and small or low market share. Indonesia has a low market share caused by several factors such as (1) inadequate information system; (2) lack of international certificate and compliance on the export products and industrial process; (3) lack of technology license utilization; (4) unstable electricity (Ridhwan et al., 2015). Indonesia was very competitive in terms of lower technology manufacturing industries such as food and beverages, manufacture, tobacco and textile.

International trade activities (export-import) shall include agreement such as the Free Trade Agreement (FTA) in which the implementation is not only considered from how big the trade size or volume is, but also the trading pattern (Alhayat, 2012; Cali et al., 2019; Athukorala & Kohpaiboon, 2011). Okabe (2015) explained that a more complementary offer and demand among countries means higher trade rate. Besides, it gave positive impacts on the bilateral export and affected the intra-industrial trade especially in amongst the ASEAN member countries. Empirical study showed that Indonesia's export was more liked bilateral than global. Indonesia's gross export was generally stable and quite immense domestically and even more than 80% of the Indonesia's export value total gained from the domestic production factor (Asian Development Bank & Islamic Development Bank, 2019). Hence, government and related parties shall synergize their efforts to increase product competitiveness, for example by considering the suggestion from the Indonesia's Ministry Coordinator of Economic Field such as maintaining the product continuity, quality, and volume; pushing the production to comply the export standard; integrated infrastructure development; and increasing the number of cold storage and packing house as the refrigeration chain transit facilities of the export products.

Besides, in association with the agriculture sub-sector, monitoring and controlling are needed concerning the width of farm area used for planting the main commodity that mostly has been turned into industrial area. Factors that influenced export performance; especially in the food sector are logistic cost and the non-tariff barriers. Thus, it requires field management and agricultural production development that could create food security.

CONCLUSION

This study aims to observe Indonesia's non-oil and gas commodity market concentration before and during the COVID-19 pandemic. Based on the result of market concentration index analysis through TSR calculation. There are 30 commodities have strong competitiveness and a tendency to act as exporters before and during the COVID-19 pandemic. Meanwhile, several commodities had weak competitiveness and a tendency to act as importers before and during the COVID-19 pandemic.

The study result also showed that there are 26 commodities had strong competitiveness and a tendency to act as an exporter in a specific year while having weak competitiveness and a tendency to act as importers in another specific year before and during the COVID-19 pandemic. They were 4 or more wheel motor vehicles, tobacco, industrial products, primary metal products, nickel ore, other traded goods, and vehicle spare parts. Therefore, based on the analysis result and discussion, the government and other parties related to the trading activities shall strengthen their integration to create a healthy trading environment and push the national economic growth. Those activities could also create an opportunity for Indonesia to strengthen its trading activity through, for example, increasing innovation for solid competitive products, good product standardization, a strategic promotion system, and a trading policy that benefits all parties.

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The Factors Analysis of Financial Conditions of Working Women Sandwich Generation

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Abstract

Balinese women are known as primary caregivers and breadwinners for their families, strength, and involvement in various community activities. The purpose of this study was to examine the factors that influence financial conditions and the role of financial literacy in mediating the relationship between factors that affect financial conditions. This research is descriptive-quantitative research using SEM-PLS analysis. The findings reveal that culture, social support, and financial literacy simultaneously positively impact financial conditions. From this research, it is also known that financial literacy acts as a mediator between the influence of culture and social support on financial conditions and also the influence of financial literacy on financial conditions. Therefore, financial literacy is very important to avoid financial pressure. Moreover, for the women of the sandwich generation to perform well while dealing with financial stress, social support is needed.

Keywords:

culture; social support; financial literacy; financial condition

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INTRODUCTION

Indonesian people belong to a collective culture or a high level of kinship (high context culture) and tend to take collective actions. In Indonesian culture, caring for and overcoming the financial needs of parents who are no longer earning is the child's responsibility. In some areas in Indonesia, parents are even considered representatives of God on earth, so neglecting parents is an act that cannot be justified. There are debts between parents and children. Parents must be responsible for their children, and likewise, children must be responsible for their parents. Caring for and meeting the financial needs of parents is considered an opportunity to pay debts and be devoted to parents. Likewise, caring for and supporting children to a certain extent is also considered an opportunity to carry out the obligations and responsibilities of parents to children.

Adults and married people (aged 40-50 years) generally still have parents or in-laws who must be cared for and financially supported. They also already have children or even grandchildren who also need financial assistance. This middle-aged generation who has to meet the living and financial needs of their parents or in-laws as well as their children or grandchildren is often stuck in financial problems, so it is called the sandwich generation. The term sandwich generation was first coined by a social worker named Dorothy Miller in 1981 to describe people in *middle age* who are *sandwiched* in meeting the needs of their children and grandchildren as well as their parents or in-laws starting from the needs of their children and grandchildren. This includes health financing at the same time. There are three types of sandwich generation (Nurhaliza, 2022), namely: 1) Traditional Sandwich Generation, namely the generation aged 30-50 years with children who have not worked and still have elderly parents with increasing living needs; 2) Club Sandwich Generation, namely people who are given the burden of supporting 3 generations at once, both the generation above and below; 3) Open-Faced Sandwich Generation, namely the people who will become the traditional sandwich generation in the future. They are not married but are burdened with the responsibility of supporting their family and relatives.

Nirwana et al. (2014) and Zulkifli et al. (2017) discovered different conclusions when it comes to how culture influences financial performance in organizations. Because of certain circumstances, financial support from two sources may not always have the expected effect on financial situations. According to earlier study, organizational culture is a key factor in determining financial performance (Yesil & Kaya, 2013). Certain cultural norms can make it more difficult to put supportive human and physical capital to use. In addition, gender-based inequities impede the effective administration of human resources. According to the appearances, there is some level of control that could potentially influence the effects of some resources on the organization's ability to achieve financial success. In fact, it is reasonable to assume that the degree of control over the two primary resources has a moderating effect on financial conditions (Usman & Wirawan, 2021).

A cultural view of Indonesian society states that nurturing or caring for family members is a woman's duty. Working women are generally part of the sandwich generation who experience the burden of parenting. Demographic studies on the sandwich generation in Indonesia show that 6.42 percent of the total 7,009 households studied are the sandwich

generation, and 10.9-11.3 percent of the sandwich generation are working women. Working women in the sandwich generation assume multiple roles and responsibilities, so they are faced with various challenges. The sandwich generation is the burden of parenting due to the demands of parenting from parents and children. Studies on the burden of parenting show that 68.02 percent of caregivers feel very burdened, and 65 per cent of caregivers show symptoms of depression. As many as 62 percent of caregivers accept some form of violence from the parents they care for.

The dual roles and responsibilities of the sandwich generation can negatively impact physical, psychological, emotional, and financial burdens. Not all the sandwich generation live well, are ready to face the burden of parenting, and are able to handle financial pressures well. The working women of the Sandwich Generation often experience financial stress. Closing debt with debt is often an alternative way out when facing financial difficulties, which in the end only adds to the difficulty.

Financial stress, financial risk tolerance, locus of control, and financial self-efficacy are among the psychological aspects associated with financial decisions (Heo et al., 2020). All things taken into consideration, self-identification lessens the negative association between financial stress and life satisfaction, but it also lessens the positive relationship between locus of control and life satisfaction (Heo et al., 2020). It has been shown that different types of social support have different effects on stress and psychological well-being, with family support having a substantial association with financial stress variables (Deegan & Dunne, 2022). Financial pressure has increased as a result of continual market price swings, and as a result, financial uncertainty has arisen (Duru et al., 2015). In general, higher levels of perceived emotionally connected social support are associated with higher levels of financial resources (Loprinzi & Joyner, 2016).

Most people crave certain financial conditions like a dream to be achieved. A person's financial condition cannot be measured with certainty because many factors influence it. A person's financial condition can change at any time, especially when there is a change in status from single to married, changes in the number of family members, increases in debt, changes in income, or changes in lifestyle.

To be able to plan and make financial decisions properly and avoid financial pressure, knowledge and understanding of various financial products and processes is required. Organization for Economic Co-operation and Development or (OECD, 2016) defines financial literacy as knowledge and understanding of financial concepts and risks. It is along with the skills, motivation, and confidence to apply the knowledge and understanding they have to make effective financial decisions, improve the financial well-being of individuals and communities, and participate in economics. Financial literacy must be mastered by the community, even including one of the basic literacies that everyone must own to live a good life (QM Financial, 2021).

The 2016 Financial Services Authority survey data noted that Indonesia's financial literacy rate was relatively low, at 29.7 percent. It means that only about 30 out of 100 people have adequate knowledge, skills, and beliefs about financial products and services (well literate). The financial literacy index in Indonesia in 2019 increased to 38 percent.

The survey results also show that the financial literacy index for men is 39.94 percent, and the women's index is lower at 36.13 percent. A low level of financial literacy can result in people being unable to prepare financial plans, choosing the wrong investment instrument, being exposed to investment fraud, and not having a social safety net to prevent people from experiencing poverty.

Financial decisions are made in relation to how individuals spend, save, and invest their money. Knowing how to manage one's finances more effectively is critical in the digital economy era. Financial literacy is directly related to financial stability, which results in a more efficient economy (Singh, 2014). Financial literacy represents a positive attitude toward decision-making as a result of financial understanding that can help decide one's level of financial pleasure. According to research findings by Farida et al. (2021), financial literacy can influence a person's thinking style towards financial management, hence improving financial circumstances. Financial literacy that is effective not only imparts financial knowledge but also motivates action.

Without financial literacy, an individual is more likely to make poor financial decisions unintentionally and is less prepared to deal with unexpected economic shocks (Hung et al., 2009; Dewi et al., 2020). To corroborate these findings, Lusardi (2012b) demonstrates that financial literacy and numeracy are associated with a variety of financial decisions, including those regarding savings, expenses, investments, and loans. Grohmann (2018) demonstrates that increased financial literacy results in more sound financial decisions. This is also consistent with the findings of Lusardi (2012a) that reflect a poor degree of financial literacy and knowledge will impair one's ability to make choices. Chijwani & Vidyapeeth (2014) provides additional support for prior studies. The findings indicated that low levels of financial literacy can result in bad financial decisions, which can have a detrimental effect on personal financial circumstances.

According to prior study, individuals who are more knowledgeable are better prepared to make financial decisions. Moreover, enhancing financial literacy enables individuals to fulfill their financial objectives, which are directly tied to how they plan to save and spend money. Garg & Singh (2018) demonstrates that financial literacy among the majority of young people worldwide remains low and worrying. These findings corroborate previous research by Yakoboski et al. (2019) which indicating that individuals with a high degree of financial literacy are more likely to be able to deal with financial shocks, to save regularly for retirement, and to avoid debt. Children also demonstrate a lack of financial knowledge (Te'eni-Harari, 2016).

Financial pressure due to the burden of parenting borne by the sandwich generation is also influenced by social support. Social support is information or feedback from others that show that someone is loved and cared for, valued, and respected. It is involved in a network of communication and reciprocal obligations. Furthermore, social support is a helpful action that involves emotions, providing information, instrumental assistance, and positive assessment of individuals in dealing with their problems. The form of support can be in the form of information, certain behaviors, or materials that can make individuals who receive assistance feel loved, cared for and valued.

This study is intended to examine the influence of culture, social support, and financial literacy on financial conditions and the role of financial literacy in mediating the influence of culture and social support on financial conditions. The novelty of this research lies in examining the influence of culture on financial literacy and financial condition. No one has yet investigated the relationship between culture and financial literacy and financial circumstances. From the analysis, it can be revealed that culture (taken collectively) has a direct impact on financial situations and an indirect impact on financial literacy. This research was conducted on Balinese women known as hard workers and active in various cultural and social activities while still carrying out their obligations to take care of and provide for their families.

METHODS

The population of this research is all women who work outside the tourism sector in Bali Province, which are classified as traditional sandwich generation (married, supporting parents and/or in-laws and children who are not yet working). The research was conducted during the Covid-19 pandemic, which made the Bali tourism sector slump. Women who work or have a career in the tourism sector are not included as respondents so as not to interfere with the generation of analysis results due to situational events. The population in this study is all Balinese women who are in the Denpasar City area. The sample criteria in this study are as follows: (1) Women who are married and have children; (2) Have a job status or have activities other than at home that bring income; (3) Have a minimum level of high school education; and (4) Domiciled in Denpasar area. The sample was determined using a purposive sampling technique, which means that sample members were chosen intentionally based on sample criteria. Considering the number of research population is difficult to know, the respondents were determined incidentally as many as 100 people. This criterion is proposed by Roscoe (Kalnadi, 2013) and also because data analysis using SEM PLS requires a minimum sample of 100.

The variables used in this study are: 1) Exogenous variables (X_i), namely variables that are not predicted by other variables in the model consisting of Culture (X_1) and Social Support (X_2); 2) Endogenous variables (Y_i) are variables that are predicted by one or more other variables in the model consisting of Financial Literacy (Y_1) and Financial Condition (Y_2); and 3) The mediating variable is Financial Literacy (Y_1).

The data source of this research is primary data in the form of perceptions whose variable indicators are measured using a 5 *Likert Scale* to indicate how strongly the respondents agree or disagree with a statement. Data was collected through an *online* questionnaire instrument and distributed using a google form that first tested its validity and reliability.

The analytical technique used in this research is descriptive analysis and structural equation modelling (Structural Equation Modeling/SEM) based on variance or Component-based SEM, which is known as Partial Least Square (PLS) Visual version 1.04bl. The steps (standard) of data analysis with PLS are as follows: (1) Designing a Structural Model (Inner Model); (2) Designing a Measurement Model (Outer Model); (3) Convert

Path Diagram to System of Equations; (4) Estimation: Weight, Path Coefficient, and Loading Method for estimating the estimated parameters in PLS is the least square method; (5) Evaluation of the Goodness of Fit Model was measured using R^2 dependent latent variable with the same interpretation as regression. Q^2 predictive relevance for the structural model measures how well the observed values are generated by the model and the estimated parameters; and (6) Examination of the effect of mediating variables. This study uses exogenous, endogenous, and mediating variables (intervening), which aims to answer whether the proposed hypothesis can be accepted or rejected.

RESULT AND DISCUSSIONS

Characteristics of Respondents based on the answers to the questionnaires that have been received are presented in the Table 1. From Table 1, it shows that there is 5 percent of respondents aged less than 35 years, 24 percent aged between 35 to 40 years are already classified as the sandwich generation, and 12 percent of respondents are still the sandwich generation at the age of more than 50 years.

Table 1. Characteristics of Respondents

Characteristic of Respondents		Freq	Percentage
Age	< 35 years old	5	5,00%
	35 – 40 years old	24	24,00%
	> 40 – 45 years old	32	32,00%
	> 45 -50 years old	27	27,00%
	> 50 years old	12	12,00%
Total		100	100%
Main Job	Government Employees	14	14,00%
	SOE Workers	9	9,00%
	Private sector workers	28	28,00%
	Professional	16	16,00%
	Trader	22	22,00%
	Business woman	21	21,00%
Total		100	100%
Side Job	Yes	63	63%
	Not	37	37%
Total		100	100%
Husband's Job	Permanent worker	26	26%
	Part time worker	41	41%
	Businessman	33	33%
Total		100	100%
Comparison of income with husband	Balanced	25	25%
	Husband is bigger	32	32%
	Husband is smaller	43	43%
Total		100	100%

Characteristic of Respondents		Freq	Percentage
Domicile	Village	32	32%
	District capital	37	37%
	Province capital	31	31%
	Total	100	100%
Average income per month	< Rp. 5 million	22	22%
	Rp. 5 - 10 million	29	39%
	Rp. 10 - 20 million	31	31%
	Rp. 20 - 30 million	15	15%
	> Rp. 30 million	3	3%
	Total	100	100%

Source: Primary data, processed (2021)

The respondents' main job is quite varied; namely, 14 percent are government employees, 9 percent are state-owned enterprise workers, 28 percent are private workers, 16 percent are professionals (notaries, accountants, doctors, lawyers), and 33 percent are a businesswoman. Compared to their husbands' income, 43 percent of respondents have more income than their husbands, 32 percent are less, and 25 percent are balanced.

The distribution of respondents' answers for each indicator on each research variable is presented in Table 2. Table 2 shows that the cultural variable has an average of 3.81, which reflects that, the respondents generally have a fairly high collective cultural orientation. The 8th indicator (respect for other people's decisions) has the lowest average of 3.56, but this average is still above 3.00, so it can still be interpreted as quite high. The 4th indicator (feeling happy when working with other people) is the indicator with the highest average of 4.03, so it can be interpreted that, in general, respondents who are the sandwich generation have a habit of working with other people. On the social support variable, an average of 3.80 was obtained, which means that respondents generally have a fairly good perception of social support. The first indicator (appraisal support) shows the lowest average of 3.56, but this average is still above 3.00, so it can still be interpreted as quite good. The third indicator (self-esteem support) shows the highest average of 3.85, so it can be interpreted that, in general, respondents have good self-esteem support.

The financial literacy variable has an average of 3.39 which means that, in general, respondents have a fairly good perception of financial literacy, but it still needs to be improved. On the average of each indicator, the first indicator (basic knowledge of finance) is the indicator with the lowest average of 3.30, but this average is still above 3.00, so it can still be interpreted as quite good. The second indicator (basic knowledge of credit) is the indicator with the highest average of 3.40, so it can be interpreted that basic knowledge of credit is the best indicator of financial literacy owned by respondents.

Table 2. Results of Descriptive Statistics

Culture (X1)		Mean
X1.1	Pride when friends get gifts	3.73
X1.2	The importance of the welfare of friends	3.65
X1.3	Willingness to spend time with friends	3.93
X1.4	Feeling happy when working with other people	4.03
X1.5	Togetherness of children with parents	4.01
X1.6	Responsibilities to family	3.91
X1.7	Sacrifice to family	3.64
X1.8	Respect for the decisions of others	3.56
Variable mean		3.81
Social Support (X2)		Mean
X2.1	Appraisal support	3.73
X2.2	Tangible support	3.82
X2.3	Self esteem support	3.85
X2.4	Belonging support	3.78
Variable mean		3.80
Financial Literacy (Y1)		Mean
Y1.1	Basic knowledge of finance	3.30
Y1.2	Basic knowledge of credit	3.40
Y1.3	Basic knowledge of savings	3.34
Y1.4	Basic knowledge of investment	3.51
Variable mean		3.59
Financial Condition (Y2)		Mean
Y2.1	Ability to earn steady income	3.78
Y2.2	Ability to pay off obligations/debts	3.28
Y2.3	Adequate fulfillment of basic needs	3.19
Y2.4	Provision of funds for savings	3.27
Y2.5	Provision of funds for religious ceremonies	3.12
Y2.6	Provision for education funds	3.72
Y2.7	Protection of life, health, and property	3.19
Y2.8	Emergency fund setting	3.04
Variable mean		3.32

For the financial condition variable, the average obtained is 3.32, which means that respondents generally have a fairly good perception of financial condition. On the average of each indicator, the eight indicators (emergency fund allowance) is the indicator with the lowest average of 3.04, but this average is still above 3.00, so it can still be interpreted as quite good. Indicator one (the ability to earn a fixed income) is the indicator with

the highest average of 3.78, so it can be interpreted that, in general, respondents who are the sandwich generation have a good fixed income.

Table 3. Validity and Reliability Test Results

Description	Criteria	Result	Conclusion
Convergent validity test	The indicator is said to be valid if the outer loading value of all	All indicator variable have a loading factor value above	Valid
Discriminant validity test	The AVE (average variance extraction) value is said to be good if it is greater than 0.50 and the correlation between variables is smaller than the AVE root	The AVE value of all research variables is above 0.50 and the AVE root value is higher than the correlation between variables.	Valid
Reliability test	Cronbach's alpha and composite reliability values must be greater than 0.70	Each variable has cronbach's alpha and composite reliability values	Reliable

Evaluation of the measurement model (outer model) is carried out to determine the validity and reliability of the link between the indicators and their latent variables. The evaluation consists have convergent and discriminant validity tests and reliability. This model is a specification of the relationship between latent variables, also called *inner relations*, to examine the type and magnitude of the influence of the independent latent variable on the latent dependent variable. This test consists of 2 stages, the first step is the determinant coefficient test *R Square* (R^2) to find out how much the independent latent variable explains the variance of the latent dependent variable. The second step is hypothesis testing, which is a test of the research model hypothesis.

Table 4. Determinant Coefficient of R Square (R^2)

Coefficient of determination test	R^2	F count	F-table (alpha = 0.05)	Conclusion
The influence of culture and social support on financial literacy	0.429	73.629	3.939	Take effect
The influence of culture, social support, and financial literacy on financial condition	0.752	147.065	3.091	Take effect

From Table 4 it is known that the variables of culture and social support affect financial literacy with an R^2 value of 0.429, meaning that the variation in financial literacy is 42.9 percent due to variations in culture and social support. Culture, social support and financial literacy affect financial conditions with an R^2 value of 0.753, meaning that 75.3 percent of the variation in financial conditions is caused by cultural variations, social support, and financial literacy.

The results of the Q2 calculation are as follows: $Q^2 = 1 - (1 - R1^2) (1 - R2^2) = 1 - (1 - 0,429) (1 - 0,752) = 0,858$, which is greater than 0 (zero) so that the exogenous latent variable is suitable as an explanatory variable that is able to predict the endogenous variable, namely financial conditions or in other words, proves that this model is considered to have good predictive relevance. Table 5 shows the results of calculations on structural equation analysis.

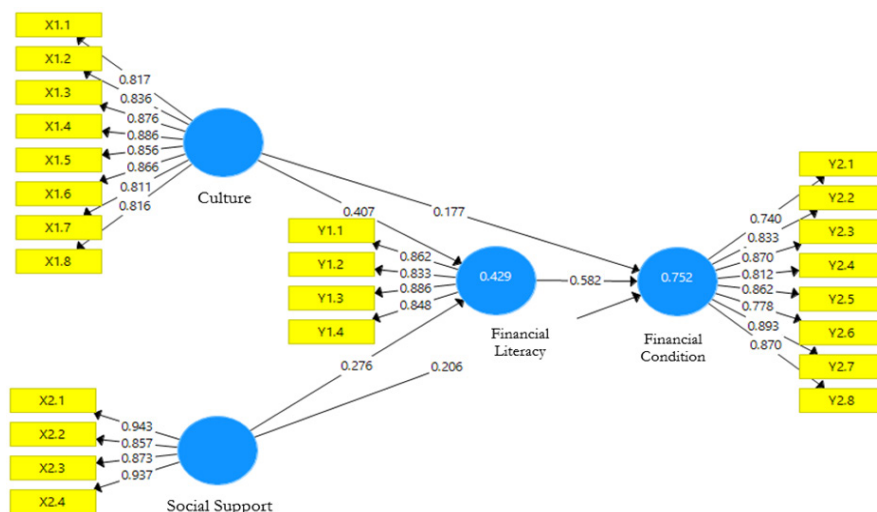
Table 5. Path Coefficient Value and P-Values

Variable	Coefficient	T Statistics	P-Value
Direct Influence			
Culture (X1) → Financial Literacy (Y1)	0.407	2,777	0.003
Social Support (X2) → Financial Literacy (Y1)	0.276	1,785	0.037
Culture (X1) → Financial Condition (Y2)	0.177	1,751	0.040
Social Support (X2) → Financial Condition (Y2)	0.206	1,807	0.036
Financial Literacy (Y1) → Financial Condition (Y2)	0.582	9.961	0.000
Indirect Influence (Indirect)			
Culture (X1) → Financial Condition (Y2)	0.236	2,545	0.006
Social Support (X2) → Financial Condition (Y2)	0.161	1,731	0.042

Source: Processed data (2021)

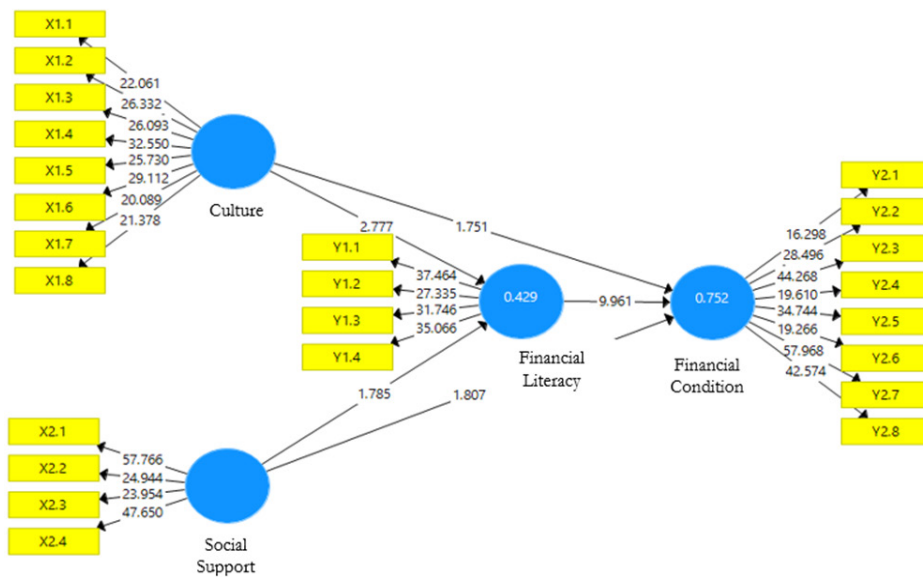
The results of the structural equation show in Figure 1 and 2. A significant effect occurs if the significance value is below 0.05. Based on Table 5, Figures 1 and 2, the cultural variable has a positive effect on financial literacy. The t-Statistic value is 2.777, and the P-value is 0.003 (significance less than 0.05). The coefficient value is positive with 0.407, which means the culture positively influences financial literacy. The social support variable has a positive effect on financial literacy. The t-Statistic value is 1.785, and the P-Values is 0.037 (significance less than 0.05). The coefficient value is positive, with 0.276, which means social support has a positive influence on financial literacy.

Figure 1. Path Coefficient Calculation Results of Research Model (Coefficient Value)



The cultural variable has a significant positive effect on financial conditions. The T-Statistic value is 1.751, and the P-value is 0.040 (significance less than 0.05). The coefficient value is positive, with 0.177, which means the culture positively influences financial conditions. The social support variable has a significant positive effect on financial condition. The t-Statistic value is 1.807, and the P-value is 0.036 (significance less than 0.05). The coefficient value is positive, with 0.206, which means social support has a positive influence on financial conditions.

Figure 2. Research Model Path Coefficient Calculation Results (Statistical T Value)



The financial literacy variable has a significant positive effect on financial condition. The t-Statistic value is 9.961, and the P-value is 0.000 (significance less than 0.05). The coefficient value is positive, with 0.582, which means financial literacy has a positive influence on financial conditions. There is an indirect effect of cultural variables on financial conditions through financial literacy. It is evidenced by the t-statistical value of 2.545 and a significance value of 0.006. The indirect effect coefficient value is 0.236, which means the financial literacy mediates the influence of culture on financial conditions. There is an indirect effect of the social support variable on financial condition through financial literacy. It is evidenced by the t statistic value of 1.731 and a significance value of 0.042. The coefficient of indirect influence is 0.161, which means the financial literacy mediates the effect of social support on financial conditions.

Descriptive statistics show the mean value of the cultural variable of 3.81. It represents the respondents as an Indonesian society that adheres to high collective culture. The mean value of the financial literacy variable is 3.39, and the respondents have a fairly good perception of financial literacy. The direct influence of cultural variables on financial literacy has a significance value of 0.003 (smaller than 0.05) and a direct influence coefficient of 0.407. It can be concluded that there is a positive

impact of culture on financial literacy. Women are not only tasked with caring for and caring for, but also working or doing activities that bring in money to help their husbands meet the family's financial needs. Family financial arrangements are generally left to women. The dual tasks and responsibilities they face ultimately encourage women to work to improve their financial literacy to manage family finances well.

Balinese women generally work, care for and support their families and are active in various social and cultural activities. Amid their busy lives, Balinese women make time to participate in women's group activities, such as social gathering groups, sports groups, women farmers groups, or joint business groups. These groups often hold knowledge and experience sharing activities, including knowledge and experience related to family financial management. This research has proved that culture has a positive effect on financial literacy.

As defined by Guiso et al. (2012), culture is the collection of shared beliefs, norms, and preferences among members of a social group. In fact, the relationship between culture and financial literacy has received less attention. One notable exception is Brown et al. (2018), which examined how culture influences financial literacy among youngsters on the Swiss-French border. They discovered that pupils from French-speaking areas possessed a greater level of financial literacy than those from German-speaking ones. According to the research they present, cultural inequalities in financial literacy are mostly explained by systemic differences in financial socialization. Guin (2017), analyzes how culture influences household saving decisions. He discovered that low- and middle-income households in German-speaking areas had a substantially higher proclivity to save than their counterparts in French-speaking areas, using the Swiss Household Panel. Meanwhile, Zhao et al. (2018) indicate that Chinese-Americans with low financial literacy have more favorable sentiments about compensated professional financial advisors than those with higher financial literacy.

Descriptive statistics show that the mean value of the social support variable is 3.80 (good enough), and financial literacy is 3.39 (good enough). There is a significant positive effect of social support on financial literacy. It is evidenced by the social support variable, which has a t-statistic value of 1.785 and a p-value of 0.037 (significance less than 0.05). The coefficient value is positive at 0.276, which is a positive influence. If social support is getting better, financial literacy will also be getting better and vice versa. The form of social support can be in the form of information, certain behaviors, or materials that can make individuals who receive assistance feel loved, cared for and valued. Improved social support enables the creation of a sense of belonging, sharing knowledge and experience, developing various alternative solutions to financial problems, and making more precise financial decisions. Conversely, if social support is low, it is difficult for women working in the sandwich generation to improve their knowledge and skills in managing finances to avoid financial pressure.

According to Jamal et al. (2015) who evaluate the impact of social influence on

financial literacy reveal that adolescent saving behavior is shaped by the impact of family and peers. In addition to saving and retirement planning, financial literacy has a significant impact on people's behavior. There is evidence to suggest that financial education should begin in elementary and secondary schools so that pupils who will grow up to handle their own finances and save for retirement will have the knowledge they need (Jamal et al., 2015). In order to expand public understanding of personal financial management, it is vital for the government to ensure that any financial education program aimed at boosting financial knowledge should not be confined to printed materials or other forms of social media.

Descriptive statistics show the mean value of the cultural variable of 3.81, which represents the Indonesian people as adherents of high collective culture. The average financial condition is 3.32, which means that respondents generally have a perception that their financial condition is quite good. There is a significant positive influence of culture on financial condition. It is evidenced by the cultural variable having a T-Statistic value of 1.751 and a P-Values of 0.040 (significance less than 0.05). The coefficient value is positive, which is 0.177, which means that there is a positive influence, or it can be said that the higher or better the culture, the better the financial condition and vice versa. As part of Indonesian culture, Bali has a high collective culture characterized by high kinship relationships, strong emotional ties within the family, and generally living in a large family environment. Collective actions are carried out to maintain kinship and overcome various family problems, including finances. Collective action in the financial aspect is in '*urunan*' or co-financing. The higher the collectivity of culture, the better the financial condition because the financial pressures experienced can be resolved together and vice versa.

An analysis by Brown et al. (2018) shows how differences in cultural norms, tastes, attitudes, and values among different social groups have an effect on financial literacy and competence. Mediating disparities in financial socialization across linguistic groups were shown to explain cultural differences in financial literacy, as revealed by mediation analysis. Students in German-speaking regions are more likely than students in French-speaking regions to get pocket money at an early age and to have independent access to bank accounts. According to a study by Guin (2017), the inequalities in financial literacy among young people are consistent with the differences in savings and spending behavior among youth and adults as well as the amount of debt that young people have (Henchoz et al., 2019).

Descriptive statistics show that the mean value of the social support variable is 3.80, which represents that respondent generally get good social support from the environment. The average financial condition is 3.32, which means that respondents generally have a perception that their financial condition is quite good. There is a positive effect of social support on financial conditions. It is evidenced by the social support variable having a t-statistic value of 1.807 and a p-value of 0.036 (significance less than 0.05). The coefficient value is positive, with 0.206, which means there is a

positive influence, or it can be said that the better the social support, the better the financial condition and vice versa. This study supports the research of Wijesinghe et al. (2015), which states that financial pressure due to the burden of parenting borne by the sandwich generation is also influenced by social support. Social support provided by the environment when a person faces financial pressures can be in the form of advice that can help reduce stress (appraisal support), physical assistance in the form of necessities or money (tangible support), thoughts or views on oneself (self-esteem support), acceptance of the environment as part of a group and togetherness (belonging support) and encouraging the emergence of appropriate steps to maintain and overcome financial conditions. Social support is helpful, so the better the social support, the better the financial condition and vice versa.

Rising life expectancy, increased health care expenditures, and increased sophistication of financial products are all associated with this shift in social support networks. As a consequence, developing a detailed grasp of the financial world has become critical for anyone seeking to ensure a financial future (Agarwalla et al., 2015). Notwithstanding, research on financial literacy conducted throughout the world reveals severe worries about individuals' abilities to safeguard their financial well-being. Individuals save less, invest poorly, and are frequently in debt (Mitchell, 2012; Reed & Cochrane, 2012). It has been demonstrated that increased financial literacy results in improved financial decision making. In a latest study (Biener et al., 2014), it was proved that increased financial literacy strengthens market microinsurance. Lusardi et al. (2018) demonstrate that early financial literacy training has a significant impact on financial outcomes since returns compound over a longer period of time. Biener et al. (2014) propose that possibly lessons learnt from poor countries provide potential for 'reverse innovation' that can assist developed countries' low-income populations in extending economic gains.

There is a significant positive effect of financial literacy on financial condition. It is evidenced by the financial literacy variable having a t-statistic value of 9.961 and a p-value of 0.000 (significance less than 0.05). The coefficient value is positive, with 0.582, which means there is a positive influence: the higher or better the financial literacy, the better the financial condition and vice versa. The role of the sandwich generation in a collective cultural environment is unavoidable and can have a negative impact on physical, psychological, emotional, and financial burdens. Working women strive to carry out their roles well by increasing financial literacy. Good knowledge of finance, savings, credit, and investment can help improve decision-making quality in dealing with financial stress. Thus, the higher the financial literacy, the better the financial condition and vice versa. This research strengthens the statement (OECD, 2016) that good financial literacy encourages effective financial decision-making, improves the financial well-being of *individuals* and communities, and participates in the economy. In addition, this research can support QM financial (2021), which states that everyone must have the financial literacy to live a good life.

The cultural variable has a t-Statistic value of 2.545, a significance value of 0.006, and a positive indirect effect coefficient of 0.236, which indicates a significant positive indirect effect of the influence of culture on financial conditions mediated by financial literacy. Financial literacy positively mediates the influence of culture on financial literacy. The examination of the influence of culture on financial conditions shows that the high collective culture adopted by Balinese women has a positive effect on financial conditions. In testing the effect of this mediation, it is proven that financial literacy can mediate the influence of culture on financial conditions, or there is an indirect effect of cultural variables on financial conditions through financial literacy. Living in an atmosphere of togetherness and close kinship as well as the exchange of information, someone's experience and knowledge can improve financial literacy in such a way as to encourage more appropriate decision making in dealing with financial conditions.

Female financial literacy was found to be lower than male financial literacy in a 2012 study by Fletschner & Mesbah (2012). Nevertheless, female financial literacy grew dramatically with education, wealth, and support from their partners to acquire and use it. According to Hsu (2016), women invest in financial literacy since couples begin to lose cognitive skills as a result of infidelity. According to a study conducted by Swamy (2014), households in which women were also involved in financial decisions experienced a bigger percentage gain in family income.

There is a significant positive indirect effect of social support on financial conditions mediated by financial literacy. It is evidenced by the social support variable having a t-statistic value of 1.731 and a significance value of 0.042. The coefficient of the indirect effect of 0.161 means that financial literacy positively mediates the effect of social support on financial conditions. In testing the effect of social support on financial conditions, social support has a positive effect on financial conditions. In testing the effect of this mediation, it is proven that financial literacy can mediate the effect of social support on financial conditions, or there is an indirect effect of cultural variables on financial conditions through financial literacy.

Social support is described as "social resources that individuals believe are available to them or are offered to them." These resources can be instrumental, emotional, or informational in nature, and each has its own distinct relationship with a variety of physical and mental health outcomes (Ashida & Heaney, 2012; Gottlieb & Bergen, 2012). It is important to realize that the impacts of social support differ according to an individual's age, gender, socioeconomic situation, cultural heritage, and social relationships (Craigs et al., 2014). Moreover, the study employed Johnson-Neyman's technique to ascertain the range of social support that influences financial decisions (Hayes, 2017). The findings of Waters & Moore (2012) reveal that, in addition to the significant consequences of financial hardship, the quantity of alternative roles and social support all play a role. Furthermore, Sharif et al. (2020) emphasize the critical role of financial literacy in managing direct and indirect costs, which can improve consumers'

quality of life. The research findings by Sharif et al. (2020) are particularly significant since they provide further context for the association between financial literacy and social support.

CONCLUSION

Based on the research results, it can be concluded that first, culture, social support, and financial literacy have a positive effect on financial conditions; second, financial literacy mediates the influence of culture and social support on financial conditions. Even so, it is not easy to break the sandwich generation in a highly collective cultural environment like Bali, Indonesia. The implications of this research are financial literacy is important to avoid financial pressure, and to carry out dual roles well and help overcome financial stress, it is necessary to provide social support for working women of the sandwich generation. The study's policy implications are that women have a right to employment and job protection, as well as the survival of their families. As stated in the essence of Law No. 13 of 2003 on Manpower, labor protection is intended to ensure the fundamental rights of workers / workers and to ensure equal opportunities and treatment without discrimination on any basis in order to realize the welfare of workers / workers and their families while also paying attention to the development of the business world.

The current study focuses on the factors that influence financial conditions, as well as the role of financial literacy in mediating the relationship between factors that affect financial conditions. The relationship between culture, social support, financial literacy and financial conditions can be investigated with a descriptive-quantitative by the use of SEM-PLS analysis in the Balinese woman as a Sandwich Generation. Another suggestion for future studies is related to the financial condition variable. It has been determined that it is challenging to break sandwich generation due a highly collective cultural environment. Hence, to understand the effects of culture, social support, and financial literacy on financial conditions, it is recommended that qualitative studies be conducted in-depth.

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Strategic Area Development to Reduce Poverty and Regional Gaps in The District

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Abstract

Developing strategic areas utilizing existing potential will increase regional economic growth, overcome regional disparities, and reduce poverty. This study aims to determine the efficiency of district strategic area development in reducing regional disparities and poverty rates in Dharmasraya Regency for the 2016-2020 period. The results of the Data Envelopment Analysis (DEA) analysis, using the assumption that input changes are directly proportional to changes in output, show mixed results. Efficiency calculations show that investment, infrastructure, and business empowerment significantly reduce poverty and regional disparities in Dharmasraya Regency. This condition shows that developing strategic district areas can reduce regional disparities and poverty rates in Dharmasraya Regency. This research implies that it can assist the government in reducing poverty in Dharmasraya Regency by allocating funds for industrial development, expanding investment, and providing financial assistance for developing community-based creative businesses. If appropriately implemented, poverty in Dharmasraya Regency will be reduced.

Keywords:

regional economy; regional development; strategic area

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INTRODUCTION

Poverty and regional disparities are problems that often occur in Indonesia. The poor have a low standard of living which directly affects their health, morale, and self-esteem. Poverty reflects a condition where a person cannot fulfill his basic needs to the fullest because there is no cost for it (Nugroho & Dahuri, 2016). According to Maxwell, poverty is described by limited income and consumption, low human dignity, social isolation, lack of ability, vulnerability to political and economic changes, and non-fulfillment of basic needs. Poverty is still a common problem, especially in developing countries (Gilbert, 2014; Zaini et al., 2018).

One indicator of poverty is the low income of the community (Angel et al., 2018; Gereke et al., 2018; Hohberg et al., 2018; Ikemi et al., 2018; Nugroho & Dahuri, 2016; Sun et al., 2018). BAPPENAS (National Development Planning Agency) stipulates that one indicator of poverty is the low level of public access to employment and business opportunities. The poor, according to the World Bank, are people who earn US\$ 1.9 per capita per day. According to the Central Statistics Agency (BPS), the poor are people who only get an average annual income of Rp. 362,000/capita/month or Rp. 12,000/capita/day. Also, based on the data and criteria from BPS, per capita income in rural areas is lower than in urban communities.

Long-term regional development emphasizes the introduction of the potential of natural resources to increase economic growth. In addition, the development of regional potential is able to improve community welfare (Kumari & Devadas, 2020), reduce poverty, and overcome regional development problems. Regional development is strongly influenced by local resources (Babkin et al., 2017; Zasada et al., 2018), markets, labor, investment, government capabilities, transportation, communication, and technology. Regional development that prioritizes regional superior potential will increase economic growth, employment opportunities, and sustainable productivity. Regional potential in the form of regional superior commodities is expected to be able to influence regional development, as well as a prime mover for regional socio-economic development (Chulaphan & Barahona, 2018; Zasada et al., 2018). Moreover, infrastructure sector, especially transportation, has an important role in the context of physical-environmental, social, cultural, political, and other development (Zasada et al., 2018).

The district's strategic areas have various terminology. For example, Special Economic Zones (Anwar, 2014; Beliakov & Kapustkina, 2016; Ezmale & Rimsane, 2014; Girma et al., 2019; Lipták et al., 2015), Economic Zones (Bozhko, 2018; Jiang et al., 2018; Yujin & Zhiyong, 2013), Special Economic Zone (Krishnasamy et al., 2018), and also called Border Zone / Potential Border Zone (Uttama, 2014). Various strategies have been carried out to develop an area including the development of regional potential (Bozhko, 2018). One of them is by promoting policies that support investment (Anwar, 2014; Ezmale & Rimsane, 2014; Uttama, 2014). Other strategies include tax incentives (Anwar, 2014; Beliakov & Kapustkina, 2016; Ezmale & Rimsane, 2014; Lipták et al., 2015), infrastructure development (Anwar, 2014; Ezmale & Rimsane, 2014; Girma et al., 2019; Glinskiy et al., 2017; Yujin & Zhiyong, 2013), ease of

managing institutions and bureaucracy (Beliakov & Kapustkina, 2016), and also the development of technologies that promote and participate in increasing the potential of the area (Anwar, 2014).

Economic growth in Dharmasraya Regency, West Sumatra Province, and Nationally experienced a slowdown in economic growth. If in 2011, the economic growth in Dharmasraya Regency, West Sumatra Province, and Nationally had almost the same percentage, ranging from 6.34% to 6.56%. This continued until 2015. After 2015, economic growth in Dharmasraya Regency, West Sumatra Province, and Nationally experienced a slowdown. GRDP growth shows the lowest economic growth compared to 2015 and previous years. Compared to the economic growth of West Sumatra and national growth, the economic growth of Dharmasraya Regency is still relatively higher. Dharmasraya Regency is the result of the division of Sawahlunto Sijunjung Regency based on Law Number 38 of 2003 which was promulgated on January 7, 2004. As a new region, special attention needs to be paid to regional potential.

If measured by Gross Regional Domestic Product (GRDP), the GRDP growth rate in Dharmasraya Regency averaged 5.66% from 2014 to 2018. Although this is a healthy number, the growth rate of each sector remains inconsistent. Agriculture, forestry and fisheries are the industries that contributed the most to Dharmasraya's GRDP between 2014 and 2018, with an average contribution of 29.6%. This is inseparable from land use in the agricultural sector of 87.31%, of which 58.01% is allocated for the plantation sub-sector and 2.25% for rice fields. Meanwhile, the fisheries sector of Dharmasraya Regency produced 201.80 tons of fish in 2017 while the forestry sector covered an area of 74,487.71 hectares. The clean water supply, waste management, waste and recycling sectors are included in the sectors that provide the smallest contribution to GRDP, which is 0.013%. When compared with the GRDP of West Sumatra; agriculture, forestry, and fisheries are also sectors that provide the largest contribution to GRDP on average, which is 23.2%. In addition, the sectors with the lowest average GRDP contribution are the provision of clean water, waste management, waste and recycling with a contribution of 0.10%, followed by the provision of electricity and gas with a contribution of 0.11%. When the economy of Dharmasraya Regency grows, it is determined by the condition of a greater contribution, but this is not in accordance with the growth rate which remains inconsistent and even begins to decline.

Prior to this study, a comparative study of 97 countries had been carried out using the DEA model for the period 1981-2004 using the Malmquist Index (Tsuneyoshi et al., 2012). In addition, the nature of inequality that affects capital accumulation and performance growth from 1965 to 1990 is also measured using the DEA index. Despite the benefits of DEA, the drawbacks of this method are considered quite significant (Goryushina & Mesropyan, 2012), because a meaningful score cannot be obtained from a single set of inputs and outcomes. Therefore, the current study offers specific techniques for implementing DEA to meet the demands of regional strategic planning. The results of this study also provide an attempt to eliminate the shortcomings noted by the DEA and provide analytical information for the strategic planning decision-making process.

This method is considered as a very effective approach for DEA application in certain cases (Wojcik et al., 2019).

Several different poverty reduction programs around the world agree that ensuring the socio-political inclusion of the poor and vulnerable, improving social security, and improving livelihoods, along with other activities such as facilitating gender empowerment, promoting socio-economic growth opportunities, improving health care facilities, and the provision of better education; is very important to reduce poverty of the poor and vulnerable as a whole. These poverty reduction programs, will continue to be instruments for policy makers and development institutions; despite the fact that these programs show varying degrees of success in different countries and regions due to the unique economic and socio-cultural circumstances of these locations. Despite significant investments, there are poverty reduction projects that continue to fail to achieve their goals (Yalegama et al., 2016). By the year 2000, the failure rate of World Bank development projects in Africa had risen to more than 50% (Ika et al., 2012). Because of this, identifying context-specific characteristics that are critical to the success of initiatives aimed at alleviating poverty is extremely crucial.

There is some extensive literature dealing with the conceptual dimensions of poverty reduction. The available literature highlights the need to develop capacity and provide social security, as well as to organize high quality community organization-based microfinance, with a focus on economic growth, and ensuring good governance. On the other hand, the existing literature has nothing to do with the comparative performance of the above-mentioned methodologies. Therefore, this study attempts to address this gap. This study assesses the effectiveness of this method using DEA-based simulations while advocating an integrative approach that incorporates action on all aspects to eliminate the multidimensional character of poverty in order to meet regional strategic planning needs. Furthermore, this study attempts to contribute to the DEA literature in two ways. First, knowledge capture and sample adequacy; Second, the resilience of dynamic system models.

Based on the previous research above, which revealed that DEA and principal component analysis are still limited. Component analysis techniques can be used, for example creating an index that measures urban competitiveness, and calculating regional competitiveness using DEA. Furthermore, because the analysis of inequality and poverty in Dharmasraya Regency has received less attention, the researchers are interested in discussing topics related to this topic in depth. This study describes a methodology that identifies the main features of the DEA system in the context of developing strategic areas to reduce poverty and regional disparities, causal relationships, and poverty reduction policy scenarios using DEA-based simulations. This study presents a research contribution to the extant literature relating to DEA and poverty reduction. Therefore, this study aims to determine the efficiency of strategic area development in reducing poverty and disparities between regions in Dharmasraya Regency.

METHODS

The approach used in this research is a combination of qualitative and quantitative methods. The qualitative method was carried out through observation at the research site. Information is collected from various agencies related to the development of superior commodities and strategic districts. Information and data collected are related to budget allocation for the development of superior commodities in strategic areas. The quantitative method uses research results related to the factors that influence regional development carried out in various regions/countries.

The data used in this study were taken from various sources such as from the Regional Government Annual Report, projections from BAPPEDA, and data related to the economic condition of Dharmasraya Regency from BPS. Data analysis was performed using Data Envelopment Analysis (DEA) as an analytical tool. All DEA data is processed using STATA software for windows. The unit of analysis used as the output variable is a) regional disparities and b) poverty levels. The input variables are a) infrastructure, b) empowerment of business actors, c) investment, and d) institutions. The Decision-Making Unit (DMU) is an observation year, which is a five-year period between 2016 and 2020.

DEA is an efficient method for evaluating multi-input and multi-output decision-making units (DMUs) without prior identification of functional relationships, objective weights, and examination of invalid components within the DMU. In other words, DEA maintains the same input and output of DMUs while employing the effective sample. Existing research calculates efficiency using a DEA model with poor (undesirable) outcomes (Bongo et al., 2018).

When evaluating efficiency, DEA identifies a unit of reference that can assist in determining the reasons for and solutions to inefficiencies, which is a significant benefit in management applications. In addition, DEA does not require a more detailed statement of the shape of the function, which reflects the relationship between the production and distribution of observations. DEA theory contains a number of value principles that form the basis for management procedures, which include:

- a) Efficiency ratio is relative, DEA maximizes efficiency for each economic unit compared to a random sample of other units. This can be used to identify economic units that might benefit from improved management.
- b) DEA shows an ideal economic unit with a value of 100% and a less efficient one with a value of 100%. In addition, there are multiplayer metrics that serve as the basis for management improvements.
- c) DEA produces a cross-efficiency matrix that describes the efficiency of an economic unit when various inputs are used and produces different outputs when other economic units are used.

RESULT AND DISCUSSIONS

The local government has established a number of macroeconomic indicators that will be used as benchmarks for development success in the current year, as part of the overall implementation of development in the current year. The macroeconomic indicators shows in Table 2. In the context of implementing the current year's development, local governments have established several macroeconomic indicators that will be used as benchmarks for the success of development. Based on the GRDP at current prices (ADHB), it is known that its value always increases from 2018 to 2020. However, the AHBK GRDP value shows a slight decline in 2020, this is due to the Covid19 pandemic which began in January 2020. GRDP 2020 is indeed higher than in 2019 but the number of economic transactions in 2020 has decreased compared to 2019.

Table 2. Macroeconomic Conditions of Dharmasraya Regency in 2018 to 2020 and projections for 2021 to 2022

No	Business Field	Realizations			Projections	
		2018	2019	2020	2021	2022
1	Value of GRDP ADHB (On the Basis of Current Price)	9,917,01	10,344,51	10,242,19	11,322,72	
	Value of GRDP ADHK (On the Basis of Constant Price)	7,208,33	7,560,32	7,454,96		
2	GRDP per capita of ADHB (On the Basis of Price Applies)	41,052,193	41,782,680	40,482,967	42,830,000	43,810,000
3	Poverty Level	6,42	6,29	6,23	6,14	6,08
4	Economic Growth	5,32	4,94	-1,39	2,50	2,90
5	Gini Ratio	0,26	0,28	0,28	0,270	0,265
6	Open Unemployment Rate	4,02	5,06	5,31	5,25	5,00
7	Human Development Index (HDI)	70,86	71,52	71,51	71,66	71,82

Source: Dharnasraya in Figures for 2021, and Projections of Bappeda in 2021

Gross Regional Domestic Product (GRDP) per capita shows the average income of all residents in a region. GRDP per capita is calculated by dividing GRDP at current prices (ADHB) by the entire population. Gross domestic product per capita is expressed as income per capita. This indicator is used to determine the prosperity and level of development of a region. The higher the per capita income, the more developed the region and the higher the average income of the population. The results of the analysis suggest that the Gross Regional Domestic Product (GRDP) per capita of Dharmasraya residents is higher than the national average. However, its GRDP is still lower than the average for the province of West Sumatra. During 2020, poor economic growth due to the COVID-19 pandemic had an impact on the decline in GRDP per capita in 2020.

The poverty rate is the percentage of the entire population living below the poverty line. What is meant by "poverty" are those whose average per capita expenditure per month is below the poverty line (GK). Poverty is defined as an economic failure to meet basic food needs, not as food that is assessed in terms of cost. Each year, BPS determines the poverty rate based on this procedure. In 2020, the Dharmasraya Regency poverty line is set at IDR 477,421 per person/month.

The poverty rate in West Sumatra Province and Dharmasraya District is lower than the national average. The poverty rate in Dharmasraya Regency has decreased over the past five years, dropping from 7.16% to 6.23% in 2020. Despite negative economic developments in 2020 due to the Covid-19 pandemic, poverty has not increased in Dharmasraya Regency. The reason is that poverty data in Dharmasraya Regency is based on the latest BPS data, March 2020. As a result, this condition has not been able to adequately define the impact of Covid-19.

The GRDP growth rate of Dharmasraya Regency with the GRDP growth rate of West Sumatra Province and National GRDP at constant prices from 2016 to 2020. Since 2017 there has been a decline in economic growth at the national, provincial, and district level Dharmasraya. The impact of the Covid-19 outbreak that took place since the first quarter of 2020 even had an impact on negative GDP growth in 2020.

Negative economic growth occurs in more than 70% of countries in the world. As a result of this situation, several economic sectors experienced negative economic growth and community economic activity declined. However, there is anticipation that this influence will wane and fade in 2021, resulting in positive economic developments. Strategic planning is needed to improve the economy of an area affected by the pandemic.

The open unemployment rate (also referred to as TPT) in Dharmasraya District is much lower than the national average as well as the West Sumatra province average. Between 2017 and 2020, the number of TPT in Dharmasraya always increases. However, between 2019 and 2020, TPT increased significantly at the provincial and national levels in West Sumatra, but not as much as at the Dharmasraya District level. According to the analysis of this data, the increase in the unemployment rate in Dharmasraya is solely due to the increase in the number of job seekers who have just finished their studies.

Table 3 describes the HDI development of Dharmasraya Regency from 2016 to 2020 compared to HDI conditions at the provincial and national levels in the same period. During the five-year period 2016-2020, Dharmasraya Regency's HDI is projected to grow. However, there was a slight decline as we approached 2020 due to the Covid-19 condition which had a significant impact on both the economic and social components of society. The only one of the four indicators that causes the HDI to fall is per capita expenditure; However, the other three indicators do not have a major impact on HDI.

Table 3. Comparison of Human Development Index of National, West Sumatra Province and Dharmasraya Regency of 2016-2020

No	Indicator	Unit	2016	2017	2018	2019	2020
A	National HDI	Index	70,18	70,81	71,39	71,92	71,94
1	Life Expectancy at Birth (UHH)	Year	70,9	71,06	71,2	71,34	71,47
2	Average length of school	Year	7,95	8,1	8,17	8,34	8,48
3	Expectations of school length	Year	12,72	12,85	12,91	12,95	12,98
4	Adjusted per capita expenditure	(000 IDR/ Person/ Year	10,420	10,664	11,059	11,299	11,013
B	West Sumatera Province HDI	Index	70,73	71,24	71,73	72,39	72,38
1	Life Expectancy at Birth (UHH)	Year	68,73	68,78	69,01	69,31	69,47
2	Average length of school	Year	8,59	8,72	8,76	8,92	8,99
3	Expectations of school length	Year	13,79	13,94	13,95	14,01	14,02
4	Adjusted per capita expenditure	(000 IDR/ Person/ Year	10,126	10,306	10,638	10,925	10,733
C	Dharmasraya Regency HDI	Index	70,25	70,4	70,86	71,52	71,51
1	Life Expectancy at Birth (UHH)	Year	70,3	70,44	70,73	71,1	71,33
2	Average length of school	Year	8,23	8,24	8,25	8,46	8,47
3	Expectations of school length	Year	12,39	12,4	12,41	12,42	12,43
4	Adjusted per capita expenditure	(000 IDR/ Person/ Year	10,781	10,851	11,189	11,431	11,273

Source: BPS Dharmasraya Regency (2021)

From an economic perspective, mining has proven to be effective in improving the economic welfare of the people of Dharmasraya Regency, West Sumatra as a whole, especially those with customary rights along the riverbanks in the area. On the other hand, Mining facilities, contribute to the widening of the wealth gap between rich and poor, as only those who have the necessary capital and production equipment can derive full benefits from mining (Meutia et al., 2022).

Strategic area is an area whose development is prioritized for regional development by utilizing the potential of the existing area. Based on the above study, the factors that influence regional development are infrastructure, business empowerment, investment, technology, labor, the role of the government, and superior commodities. The indicators used are: a) infrastructure, b) empowerment of business actors, c) investment and d) institutions as input variables; while, a) poverty rates and b) regional disparities as output variables.

Determination of district development efficiency, to encourage poverty reduction and solve inter-regional problems in Dharmasraya Regency, is carried out by setting budget allocations for strategic area development. The input variable concerns the

relationship between local government budget allocations and the input of each variable. The proportion of budget allocation concerns the relationship between strategic area development and GRDP. The output indicator variable for the poverty level is the number of poor people. The indicator variable for regional disparity is the income per capita of the people in Dharmasraya Regency. This study determines the efficiency of district strategic area development from 2016 to 2020.

The infrastructure budget allocation is made through the opening of new roads, road construction, road pavement, rigid concrete, drainage, construction, and repair of bridges. The budget allocation for the empowerment of business actors is carried out by conducting empowerment programs in the field/plantation, training for agribusiness actors, and mentoring. Budget allocations are made through the provision of oil palm and rubber seeds, provision of fertilizers, and assistance in opening new land. Institutional budgeting is carried out through programs for developing rural economic institutions, improving farmer institutions, managing Village Unit Cooperatives (KUD), district agricultural extension operational costs, and improving farmer institutions. The variable number of poverty used is the percentage of poor people compared to the total population. The regional disparity variable uses the percentage of regional per capita income compared to the Gross Regional Domestic Product (GRDP) of Dharmasraya Regency.

Table 2 shows the percentage of input variables and output variables. The table shows the percentage of poverty reduction between 2016 and 2020 due to a decrease in the number of poor people in Dharmasraya Regency. Regional disparities are significantly reduced. The decrease in regional disparities is caused by the increase in the income per capita of the community. Budget allocations for infrastructure fluctuated in 2020 due to road network improvements and construction of new roads.

The priority of infrastructure development reduces the budget allocation for business empowerment from 2016 to 2020. The investment budget allocation fluctuates over five years (2016-2020). The smallest amount of investment occurred in 2019 due to reduced budget allocations for fertilizers and seeds. The following are input variables and output variables from Dharmasraya Regency from 2016-2020.

Table 4. Output Variables and Input Variables

Year	Poverty Rate	Regional Disparity	Infrastructure	Business Actor Empowerment	Investment	Institutional
2016	9.868985	0.000475	1.009475	0.043342	0.622595	0.053549
2017	8.983174	0.000461	1.008194	0.041789	0.714839	0.051742
2018	7.783985	0.000448	1.029053	0.041358	0.887185	0.050342
2019	7.223363	0.000436	0.988894	0.041476	0.00010	0.049236
2020	6.314393	0.000425	1.084902	0.040825	0.348359	0.048074

Source: Regional Government of Dharmasraya Regency, Processed Data 2020

Data processing uses the assumption of Constant Return to Scale (CRS) Data Envelopment Analysis (DEA) that changes in input are directly proportional to changes in output. This shows the efficiency of developing district strategic areas against regional inequality. In 2016, 2018, and 2020 showed 'efficient' results. The years 2017 and 2019 show close to 'efficient' (coefficient close to 1). The calculation results show that the development of strategic districts is able to overcome the gaps between regions in Dharmasraya Regency. In 2019, the efficiency is 0.9950 (close to 1). The budget allocation for investment and infrastructure is smaller than the previous year and the following year. In 2017 the efficiency was 0.9990. The infrastructure budget allocation is smaller than the previous year and the following year.

Table 5 shows the efficiency of developing district strategic areas in poverty reduction in 2016 and 2018 showing efficient results. In 2017 showed inefficient results (0.8290). In 2019 showed inefficient results (0.7720). In 2020 shows almost efficient results (0.9440). The calculation results show that the development of district strategic areas shows the least efficient results in 2019 (0.7720). This inefficiency is caused by the small budget allocation for infrastructure and investment. The development of strategic district areas in 2017 showed inefficiency due to small investment and infrastructure budget allocations. In 2020, efficiency almost reached 0.9440 (close to 1) because the budget allocation for empowering business actors was smaller than in previous years.

The results of the study show the efficiency of developing district strategic areas against regional disparities and poverty. The four variables used are infrastructure, business empowerment, investment, and institutions. Infrastructure and investment are the most influential variables. The variables of investment, infrastructure, and empowerment of business actors greatly affect poverty reduction in an area. The results of this study are in line with Brunner (2013) who stated that infrastructure development and investment are very important in reducing disparities between regions.

Table 5. The Efficiency of Regency Strategic Area Development on Regional Poverty and Disparity

Year	Disparity	Poverty
2016	1.0000	1.0000
2017	0.9990	0.8390
2018	1.0000	1.0000
2019	0.9950	0.7720
2020	1.0000	0.9440

Source: Processed Data, 2020

Poverty in a developing country like Indonesia seems to be an endless topic of conversation. There are several variables that are developing and are expected to continue

to grow, including poverty from a community perspective. Poverty is a condition where individuals are unable to improve their economic standard because they are hindered by a person or group of people, or by government laws that do not support the economic life of the community. Due to the lack of social networks and support structures, one cannot exploit the potential to increase one's productivity.

Policy instruments that are not in line with regional development will have little impact on meeting the needs of the community, including the economic sector, which will have an impact on the spread of poverty. Public facilities and infrastructure are provided by the government as a service to the community, and these facilities and infrastructure are grouped in a system that allows all members to contribute to meeting the needs of the community. Agricultural commodities are exposed on a large scale in agropolitan areas that have the necessary infrastructure, institutions, processing/marketing, and other sectors to support the development of commodity centers. Regional development is exposure to the economic scale of fishery commodities in agropolitan areas that have the necessary infrastructure, institutions, processing/marketing, and other sectors to support the development of commodity centers. The notion of agropolitanism is often seen as a way to reduce poverty by improving the city's economy, among others, through efforts to improve agricultural areas and aquaculture. Utilization of agricultural resources which include aquaculture and superior commodities, development of public infrastructure, agribusiness infrastructure, socio-economic infrastructure, and development of environmental sustainability; all of these things are important for the successful development of agropolitan areas.

Comprehensive poverty reduction requires multiple stakeholders; namely, the central government, local governments, business people, and the community (Chamidah et al., 2020; Nguyen & Nguyen, 2019) to jointly find forms of poverty reduction and realize accelerated poverty reduction in Indonesia. This can be done by formulating four principles. The first principle is to improve and develop social protection systems (Aspinall, 2014). In addition to facing high potential for social vulnerability, Indonesia is also faced with the phenomenon of aging population growth in its demographic structure. It is feared that it will cause an economic burden for the younger generation or a high dependency ratio. The second principle in poverty reduction is to increase the access of the poor to essential services.

The third principle is the effort to empower the poor with the aim of increasing the effectiveness and sustainability of poverty reduction (Chamidah et al., 2020). In poverty reduction efforts, it is very important not to treat the poor as mere objects of development. The importance of implementing a strategy based on this principle in considering poverty is also due to inequality and a non-pro-poor economic structure (Holtemöller & Pohle, 2020; Luo et al., 2020; Suriyanti et al., 2020). In addition, income inequality causes the output of economic growth to be uneven across all groups of people (Shao et al., 2016).

Development that involves and benefits all aspects of society is the fourth precept,

which is described as development that involves and benefits all elements of society simultaneously. Participation is the operative word in all aspects of implementing development programs (Chamidah et al., 2020; Pouw & Gupta, 2017; Pouw et al., 2020). Information from various countries shows that poverty can only be eradicated if the economy improves quickly. As a result, economic expansion must be able to create large numbers of productive jobs.

To develop a dynamic economy, a conducive and stable business climate must be created, both in terms of implementation and policy (Chamidah et al., 2020; Murdifin et al., 2019; Nazir et al., 2020). Increasing economic growth and equity is the main goal of national development, with the ultimate goal of maintaining national stability. Development planners must pay attention to the context of the area where development operations are carried out because the community is a very important aspect in the success of national development (Chamidah et al., 2020).

In addition to the low standard of living, the implementation of regional development is motivated by the need to achieve sustainable national economic growth in the long term (Cheng et al., 2021; Luong et al., 2020). The implementation of regional development is expected to improve the standard of living of the population, and become the basis for the economic development of a developing country. The attention of economists and local community planning professionals in the process of economic growth and equitable development is focused on the most critical issues in regional development efforts, which are the most significant concerns in regional development efforts (Lyubimov, 2017).

The results of this study are in line with the research conducted by Thabrani et al. (2019) which concludes that the efficiency level between health service areas in West Sumatra Province has been running on an average of low-medium in the range of 60%. In each model, the level of efficiency between regions shows a significant difference. Short-term health care output (health level) is significantly more unequal than long-term health care output (life expectancy). In addition, the calculation of the efficiency level shows that the city level area has a lower efficiency level than the district level location. Every year, districts and regions with moderate levels of efficiency show variations in input consumption. This study provides data and index weights not only for input factors such as indicators, sub-indicators, and variables, but also for output factors.

In the end, the most weighted input factor variable is Life Expectancy. Even so, experts believe that regional development strategies have a significant influence in terms of production, with Work Productivity receiving the greatest weight. Meanwhile, the percentage of the poor population has the lowest weight of production factors. Regions that have high competitiveness values in West Sumatra Province are more likely to become municipalities. The competitiveness rating of West Sumatra Province is determined more by input factors than by output considerations. This also shows that the input variables are more significant in this province than the output factors.

Moonen et al. (2016) describe that relevant and specific local context information is needed by policy makers to implement efficient, effective, and fair policies for their communities. Therefore, this research contributes to closing the information gap that exists at the local level in Dharmasraya Regency.

To support regional economic development, the development of alternative economic sectors is very important. Selection was carried out using the findings of a stakeholder analysis and a perception survey. Stakeholder perceptions are relevant because regional development must be based on active community involvement, private sector participation, and improved relations between the community and government.

The determination of four criteria for the development of an economic sector is carried out by assessing: (1) the sector is a relatively superior sector in many sub-districts, (2) the sector is a competitive leading sector in many sub-districts, (2) the sector is able to absorb a large number of workers, and (4) the sector is the sector that is most chosen based on the perception of stakeholders. Based on the results of the DEA analysis, it can be concluded that in order to increase regional economic development in coastal sub-districts, the sectors that need to be developed in order of priority are as follows: (1) the agricultural sector; (2) processing industry; (3) trade sector; hotels and restaurants; and (4) electricity; gas; and the water supply sector.

The findings from the fourth hypothesis test are in accordance with previous research (Arnia & Efrida, 2013), which found that the greater the value of the human development index, the lower the poverty rate. The same research finding was reached by (Zuhdiyaty & Kaluge, 2017), who found that the human development index (HDI) had a negative effect on poverty.

Moreover, Badrudin (2012) implies the failure of government policies in poverty reduction. The facts show that efforts to eradicate poverty on a large scale and evenly across all regencies in the past have ended in failure. This is because the plan ignores precise and specific poverty metrics based on certain elements, such as regional economic performance as measured by GRDP, socio-cultural characteristics, and policy and expenditure management. These determinants are very important to increase the effectiveness of the overall development program.

The results show that regional development requires infrastructure (Glinskiy et al., 2017; Krishnasamy et al., 2018; Sutriadi et al., 2015), investment (Ezmaale & Rimsane, 2014; Utama, 2014), and increased human resources for addressing regional disparities (Kumari & Devadas, 2017), and reducing poverty levels. In line with Badrudin (2012), overcoming regional disparities is very dependent on the ability of the region to manage natural resources and existing human resources, supported by technological developments (Anwar, 2014). Regional development requires promotion and investment policies, opening up economic activities, integrating central and regional programs, building mutually inclusive development, and developing cross-country cooperation (Utama,

2014). Regional development can improve living conditions, increase opportunities for poor areas, and reduce poverty (Lipták et al., 2015).

DEA-based port efficiency improvement is followed by step-by-step selection of benchmarking objectives by Park et al. (2012). DEA is widely used to analyze the effectiveness of port terminals and to develop benchmarking tools. However, this study does not include minimizing the resources required to select benchmarking objectives and does not provide clear guidance on which resources should be prioritized for efficiency gains. To address this issue, they suggest a DEA-based step-wise benchmarking technique that can select benchmarking objectives by assessing input reductions and output expansions, as well as prioritizing resources for efficiency improvements. They proposed a comparative distance minimization model and sensitivity analysis using the DEA approach to achieve this goal. A comparison of 30 major international ports was carried out to demonstrate the efficacy of this method. Industrial applications show that this new technique can be a more realistic and effective comparison tool for terminal ports.

In particular, research on poverty disparities and regional disparities, as well as infrastructure disparities, which focused on factors that drive inequality as well as geographic classification and correlation between dependent and independent variables has been carried out by (Marinho et al., 2017). Casual variables are emphasized as necessary and sufficient conditions that must exist to obtain results on outcome variables that are superior to the results of certain combinations of variables that may occur in the field. Qualitative comparative analysis methods for research on regional poverty and inequality can contribute to and increase knowledge by enabling researchers to see not only correlations between variables, but also comparisons of combinations between variables.

Dharmasraya Regency that has reached the highest level of efficiency is projected to continue to climb towards greater economic growth. Meanwhile, for regions that have not reached the maximum level of efficiency, it is expected to reduce input consumption while increasing output. Although statistically there are differences in the amount of regional original income between Dharmasraya Regency and other Regencies, this is mainly due to differences in the number of natural resources utilized by each region, as well as differences in infrastructure, human resources, social relations, bureaucratization, politics, cultural, and geographical conditions between regions. The existence of disparities in resources and other conditions does not provide obstacles to achieving maximum production. Therefore, it is necessary to take steps to monitor and analyze the use of each input in order to avoid waste, which can lead to inefficiency. It is also important to develop a strategy to allocate revenue generated to sectors that are on track and as needed, to achieve 100% efficiency in the future.

In general, the findings of the DEA-based simulations matched the most critical concepts defined by the participants, which were represented by greater relative weights. This demonstrates the participant's in-depth understanding of the subject matter as

well as the robustness of the system. Scenarios are described as “reasonable depictions of how the future might unfold based on a coherent and internally consistent set of assumptions. It also represents uncertainty as the range of possible outcomes. In fact, designing randomized control trial experiments along each poverty reduction approach and applying the efficacy of each approach described above using different micro-econometric models may be necessary to establish precise causal pathways of the various poverty reduction approaches.

DEA-based simulation results show that in the context of poverty reduction; high quality community organizations should provide microfinance, improve the capacity of the poor while providing a social safety net for the poor and vulnerable, ensure good governance in community organizations and the institutions that support them, continue to diversify livelihood options, and provide markets for small producers . These findings suggest that the various approaches to poverty reduction are relatively complementary and must be implemented simultaneously to achieve comprehensive poverty reduction. However, compared to market-based alternatives, variables such as a) solid governance within community organizations and supporting institutions, b) high quality community organization-based microfinance, and c) skills enhancement combined with social security; seems to work better. There is a lot of literature on radical approaches such as land reform, decentralization, and poverty reduction that have not been discussed in this study. However, the findings of this study lead to the conclusion that multidimensional poverty reduction requires a multifaceted and integrated approach to poverty reduction. The findings of this study will clearly assist in improving the design, management, and implementation of poverty reduction programs in developing countries.

CONCLUSION

The effect of developing district strategic areas in reducing regional disparities shows the following results: In 2016, 2018, and 2020 showed efficient results, while in 2017 and 2019 showed almost efficient results (0.9990 and 0.9950, respectively) due to the small allocation of investment and infrastructure budgets. The effect of developing district strategic areas on poverty reduction shows the following results: 2016 and 2018 showed efficient results. 2017 and 2019 showed inefficient results (0.8390 and 0.7720, respectively) due to very small investment and infrastructure budget allocations. Moreover, in 2020 it showed results that were close to efficient (0.9440), as evidenced by the small budget allocation for empowering business actors.

Local governments must establish a greater strategic will to overcome poverty. In addition to the availability of resources, budget management also needs to be improved to increase organizational productivity. Efforts to promote good governance must also be carried out simultaneously with poverty reduction efforts. All development actors within the central and local governments, universities, non-governmental organizations, private businesses, and international organizations must also support and participate

in efforts to achieve success. Participation and cooperation are expected to encourage the development of universal views, agreements, and synergies in poverty reduction initiatives due to increased participation and cooperation.

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Foreign Capital Inflows and Stock Market Development in Nigeria: An Asymmetric Causality Approach

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Abstract

The study used the recently developed symmetric and asymmetric Granger causality test by Hatemi-J to investigate the causal relationships between foreign capital inflows and stock market development in Nigeria from 1986 to 2019. The findings show unidirectional symmetric causality between stock market development and foreign direct investment, while no symmetric causality was found between stock market development and foreign portfolio investment. The results show unidirectional asymmetric causality of positive and negative shocks of stock market development to the negative shock of foreign direct investment. In contrast, the negative shock of stock market development shows a unidirectional asymmetric causality to the positive shock of foreign portfolio investment. The results revealed the causality relationship between foreign capital inflows and stock market development, including positive and negative aspects in Nigeria. These findings have implications for portfolio design and strategies that are important to policymakers and investors.

Keywords:

Stock Market Development, Foreign Capital Inflows, Asymmetric, Causality, Nigeria

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INTRODUCTION

One of the most disputed issues in finance and international economics is the direction of causation between stock market development and foreign capital inflows. The main reason for the disagreement surrounding the causality between the stock market and foreign capital inflows is that the focus on the subject has grown tremendously since the financial deregulation discussion began. In macroeconomics, the unanimous view on the causal relationship between the two variables has generated increasing interest (Garcia & Liu, 1999; Raza & Jawaid, 2014; Bayar, 2017; Edo, 2018). Foreign capital inflows are important sources of investment flows that supplement the stock market's insufficient financial resources in most developing countries (Tsaui, 2018; Makoni & Marozya, 2018; Raza & Jawaid, 2014). While the stock market is an important network for drawing international capital inflows for economic growth, it is also an important network for attracting domestic capital inflows (Edo, 2018).

Consequently, upon the important role of the stock market in promoting capital inflows, scholars have discussed the feedback relationship between foreign capital inflows and stock market development (Soumaré & Tchana, 2015; Folorunso, 2012; Bayar, 2017; Awolaye & Dada, 2018; Akinmulegun, 2018; Onyeisi et al., 2016; Nwosa, 2015). This is because past foreign capital inflows could explain the current level of stock market development since foreign capital inflows tend to contribute to stock market development, and past stock market development could also explain the current level of foreign capital inflows because stock market development and growth can bring liquidity, which encourages foreign capital inflows. Bayar (2017), Bayar & Gavriletea (2017), Makoni & Marozva, (2018), Nwosa (2018), and Awolaye & Dada, (2018) found that capital inflows are driven by stock market development. This demonstrates that stock market success is what draws foreign capital inflows, which in turn promotes development. Anokye & Tweneboah (2009), Soumaré & Tchana (2015), and Bayar (2017) found that foreign capital inflows drive stock market development. That is, the stock market develops as a result of foreign inflows as a source of investment. Other research by Adebisi & Arikpo (2017), Akinmulegun (2018), and Nwosa (2018) revealed no evidence of a causal relationship between these variables. As a result, present research on this topic might be classified as mixed and inconclusive.

Aside from the inconsistent and ambiguous findings in the prior empirical literature, extant studies on this topic ignore the asymmetric structure that underpins both foreign capital inflows and the stock market. To reiterate this fact, the way investors react to unfavorable news that the market will exhale will be different from how they react to positive news, resulting in a distinct impact on the stock market. There is the likelihood of a non-linear pattern in the foreign capital inflows based on the degree of asymmetric information in the stock market and the value of the domestic interest rate. Similarly, emerging nations' stock markets are susceptible to global information and events, resulting in a volatile and uncertain environment. Furthermore, asymmetric structures can be found in trends and patterns in time series data (Olayungbo, 2015; Dada, 2021), and most macroeconomic variables have exhibited asymmetric behaviour at various stages

of economic activity (Kocaarslan et al., 2019; Dada, 2021), as well as in the variations of key market factors (Jammazi et al., 2014). Asymmetric information also exists in financial markets (Auer, 2019; Hatemi-J, 2019), as well as in the real world (Auer, 2019; Hatemi-J, 2019; Garcia & Liu, 1999). Based on current modern econometrics, the use of asymmetric structures in empirical research is strongly supported by economic realities (Hatemi-J & El-Khatib, 2020).

Meanwhile, earlier research on the relationship between foreign capital inflows and stock market development has assumed a linear and symmetric relationship, in which the influence of negative and positive news is equal in scale and fails to distinguish the shocks. This assumption of linear and symmetry relations may be overly restrictive and lead to misleading conclusions, as there is the possibility of asymmetric structure in reality in numerous cases (Hatemi-J, 2012a; Olayeni, 2012; Olayungbo, 2015). The linear and symmetric connection communicates nothing about a positive or negative shock because it cannot provide the hidden information about the intrinsic dynamics of the variables in either a positive or negative shock that may be analyzed (Eng & Wong, 2015; Hristu-Varsakelis & Kyrtsov, 2008). As a result, this study contributes to the body of knowledge and distinguishes itself from previous research on the causal relationship between foreign capital inflows and stock market development by decomposing both foreign capital inflows and stock market development into negative and positive shocks, to show the strength of the negative and positive shocks since the variables reacts to both negative and positive shocks (Dhaoui et al., 2018).

In the context of emerging nations, such as Nigeria, studies on the causal relationships between foreign capital inflows and stock market development are abounded to determine the component that precedes the other to affect economic growth. Meanwhile, the results of existing studies on the Nigerian economy are inconsistent and inconclusive. The symmetric causality method has received the most attention in the extant literature (Nwosa, 2018; Odo et al, 2016; Akinmulegun, 2018). Findings of extant studies may be policy deficient if the robustness of the asymmetric structure in the financial system and capital inflows is overlooked.

Therefore, this study explores the asymmetric response in the link between foreign capital inflows and stock market development in Nigeria to capture and correct the limitations in previous studies. The symmetric causality test is also investigated, as well as the sign of causality between the two variables, which provides a more thorough view of the relationship. Finally, the causal link is examined in an asymmetric framework. The asymmetric approach allows scholars to look at the differential causal relationship between positive and negative shocks in foreign capital inflows and stock market development to see if there's an asymmetric causal link between the two variables. It aids in distinguishing the causal impact of positive and negative changes, and it is unique since financial market participants react differently to good and bad news. Because a linear relationship may not be sufficient to capture the underlying relationship, the asymmetric structure provides a better, more accurate and relevant analytical examination of the relationship. This study also differs from previous research in that it uses the Hatemi-J (2012a 2014b)

pathway to decompose data on foreign capital inflows and stock market development into positive and negative shocks and to give more precise critical standards, the study adopts a bootstrap simulation method with leverage changes (Hatemi-J, 2012b; 2019), to allow empirical investigation of asymmetric structure in the causality relationship of the variables in Nigeria.

METHODS

The data used in this analysis are stock market development (SMD), which is expressed as a percentage of GDP as a proxy of market capitalization, and foreign capital inflows, which focus on foreign direct investment (FDI) and foreign portfolio investment (FPI) as a percentage of GDP. These two types of inflows are distinct; FDI is a long-term investment inflow with lower volatility, whereas FPI is a short-term investment inflow with more volatility. They are the two most common types of capital inflows, both of which are primarily related to financial market activity and both of which dominate the stock market. The analysis uses annual data from the Statistical Bulletin of the Central Bank of Nigeria (CBN) from 1986 to 2019.

The Granger causality test determines if one series' explanatory ability predicts the value of the other series in the future. Although it provides useful information about the link between time series, the influence of negative and positive values on the feature value of other series may vary. The benefit of this test concerning symmetric ones is that it distinguishes between the impact of negative and positive shocks. This enables the transformation of the original variable into both positive and negative cumulative components. It is asymmetric since the positive and negative values are not equal and could result in distinct causal outcomes. The approach follows a random walk since the goal is to investigate the causal relationship between two integrated variables as described thus:

$$SMD_t = SMD_{t-1} + \varepsilon_{1t} = SMD_0 + \sum_{j=1}^p \varepsilon_{1j} \quad (1)$$

and

$$FCI_t = FCI_{t-1} + \varepsilon_{2t} = FCI_0 + \sum_{i=1}^t \varepsilon_{2i} \quad (2)$$

Where $t = 1, 2, \dots, T$; the constant term SMD_0 and FCI_0 are initial values of the variables while ε_{1i} and ε_{2i} are the error terms. The positive, as well as the negative shocks, are specified as: $\varepsilon_{1i}^+ = \max(\varepsilon_{1i}, 0)$, $\varepsilon_{1i}^- = \min(\varepsilon_{1i}, 0)$, $\varepsilon_{2i}^+ = \max(\varepsilon_{2i}, 0)$, $\varepsilon_{2i}^- = \min(\varepsilon_{2i}, 0)$, respectively.

Hence, one can state $\varepsilon_{1i} = \varepsilon_{1i}^+ + \varepsilon_{1i}^-$ and $\varepsilon_{2i} = \varepsilon_{2i}^+ + \varepsilon_{2i}^-$. It follows that:

$$SMD_t = SMD_{t-1} + \varepsilon_{1t} = SMD_0 + \sum_{i=1}^t \varepsilon_{1i}^+ + \sum_{i=1}^t \varepsilon_{1i}^- \quad (3)$$

Similarly

$$FCI_t = FCI_{t-1} + \varepsilon_{2t} = FCI_0 + \sum_{i=1}^t \varepsilon_{2i}^+ + \sum_{i=1}^t \varepsilon_{2i}^- \quad (4)$$

Lastly, the positive and negative shocks for each variable can be set in a cumulative form as

$$SMD_t^+ = \sum_{i=1}^t \varepsilon_{1i}^+ \text{ and } SMD_t^- = \sum_{i=1}^t \varepsilon_{1i}^- ; FCI_t^+ = \sum_{i=1}^t \varepsilon_{2i}^+ \text{ and } FCI_t^- = \sum_{i=1}^t \varepsilon_{2i}^-$$

In the event of testing for asymmetric causality using the standard vector autoregressive model of order p, VAR (p) model is expressed as:

$$y_t^+ = \alpha_0 + A_1 y_{t-1}^+ + \dots + A_p y_{t-p}^+ + u_t^+ \quad (5)$$

and,

$$y_t^- = \beta_0 + A_1 y_{t-1}^- + \dots + A_p y_{t-p}^- + u_t^- \quad (6)$$

Where y_t^+ and y_t^- shows variable vector and u_t^+ , u_t^- is a 2x1 vector of the cumulative sum of positive and negative error terms, A_1 is parameter matrix which is determined by using delay distance. Testing the causal relationship among positive cumulative shocks (FCI^+ , SMD^+), (SMD^+ , FCI^+), the VAR (p) model is expressed as:

$$SMD_t^+ = \alpha_0 + \sum_{k=1}^p \alpha_{1k} SMD_{t-k}^+ + \sum_{k=1}^p \alpha_{2k} FCI_{t-k}^+ + \mu_{1t} \quad (7)$$

$$FCI_t^+ = \beta_0 + \sum_{k=1}^p \beta_{1k} FCI_{t-k}^+ + \sum_{k=1}^p \beta_{2k} SMD_{t-k}^+ + \mu_{2t} \quad (8)$$

By the same token, equation (6) can be employed to test for the causal relationship among negative cumulative shocks (FCI_t^- , SMD_t^-), (SMD_t^- , FCI_t^-)

This study, like Hatemi-J's work, looks for different combinations of shocks in each direction of causation, such as (SMD_t^+ , FCI_t^-), (FCI_t^+ , SMD_t^-), (SMD_t^+ , FCI_t^+), (FCI_t^- , SMD_t^+). In addition, the collection of symmetric causality testing (SMD_t , FCI_t) is examined inside the structure of a similar bootstrap simulation approach.

RESULT AND DISCUSSION

The link between foreign capital inflows (FCI) and stock market development (SMD) has produced varied outcomes in terms of causality. Soumaré & Tchana (2015) investigated the causal relationship between foreign direct investment (FDI) and emerging market financial market development. They show that in emerging economies, FDI and SMD have a bidirectional causal relationship. In their research, Raza et al. (2015) discovered a bidirectional causal link between FDI and economic growth with stock market development, as well as a unidirectional causal link between workers' remittances and stock market capitalization. In addition, Agbloyor et al. (2013) examined the impact of FDI on SMD in 16 African countries in their study. They discovered a strong two-way causal relationship between FDI and stock market development. In Turkey, Bayar (2017) investigated the causal relationship between FCI and SMD. In Turkey, the Hacker and Hatemi-J bootstrap causality tests revealed unidirectional causation between FDI and SMD, as well as unidirectional causality between SMD and FPI. Makoni & Marozva

(2018) found that causality emerged from FPI, FDI, and real economic growth to financial market development induces FDI and FPI in Mauritius in their study, FPI, and financial market development in Mauritius. Nwosa (2018) showed unidirectional causality of SMD to FPI in his study does SMD spurs capital inflows in Nigeria, using a pair-wise Granger Causality approach, while Bayar & Gavrilea (2018) found one-way causality from financial development sectors to FDI in their study FDI and financial development, using a panel cointegration and causation, European Union Countries.

Odo et al. (2016), on the other hand, investigated the impact of FDI on the growth of the Nigerian stock market and discovered that FDI and stock market growth in Nigeria had no direct relationship. Furthermore, Onyeisi et al. (2016) investigated the impact of foreign portfolio investment inflows on the growth of the Nigerian stock market but found no direct link between FPI and the stock market. Adebisi & Arikpo (2017) discovered that there is no causal relationship between stock market liquidity and FPI in their study of financial market performance and FPI in Nigeria. According to Akinmulegun (2018), the impact of capital market development on FPI in Nigeria indicated that there is no direct relationship between SMD and FPI in Nigeria. In his analysis, Nwosa (2018) also demonstrated that there is no causal relationship between SMD and FDI in Nigeria.

According to the aforementioned assessment, there are sparse studies in Nigeria that account for the potential for asymmetric causality in SMD and FCI. Because financial data is not normally distributed with the aspect of volatility (Hatemi-J, 2019), foreign capital inflows also follow a nonlinear pattern based on the level of asymmetric information. Failing to consider the asymmetric issue may lead to erroneous regression results and mislead the policymaking process. As a result, this study adds to the existing research by considering both symmetric and asymmetric causality tests to re-examine the link between the FCI and the SMD.

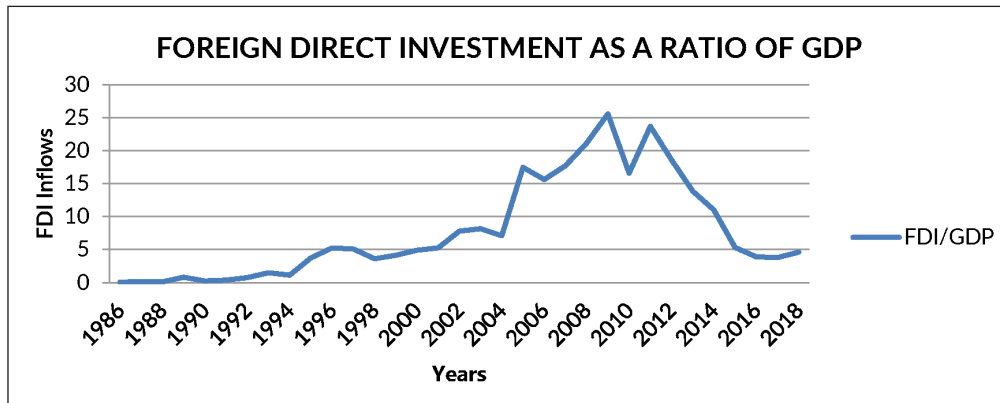
Overview of foreign capital inflows and stock market development in Nigeria

The Nigerian economy has experienced tremendous recognition in both stock market indicators and foreign capital inflows after the commencement of the Structural Adjustment Programme (SAP). The financial market deregulation in 1986 and beyond has attracted the influx of foreign capital inflows via the stock market into the economy. Both Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) have exceeded any other types of foreign capital inflows in Nigeria.

Through the introduction of SAP along with economic liberalization in Nigeria, FDI from 1986 has been oscillating through 1990 (see Figure 1). After this year, due to a rise in oil prices, the Nigerian economy witnessed a relatively persistent increase in the value of FDI from N 4,686.0 million in 1990 to N22,229.2 billion in 1994 and an uneven increase was recorded till 1999 to the value of N92,792.5 billion. On the transition to democracy in 1999, FDI value increased tremendously to the value of N258,388.6 billion in 2003. Subsequently, a downward movement occurred till 2004

when it fell to N248,224.55 billion. The trend varied to an upward trend again as a result of political stability and other favourable factors until it reached N1,273,815.8 trillion in 2009. Thereafter, it fell marginally but increased and reached the highest point of N1,360,307.9 trillion in 2011. After, the value of the FDI plummeted from N411,527.0 billion in 2013 to the value of N259,674.4 billion in 2017 but marginally increased to the value of N332,066.4 billion in 2018.

Figure 1. The Trend of Foreign Direct Investment in Nigeria (1986-2018)



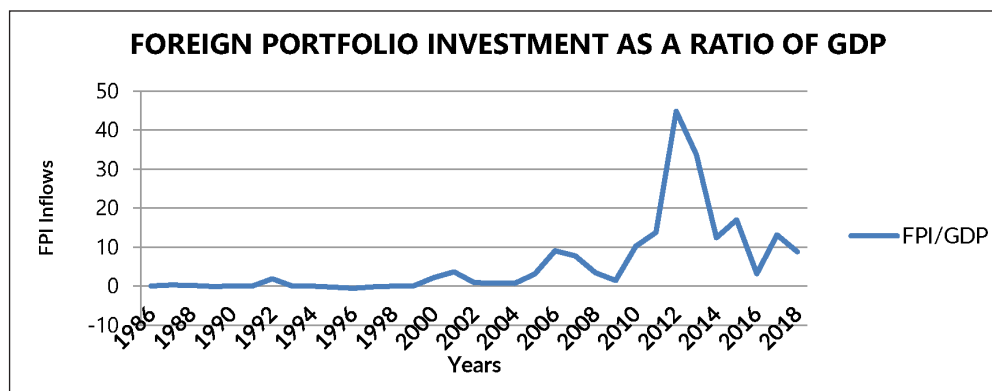
Source: Author's Computation

The recent sharp decline can be connected with corruption, insurgency insecurity, and soon in the country. On the other side, FPI was observed shortly after the liberalization of the financial system in 1986 and the first record via monetary authority (CBN) was N151.6 million in 1986 (see Figure 2). Thereafter, the announcement of several decrees in 1987 led the value to rise to the value of N4,353.0 billion. However, between 1987 and 1998, FPI recorded a negative value. The introduction of SAP has been attributed to the negative value of FPI. However, after the return of democracy and the institution of the Automated Trading System in the trading activities of the stock exchange in 1999, FPI bounced back with a record value of N1,015.7 billion and the trend continued to rise from N51,079.0 billion in 2000 to N9,518.99 billion in 2001 but dropped sharply to N23,541.0 billion in 2004. The trend changed to an upward trend again from 2005 to 2007 but plummeted from N332,547.8 billion in 2007 to the value of N70,938.5 billion in 2009. This might have resulted from the effect of the Global Financial Crisis (GFC) in 2008. However, the trend bounced back from N556,585.5 billion in 2010 to the value of N2,687,232.5 trillion in 2012, which was the maximum in the economic history of Nigeria. There were significant outflows of FPI between 2013 and 2016 which could be a result of the reaction towards monetary policy normalization of the US Federal Reserves but returned to its increase to the value of N898,497.3 billion, thereafter, declined to N614,100.2 billion in 2018.

Furthermore, the stock market development (proxy MCAP as % of GDP) increased from N6.80 billion in 1986 to the value of N16.30 billion in 1990 (see Figure 3). The trend continued to rise to the value of N180.4 billion in 1995. Thereafter, it declined

slightly between 1996 and 1998 from N285.8 billion to N262.6 billion in 1998. The trend continued to rise until it reached N13,181.9 trillion in 2007. Again, the value of MCAP fell between 2008 and 2009 from N9,562.9 trillion to N7,030.8 trillion which was attributed to the GFC. However, the trend maintained a steady increase from N9,918.2 trillion in 2010 to the value of N19,077.4 trillion in 2013. Between 2014 and 2016, the trend oscillated which could be due to a lack of investors' confidence and instability in the economy. Thereafter, after the exited of the recession of 2016, the MCAP trend changed to an upward trend from N21, 128.9 trillion in 2017 to N21,904.0 trillion in 2018.

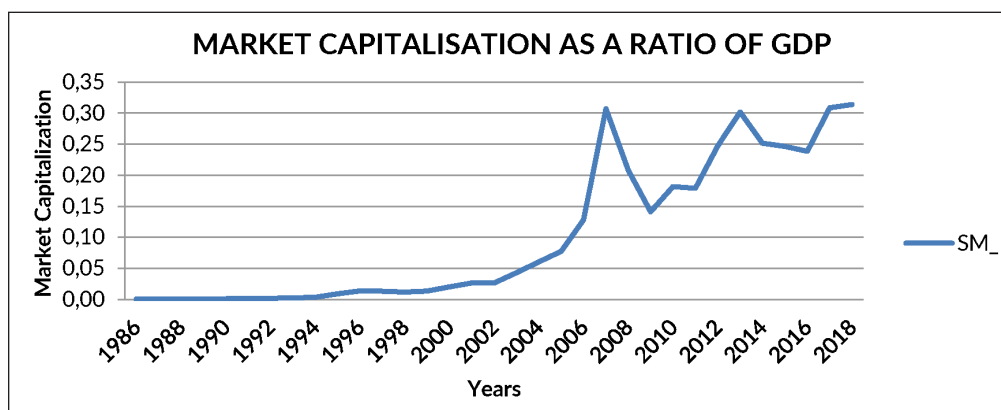
Figure 2. The Trend of Foreign Portfolio Investment in Nigeria (1986-2018)



Source: Author's Computation

The trends of foreign capital inflows both FDI, as well as FPI together with stock market development (proxy MCAP % of GDP), show that the trend is in the same direction. This is given a clear direction for appropriate policy options and it gives new perceptions regarding which of the two variables precedes one another. This, however, arouses an inquiry into the existence of the causal relationship between these two variables in Nigeria. Also, the trends of the variables cannot be regarded as moderate, which means there are forms of fluctuation in the trend that implies that asymmetric structures are evident in the trends of FCI and SMD in Nigeria.

Figure 3. The Trend of Stock Market Development in Nigeria (1986 -2018)



Source: Author's Computation

Descriptive statistics and Correlation matrix

The study investigates the features and stationary qualities of the data employed before investigating the asymmetric causality test between both positive and negative shocks of FDI, FPI, and SMD. The descriptive statistics and correlation analysis of the data are shown in Table 1.

Table 1. Descriptive Statistics and Correlation Matrix

	SMD	FPI	FDI
Mean	6.645	5.781	7.840
Median	6.640	1.423	5.069
Maximum	9.994	44.839	25.550
Minimum	1.917	-0.569	0.048
Std. Dev.	2.767	10.042	7.571
Skewness	-0.317	2.534	0.903
Kurtosis	1.690	9.437	2.567
Jarque-Bera	2.913	92.277	4.745
Probability	0.233	0.000	0.093
Observations	34	34	34
SMD	1.000		
FPI	0.689	1.000	
FDI	0.547	0.457	1.000

Note: SMD= stock market development, FPI=ratio of portfolio inflows to GDP, FDI=ratio of foreign direct inflows to GDP.
Source: Author's Computation (2021)

The average (mean) values for stock market development (SMD), foreign portfolio investment (FPI), and foreign direct investment (FDI) are 6.645, 5.781, and 7.840, respectively. The variables' average value falls between their varying lowest and maximum values, showing long-term stability. The standard deviation shows that stock market development (SMD) is the most stable distributed variable from its mean. SMD is negatively skewed, yet FDI and FPI are favorably skewed, according to descriptive statistics. Furthermore, because SMD and FDI have values less than 3, kurtosis, which measures the peaks of a distribution, shows that they are platykurtic, but FPI is leptokurtic (value greater than 3). The J-B statistics suggest that SMD and FDI are normally distributed, because their J-B probability value is more than 5%, however, FPI is not. Furthermore, the correlation coefficient between various types of FCI (FPI & FDI) and SMD is (0.689). (0.547). This indicates that the two variables are inextricably linked. The correlation between the two variables is strong enough to suggest a causal link. Shocks in one of the two variables produce shocks in the other, according to this correlation study.

Unit root test

Following the descriptive and correlation analyses of the variables, the study uses a unit root of the variables for further preliminary analyses to avoid false regression outcomes and determine the sequence of integration of FCI and SMD. The unit root test before asymmetric causality is shown in Table 2. Following the data breakdowns into positive and negative components, the unit root tests are looked at to see if the extra-unconstrained potential that is introduced to the VAR model delivers the impact of one unit root. The results of the unit root tests, using the Phillips-Perron (PP) test support one extra lag because all the variables are integrated of the order one $I(1)$. After the unit root test, the optimum lag length of the VAR model was chosen following the information criteria recommended by the Hatemi-J criterion, and the extra-unrestricted lag requires based on the order of integration of variables.

Table 2. Unit Roots Test (Phillip Perron) Before Asymmetric Causality

Variables	Level		First Differences	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
SMD	-1.6148	-0.8051	-4.2492***	-4.5749***
FDI	-1.6146	-1.3442	-6.6111***	-6.7600***
FPI	-2.4216	-3.1040	-8.0270***	-7.7601***
SMD ⁺	-1.4790	-0.5311	-4.1173***	-4.3083***
FDI ⁺	0.0688	-2.0320	-5.9863***	-5.95546***
FPI ⁺	1.1113	-1.0544	-5.3667***	-6.2337***
SMD ⁻	0.0256	-1.7787	-3.3297**	-3.2497*
FDI ⁻	1.4062	-0.7855	-4.7342***	-5.4134***
FPI ⁻	2.0459	0.0911	-4.4607***	-5.3693***

***, ** and * denote levels of significance at 1%, 5% and 10% respectively

Author's Computation, 2021

The Empirical Results

Given the features and stationary nature of the data, and the fact that the residuals are not normally distributed, it is vital to use bootstrap to generate accurate critical values for the causality test, as pointed out by Hatemi-J (2012 a). As a result, both the symmetric and asymmetric Granger causality tests, and the bootstrapping were performed in this study. The estimation of outcomes for the causality test is shown in Tables 3 and 4. The study looked at every potential combination. The symmetric and asymmetric causation between stock market development (SMD) and foreign direct investment (FDI) is shown in Table 3. The symmetric causality result reveals that the null hypothesis that stock market development does not cause FDI is rejected at the 10% level of significance for the first direction. This means that a unidirectional causality exists from stock market development (SMD) to foreign direct investment

(FDI). These causation tests show that changes in stock market performance have a higher causal impact on foreign direct investment in Nigeria. Improved stock market performance attracts more foreign direct investment (FDI) into the Nigerian economy. This conclusion is compatible with the study of Sourmaré & Tchana (2015) and Bayar & Gavrilea (2018), who reveals unidirectional causality from SMD to FDI. On the other hand, the null hypothesis that FDI Granger causes SMD cannot be rejected at any level of significance. It means that FDI has no predictive power on SMD in the second direction. These causality tests show that changes in FDI have no causal effect on SMD in Nigeria. This however contradicts the result by Bayar (2017) who found a unidirectional causality relationship between FDI and SMD. When asymmetric causality tests are taken into account, the results show that the null hypothesis of positive shock on stock market development SMD^+ not causing negative shock in foreign direct investment FDI^- , i.e. ($SMD^+ \nrightarrow FDI^-$), is rejected at a 10% level of significance in the first direction, which means that changes in the stock market performance cause downturn in foreign direct investment inflows in the country. In the other direction, a negative shock of FDI^- not Granger causes a positive shock of SMD cannot be rejected at any level of significance. This means that FDI^- has no causative power on the SMD^+ ($FDI^- \nrightarrow SMD^+$) in the second direction. The non-causality from FDI^- to SMD^+ contradicts Bayar (2017) who reveals a unidirectional causality from FDI to SMD using the Hacker and Hatemi-J bootstrap causality test.

Table 3. The Results of Symmetric and Asymmetric Causality Tests between Stock Market Development and Foreign Direct Investment.

Null Hypothesis	Estimated Wald test Stat	1% Bootstrap Cri. Val.	5% Bootstrap Cri. Val.	10% Bootstrap Cri. Val.	Lag Order	Causality
$SMD \nrightarrow FDI$	4.065*	7.832	4.299	2.894	1	Yes
$FDI \nrightarrow SMD$	1.120	8.531	4.299	2.968	1	No
$SMD^+ \nrightarrow FDI^+$	1.708	11.183	5.190	3.350	1	No
$FDI^+ \nrightarrow SMD^+$	0.943	8.584	4.368	2.838	1	No
$SMD^+ \nrightarrow FDI^-$	3.075*	8.700	4.385	2.908	1	Yes
$FDI^- \nrightarrow SMD^+$	0.804	7.828	4.318	2.902	1	No
$SMD^- \nrightarrow FDI^-$	8.205**	13.914	5.442	3.164	2	Yes
$FDI^- \nrightarrow SMD^-$	1.715	10.479	4.824	3.044	2	No
$SMD^- \nrightarrow FDI^+$	1.651	12.751	7.227	5.270	2	No
$FDI^+ \nrightarrow SMD^-$	1.678	21.170	9.564	6.237	2	No

* and ** denote levels of significance at 10% and 5% respectively

The notation $SMD \nrightarrow FDI$ means that variable SMD does not cause variable FDI

The number of bootstrap iterations is 10,000 in each case.

Author's Computation, 2021

The result also shows that the negative shock of the stock market development did not cause a negative shock in foreign direct investment, i.e. ($SMD^- \neq f FDI^-$) is rejected at a 5% level of significance. This result indicates that a decline in stock market performance will cause a reduction in the inflows of FDI in the country. On the other side, the negative shock of FDI^- granger causing the SMD^- cannot be rejected at any significance level, which implies that FDI^- has no predictive power on the SMD^- for the second direction. The result of the causality effect seems to be stronger for ($SMD^- \neq f FDI^-$) because the magnitude of the causal impact is 8.205, which is larger than the 3.075 of the positive shock ($SMD^+ \neq f FDI^+$). This implies that investors react more to negative news than positive news about the stock market growth. This result is supported by Hatemi-J, (2019) who concluded that investors tend to react to negative news more than the good news. Hence, the null hypothesis that the SMD is not causing FDI is thus rejected at a predictable significance level, indicating that symmetric and asymmetric, both positive and negative shock granger causalities exist from the stock market development to foreign direct investment inflows in Nigeria, whereas the null hypothesis that FDI does not granger cause the SMD cannot be rejected at any conventional significance level, indicating that there are no symmetric and asymmetric causal effects running from FDI to SMD in Nigeria.

On the other hand, Table 4 also displays the results of the bootstrap simulation of symmetric and asymmetric causality tests between stock market development (SMD) and foreign portfolio investment (FPI). According to the findings, there is no evidence of symmetric causality between SMD and FPI. At any conventional significance level, the null hypothesis of no Granger causality flowing between SMD and FPI cannot be rejected. This means that there are no predictable causal implications in both directions between the two variables. This result is supported by the study of Akinmulegun (2018), Nwosa (2018), and Sajid et al. (2021), they all found no causal relationship between these variables. When evaluating an asymmetric causality test, all possibilities are considered. The results demonstrate that the null hypothesis of negative shock in the SMD^- not causing positive shock in FPI^+ ($SMD^- \neq f FPI^+$) is rejected at the 5% significance level in the first direction. This suggests there is a unidirectional Granger asymmetric causal link from the negative shock in stock market development (SMD^-) to the positive shock in foreign portfolio investment inflows (FPI^+).

This result means that a downturn in stock market performance leads to a considerable upturn in FPI as a result of the expectation of a future rise in stock market value. This means that hot money (FPI) will always seek places with a high rate of return on investment; a drop in stock market performance may serve as a motivation for investors to increase their investment for future higher returns. This study is supported by Hatemi-J, (2019), who found that investors respond to negative shocks in the market more than positive shocks of the same magnitude. However, in the second direction, the null hypothesis of the positive shock of FPI^+ not granger causing the negative shock SMD^- cannot be rejected, which means that positive shock FPI^+ has no predictive power on the negative shock in the SMD^- . Meanwhile, other null hypotheses for different

combinations of cumulative foreign capital inflows and stock market development cannot be rejected at any widely accepted level of significance. Hence, the empirical results of this study indicate that there is a causality relationship, including both positive and negative aspects, between SMD and FCI in Nigeria and the research further discovers that the stock market development is more important as it is capable of influencing inflows of capital both in the symmetric and asymmetric condition in the Nigerian stock market.

Table 4. The Results of Symmetric and Asymmetric Causality Tests between Stock Market Development and Foreign Portfolio Investment

Null Hypothesis	Estimated Wald test Stat	1% Bootstrap Cri. Val.	5% Bootstrap Cri. Val.	10% Bootstrap Cri. Val.	Lag Order	Causality
$SMD \neq FPI$	1.003	8.875	4.320	2.895	1	No
$FPI \neq SMD$	0.015	8.085	4.413	2.917	1	No
$SMD^+ \neq FPI^+$	2.130	9.553	4.387	2.839	1	No
$FPI^+ \neq SMD^+$	0.049	8.882	4.280	2.837	1	No
$SMD^+ \neq FPI^-$	0.250	8.202	4.144	2.811	1	No
$FPI^- \neq SMD^+$	0.331	8.337	4.340	2.957	1	No
$SMD^- \neq FPI^-$	0.384	18.939	8.878	5.951	2	No
$FPI^- \neq SMD^-$	0.309	14.707	7.579	5.372	2	No
$SMD^- \neq FPI^+$	11.338**	19.283	8.380	5.779	2	Yes
$FPI^+ \neq SMD^-$	5.474	16.314	8.136	5.583	2	No

* and ** denote levels of significance at 10% and 5% respectively

The notation $SMD \neq FPI$ means that variable SMD does not cause variable FPI

The number of bootstrap iterations is 10,000 in each case.

Author's Computation, 2021

CONCLUSION

The main goal of this study is to look into the causal relationship between foreign capital inflows (FCI) and stock market development (SMD), which is crucial for investors and policymakers. Due to the differences in the approach utilized and the periods studied by earlier studies on the subject, the results are mixed. This study adds to the previous one by looking at the asymmetric causal relationship between foreign capital inflows and stock market development in Nigeria from 1986 to 2019. It does so using a Granger causality framework with symmetric and asymmetric structures. The bootstrapping asymmetric causality technique is used to investigate the predictive capacity of SMD and FCI in Nigeria. The study's key findings are as follows: According to the symmetric causality result, SMD granger causes FDI, while the latter has no predictive power over SMD.

The study discovers an asymmetric causal relationship between SMD and FDI, as seen by distinct patterns of positive and negative SMD shocks to adverse FDI shocks in Nigeria. On the other hand, the study finds no causal link between SMD and FPI in both directions using a symmetric causality test. By using the asymmetric causality test, the study finds that the causality running from SMD to FPI is asymmetric, as expressed by negative shock to positive in Nigeria. Finally, the study discovers an asymmetric causality between Nigeria's stock market development and foreign capital inflows.

These findings, however, have implications for policymakers and investors, who should formulate policies to improve the stock market environment with a profitable trading strategies framework that will entice more international investors into the Nigerian stock market. Also, based on the findings, the asymmetric relationship suggests the presence of potential benefits for investment in stock markets for investors, and this implies the existence of diversification opportunities for foreign investors. The findings can be considered for international investors in their portfolios trading strategies, as well as make decisions on SMD and FCI, and regulations should decide between positive and negative shocks, as their effects differ.

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Factors Predicting Financial Sustainability in the Banking Sector

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Abstract

The banking sectors are striving to operate their businesses during the Covid-19 pandemic. This requires innovation to enable the provision of services to the community and improve financial performance. Therefore, this research aimed to analyze the effect of intellectual capital on financial sustainability mediated by financial performance. The purposive sampling technique was employed, with 31 national private banks listed on the IDX as samples and PLS-SEM to solve the research hypothesis. The result demonstrated that the financial performance variable mediates the effect of intellectual capital on financial sustainability. The implication is that the banking sector should pay attention to its intellectual capital, which will improve its financial performance and promote the sustainability of the business.

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INTRODUCTION

The Covid-19 pandemic has impacted the economy of all countries, including Indonesia, and disrupted the growth of the business sector. This situation has also negatively affected the banking industry, an intermediary institution that provides investment funds for businesses. The banking sector faces challenges due to the pandemic, necessitating financial sustainability procedures to ensure its survival.

Sustainability in the banking sector is indicated by financial sustainability. This is a company's ability to meet all economic costs and develop physical, human, and intellectual infrastructure to maintain its production capacity (Pedersen et al., 2017). Besides the physical and human aspects, intellectual development must be improved to ensure the company can compete and survive during a crisis, such as the Covid-19 pandemic.

As the fastest-changing financial services industry, the banking sector requires innovation via reliable technology. According to Xu & Liu (2020), using reliable technology indicates an increase in a bank's information and knowledge resources and leads to improved intellectual capital. This will subsequently increase the company's competitiveness and financial performance. Wijaya & Amanah (2017) stated that intellectual capital is a resource owned by a company, which embodies the difference between the corporate's market and book value. It is often the main factor in determining a company's profit.

Additionally, Pulic (1998) affirmed that intellectual capital consists of human, structure, and consumer capital, which enable the generation of added value to the company. Pulic also developed a method of measuring intellectual capital, namely VAICTM, which provides information about tangible and intangible assets owned by the corporation. The intellectual capital Value-Added Coefficient (VAICTM) is a formula to help present and calculate information about the value created by tangible and intangible resources (Gozali & Hatane, 2014).

VAICTM consists of three main elements, i.e., value-added from capital employed, human capital, and structural capital. The value-added from the capital employed indicates the value formed by one unit of physical capital. This ratio indicates the contribution each unit of capital made to the organization's added value (Wijayani, 2017). The value-added from human capital describes an employee's ability to generate value for the business from the funds spent by the company. An increase in the value generated from each Rupiah issued denotes the presence of leading human resources and quality employees who can improve company performance (Harianja & Fauzie, 2014). Structural capital value-added is the contribution of structural capital to value formation. It is calculated by the amount of structural capital required to obtain one (1) Rupiah of added value and describes an indicator of value formation (Wijaya & Amanah, 2017).

Meanwhile, financial performance is an analysis of the degree to which financial targets have been accomplished (Pham, 2021). This research determined the financial performance of several banks to describe their financial position during a specific period, including aspects of raising and distributing funds (Tristingtyas & Mutaher, 2013).

According to Nasfi (2019), Return on Assets (ROA) is a tool for assessing banking performance. It also describes the effectiveness of a company in obtaining profits by maximizing its assets (Sarwono & Sunarko, 2015). Hence, this research employed ROA to assess the financial performance of various banks.

Corporate sustainability correlates with a company's ability to achieve profits, protect the environment, and improve social life (Supriyadi, 2013). The sustainability of banking institutions can be measured using financial sustainability ratios. Almilia et al. (2009) stated that Financial Sustainability Ratio (FSR) greater than 100% is an excellent benchmark to measure this capability. High FSR values are achieved when the total financial income is higher than the financial burden, enabling businesses to continue their operational activities.

Several types of research have explored the effect of intellectual capital on financial performance and financial sustainability, as well as the influence of financial performance on financial sustainability. These findings have been inconsistent, as research by Chu et al. (2011), Clarke et al. (2011), Ciptaningsih (2013), and Hamdan (2018) showed that intellectual capital has no impact on market-based financial performance due to conditioning by company policies and the manager's attitude. Conversely, the results of Mondal & Ghosh (2012), Fathi et al. (2013), Devi et al. (2017), Budiarmo (2019), Siswanti & Sukoharsono (2019), and Robiyanto et al. (2019) indicate that intellectual capital positively affects the financial performance of companies. This implies that intellectual capital has become one of the most critical investments for improving corporate financial performance.

Meanwhile, the results of research by Almilia et al. (2009), Kapoor & Sandhu (2010), Amouzesh et al. (2011), Ameer & Othman (2012), Pan et al. (2014), Pham et al. (2021), and Yilmaz (2021) showed that a company's financial performance positively affects financial sustainability. This signifies that engagement in sustainable business practices will improve financial performance. However, the research by Wahyuni & Fakhrudin (2014) showed that financial performance has no positive effect on financial sustainability.

Jordao & Almeida (2017) and Siswanti & Sukoharsono (2019) proved that financial performance mediates the effect of intellectual capital on business sustainability. Intellectual capital improves financial performance systematically over time and increases financial sustainability. Recently, many digital payments emerged and are preferred for transactions, particularly during the pandemic. This led to the interest in examining the need for banks to manage their intellectual capital to improve financial performance and survive the increasingly fierce competition.

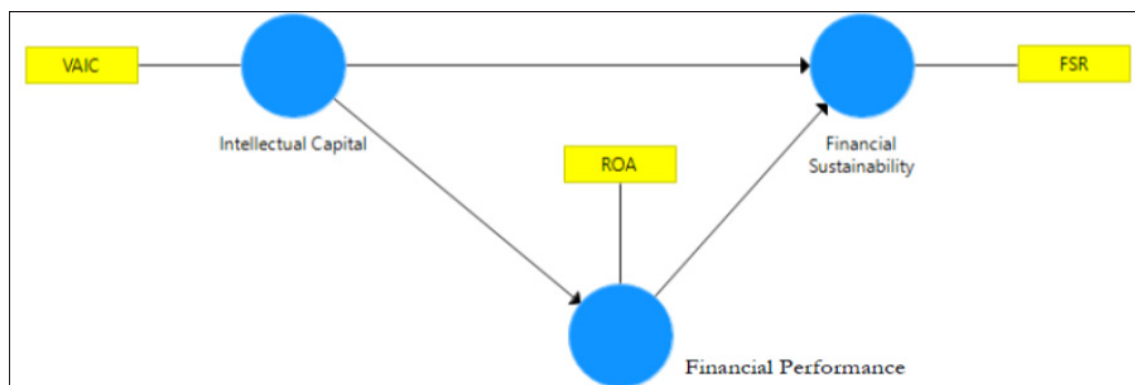
Based on the inconsistency of previous investigations, alongside digital payment development, this research analyzed intellectual capital as a predictor of financial sustainability variables, using financial performance as a mediator. The practical contribution of this research is that the banking sectors can understand the factors that affect financial sustainability and use the findings as references to make decisions that will promote their survival in this pandemic. The theoretical contribution is strengthening existing theories, especially concerning intellectual capital, financial performance, and financial sustainability.

METHOD

The causal research method was employed, using data comprising the financial statements of national private banks listed on the Indonesian Stock Exchange (IDX). The population was all national private banks in Indonesia, and the non-probabilistic purposive sampling technique was used. The criteria for inclusion were a national private bank listed on the IDX, registration of national private banks on IDX before 2016, and the publication of financial reports continuously during the year of observation from 2016 to 2020.

Subsequently, a sample of 31 national private banks listed on IDX was obtained. The variables examined were 1) intellectual capital as the exogenous latent variable, calculated using the Intellectual Capital Value-Added Coefficient (VAIC). 2) Financial performance as the mediating latent variable, measured via the Return on Assets (ROA). 3) Financial sustainability as the endogenous latent variable, calculated using the Financial Sustainability Ratio (FSR). The data analysis method used was the Partial Least Square - Structural Equation Modelling (PLS-SEM). Structural equation analysis is a variant-based technique that can simultaneously measure and test structural models. It enables the estimation of complex models and prediction in statistical models, using structures designed to provide a causal explanation (Sarstedt et al., 2017). This research employed PLS-SEM to determine the applicability of the created to predict financial sustainability in the banking sector. The path diagram formed can be observed in Figure 1.

Figure 1. Path Diagram of Exogenous Latent Variables, Mediation Latent Variables, and Endogenous Variables and their Comparing Indicators



Source: SmartPLS Result

RESULTS AND DISCUSSION

The results of research testing using the PLS-SEM method can be interpreted in two stages: the measurement and structural models (Makki & Lodhi, 2014). During the first stage, validity and reliability tests were used to measure each construct, as reflected in the path diagram in Figure 1. The model measurement was performed using the SmartPLS 3.3.3 program with the PLS Algorithm to generate values for the validity and reliability tests. There are two types of validity in PLS-SEM, namely convergent

and discriminant. Convergent validity comprises a set of indicators representing one latent variable, where each is assessed using the average value of the extracted variance (Average Variance Extracted / AVE). AVE values > 0.5 are considered to possess adequate convergence, meaning one latent variable is capable of describing more than half the variance of its indicators.

Table 1. Value and Square Root of AVE

Latent Variable	AVE	Square Root of AVE
Intellectual capital	1	1
Financial performance	1	1
Financial Sustainability	1	1

Source: SmartPLS Processing Results

Discriminant validity is the degree of empirical difference between constructs in a structural model (Hair et al., 2019). It was measured using the Fornell-Larcker criteria and cross-loading, where the excellent value of the model fit for discriminant validity is ≥ 0.708 (Hair et al., 2019). The value of the convergent validity generated by the resulting AVE value can be seen in Table 1.

Table 2. Cross-Loading Indicator Value for the Latent Variables

Indicator	Latent Variable		
	Intellectual Capital	Financial Performance	Financial Sustainability
VAIC	1	-0.258	-0.366
ROA	-0.258	1	0.545
FSR	-0.366	0.545	1

Source: SmartPLS Processing Results

Based on the research results, the AVE values of the latent variables of intellectual capital, financial performance, and financial sustainability were 1. The AVE value was one (1) because each latent variable in this research had only one (1) indicator. Since this score is > 0.5, the latent variables were declared valid. The values for discriminant validity were also calculated, as shown in Tables 2 and 3.

Table 3. Fornell-Larcker value

Latent Variable	Intellectual Capital	Financial Performance	Financial Sustainability
Intellectual Capital	1		
Financial performance	-0.258	1	
Financial Sustainability	-0.366	0.545	1

Source: SmartPLS Processing Results

Hair et al. (2019) use two methods to assess consistent internal reliability in PLS: Cronbach's alpha and composite reliability. The criteria for describing a latent variable as reliable is achieving Cronbach's alpha and composite reliability scores ≥ 0.7 (Hair et al., 2019). The results of the reliability test conducted using Cronbach's alpha method and composite reliability can be seen in Tables 4 and 5.

Table 4. Value of Cronbach's Alpha

Latent Variable	Cronbach's Alpha
Intellectual Capital	1
Financial Performance	1
Financial Sustainability	1

Source: SmartPLS Processing Results

Table 5. Value of Composite Reliability

Latent Variable	Composite Reliability
Intellectual Capital	1
Financial Performance	1
Financial Sustainability	1

Source: SmartPLS Processing Results

As shown in Tables 4 and 5, the Cronbach's alpha and composite reliability values generated by every latent variable were 1. Since this value is ≥ 0.7 , all latent variables used in this research were considered reliable. Based on the validity and reliability testing, the indicators and latent variables used in this research were regarded as valid and reliable, and the formed model was appropriate for hypothesis testing.

After the first stage of determining the measurement model, all exogenous and endogenous latent variables were declared valid and reliable. In the second stage, the structural model was established by estimating the coefficient of determination value, path coefficient value, effect size f^2 , and Q^2 value for the path model built.

The coefficient of determination (R^2) describes the influence of the exogenous latent variable on the endogenous latent variable. Table 6 shows the results of the R^2 value. The significance of the R^2 value generated in Table 6 is described below: The R^2 value denoting the magnitude of the effect of the intellectual capital latent variable on financial performance was 0.067. This indicates that the correlation between intellectual capital and financial performance is 0.258, obtained from the root of the R^2 value of 0.067, and signifies a low correlation. The R^2 value of the influence of the financial performance latent variable on financial sustainability was 0.352. This indicates that the correlation between financial performance and financial sustainability is estimated at 0.593, obtained from the root of the R^2 value of 0.352, alongside denotes a moderate correlation.

Table 6. R² Value

Latent Variable	R ²	Adjusted R ²
Financial performance	0.067	0.06
Financial Sustainability	0.352	0.343

Source: SmartPLS Processing Results

The outcomes of the SmartPLS 3.3.3 program with bootstrapping facilities to obtain the path coefficient values are listed in Table 7. Table 7 illustrates the influence of intellectual capital on corporate financial performance, with a P value of 0.001, which is < the value of 0.05. Financial performance was also shown to impact financial sustainability, as a P value of 0 was obtained, which is < α value of 0.05. Finally, financial performance was proven to mediate the effect of intellectual capital on financial sustainability, denoted by a P value of 0.013, which is < α value of 0.05.

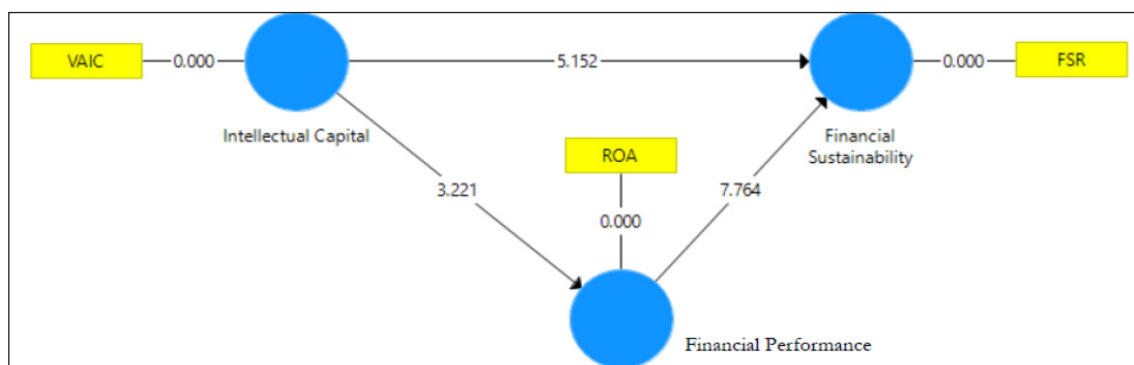
Table 7. Path Coefficient Values

Path	Standardized Beta	Standard Error	t - Value	P Values
Intellectual capital → Financial Performance	-0.258	0.08	3.221	0.001
Financial Performance → Financial Sustainability	0.483	0.062	7.764	0
Intellectual Capital → Financial Performance → Financial Sustainability	-0.125	0.05	2.505	0.013

Source: SmartPLS Processing Results

In addition, a structural model was obtained from the assessment of the inner model, as demonstrated in Figure 2. Figure 2 explains the direct influence of intellectual capital on financial performance as well as financial performance on variable financial sustainability. The t value indicates this on each line, which explains the relationship between the latent variables.

Figure 2. Structural Model



Source: SmartPLS Result

Changes in the R^2 value occur when an exogenous latent variable is eliminated from the model. This procedure can be used to estimate the impact of the omitted variable on the endogenous latent variable and is called the effect size f^2 (Hair et al., 2019). Table 8 shows the effect size of f^2 for this research. From Table 8, removing the latent variable of intellectual capital from the path model produces an effect of 0.071 on the latent variable of financial performance, which is categorized as a small effect. Also, the elimination generated a small effect of 0.084 on the latent variable of financial sustainability. The removal of the financial performance from the path model created a medium effect of 0.336 on the latent variable of financial sustainability. Based on the analysis of the effect size, f^2 , the latent variable of financial performance, was determined as an essential variable influencing financial sustainability, as its removal produced a medium effect on the path model.

Table 8. Effect size(f^2)

Latent Variable	Intellectual capital	Financial Performance	Financial Sustainability
Intellectual capital		0.071	0.084
Financial Performance			0.336
Financial Sustainability			

Source: SmartPLS Processing Results

The Q^2 value is an indicator to measure the predictive power or relevance. It is generated from a blindfolding process that shows the path model's accuracy in predicting the observed value. The slight difference between the predicted and observed values is translated into a higher Q^2 value to produce a higher predictive accuracy (Hair et al., 2019). The criterion for Q^2 is that the value must be greater than 0, which indicates sufficient reconstruction of the observed values and the model's predictive accuracy.

As a rule of thumb, Q^2 values above 0, 0.025, and 0.50 illustrate the path model's tiny, medium, and significant predictive relevance (Hair et al., 2019). Table 9 presents the value of Q^2 generated in this research. The values of Q^2 in Table 9 are all greater than zero, meaning that the structural model formed is congruent with the observation data and can be used for prediction.

Table 9. Value of Q^2

Latent Variable	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Intellectual capital	155	155	
Financial Performance	155	145.261	0.063
Financial Sustainability	155	100.005	0.355

Source: SmartPLS Processing Results

DISCUSSION

The path coefficient value obtained in this research indicates that intellectual capital influences corporate financial performance. The findings are consistent with research by Bayraktaroglu et al. (2019), which described a relationship between intellectual capital and corporate performance. Similar results were obtained by Siswanti & Sukoharsono (2019), Weqar & Haque (2020), and Olarewaju & Msomi (2021).

The influence of intellectual capital on financial performance highlights its role as a potential resource that can generate added value and maximize company performance (Devi et al., 2017). Additionally, Budiarmo (2019) stated that intellectual capital is a knowledge asset and an essential part of creating company value, as it can improve performance and plays a role in competitive advantage. This was confirmed by Festa et al. (2021), who affirmed that intellectual capital positively impacts company profits and value and contributes to company performance and financial stability.

Furthermore, Sheikh & Wepukhulu (2019) research highlighted the importance of an intellectual capital component in improving the corporate's financial performance. This was corroborated by Soetanto & Liem (2019), who described a positive and significant relationship between intellectual capital and its components on company performance. Research by Asiaei et al. (2020) also described a positive and significant relationship between the components of intellectual capital and financial performance. Finally, Isola et al. (2020) reported similar findings.

The results of this research show that companies in the banking industry develop and utilize intellectual capital as a competitive advantage, thereby improving their financial performance. According to Nazir et al. (2020), knowledge is an intangible asset that has become very important for financial companies in recent years. This highlights the need to focus on every element of intellectual capital to improve financial performance. Using banking companies as a sample, Soewarno & Tjahjadi (2020) found that intellectual capital affects financial performance.

Alhassan & Asare (2016) also stated that intellectual capital combined with other assets could improve a company's performance. This can be done by increasing investment in intellectual capital (Asif et al., 2020), contributing to firm value (Kasoga, 2020). According to Lukman & Tanuwijaya (2020), higher intellectual capital coefficient values indicate that a company is increasingly applying the components of intellectual capital to create value. In the companies used as samples, the coefficient value of intellectual capital increased during the year of observation, signifying their application of the components of intellectual capital to create firm value.

An example of using intellectual capital is using digital technology to enable consumers to conduct banking transactions, alongside training employees to improve their ability to provide full service to consumers. The combination of technical support and the provision of good service allows the enhancement of the company's financial performance. Meanwhile, this research also measured the effect of financial performance on financial sustainability using ROA. The results are congruent with research by Bhanot

& Bapat (2015), which stated that a company's financial performance measured by ROA significantly contributes to business sustainability.

Marwa & Aziakpono (2015) also confirmed ROA to be the primary determinant of financial sustainability, while Bartolacci et al. (2018) reported a positive and significant relationship between both variables. Conversely, Saputri (2019) stated that the profitability value as measured by ROA has a significant adverse effect on the company's sustainability, while Sholikah & Miranti (2021) provided contrary findings.

ROA is also an illustration of a company's ability to generate profits compared to its total assets (Nurhikmah & Rahim, 2021) and has been shown to increase sustainability (Rianasari & Pangestuti, 2016; Henock, 2019). In this research, the companies used as samples had an average ROA value that increased during the year of observation to facilitate a rise in sustainability. This supports research by Mohammad et al. (2017), where a gradual increase in the sustainability of private commercial banks was found due to ROA, which increased yearly.

Weber (2016) also discovered a relationship between financial performance and sustainability performance among banks in China. The positive effect of financial performance on financial sustainability signifies the survival of a business in the face of competition. It also indicates that the banking companies used as samples display healthy financial performance in executing their operational activities.

Therefore, the sample companies are required to focus on the company's financial performance during their business operations because financial sustainability is a measuring tool to determine their ability to thrive. This was manifested in research by Siswanti & Cahaya (2021), which showed the significant impact of financial performance on business sustainability. Githaiga (2022) also argued that the increase in ROA, a measure of profitability ratios, will increase financial sustainability.

The final section of this research explained the influence of intellectual capital on financial sustainability mediated by financial performance. The findings are consistent with Siswanti & Sukoharsono (2019) findings, which showed that the financial performance of Islamic banks in Indonesia partially mediates the influence of intellectual capital on business sustainability. Siswanti & Cahaya (2021) discovered a partial mediation in their research, while Fajriyanti et al. (2021) found similar results.

Intellectual capital is an important strategy to achieve a competitive advantage. This is facilitated through investment in intellectual capital to realize sustainability (Fathi et al., 2013), highlighting a relationship between both phenomena (Massaro et al., 2018; Secundo et al., 2020). Yusliza et al. (2019) indicated that intellectual capital significantly enables companies to achieve business sustainability. Hence, increasing investment in intangible assets will create a sustainable competitive advantage that can improve the company's overall performance (Ullah et al., 2021). Sofia et al. (2021) argued that company resources are essential and form the basis for competitive advantage, and successful business competitors can improve company performance and sustainability.

In this research, the financial performance variable could mediate the effect of intellectual capital on financial sustainability. This is because poor financial performance, despite increased use of intellectual capital, will lead to financial difficulties and problems in business survival and operations. The sample companies were shown to have focused on and utilized intellectual capital as a competitive advantage to improve their financial performance, thereby facilitating their survival and continued functioning. Jordao & Almeida (2017) stated that intellectual capital impacts company profits and can lead to financial sustainability. Xu & Wang (2018) asserted that as measured by VAIC, intellectual capital positively influences financial performance and impacts company sustainability. According to Alvino et al. (2021) and Xu & Li (2022), applying intellectual capital can increase competition, improve company performance, maintain competitive advantage, and ultimately enhance business sustainability.

CONCLUSION

Based on the data processing and analysis outcomes, this research concluded that intellectual capital affects a company's financial performance. Subsequently, financial performance impacts financial sustainability, and financial performance variables mediate the effect of intellectual capital on financial sustainability. Companies engaged in banking should pay attention to, manage, and invest in intellectual, human, structural, and physical capital by training their employees, using the latest technology, creating a systematic information system, and regularly evaluating existing work procedures. This is because intellectual capital can be used as a competitive advantage to counter the increasingly fierce business competition, improve performance, and promote business survival.

Also, investors should consider intellectual capital because an increase in its coefficient indicates that the application of its components can create value. Investment should be executed by selecting companies that create corporate value. Finally, customers and users of banking facilities should patronize banks investing in intellectual capital, such as technology, employee training, and others. This will facilitate the performance of banking transactions and the achievement of excellent service to obtain benefits.

There were two limitations in this research: First, only private banking companies were examined, preventing the generalization to other company types, though the results were strongly supported by previous research. Future research can expand the object of research to encompass other banking companies, such as Islamic banks. Second, this research only focused on intellectual capital, financial performance, and sustainability. Future research can examine the impact of the green intellectual model, other financial performance measures, such as ROE, and control variables like the firm size on the application of intellectual capital and its effect on firm financial performance and business sustainability.

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Electronic Banking and Bank Performance: Evidence from Nigeria

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Abstract

The innovative advancement of the financial system has made deposit money banks all over the globe adopt a technological mode of meeting the customer's needs, so it has to improve the level of deposits and withdrawals. Hence due to this innovation, this study examines the impact of electronic banking on bank performance in Nigeria. The secondary data collected from the central bank of Nigeria Statistical bulletin from 2009-2017 were subjected to Johansen Co-integration and Vector Error Correction Method (VECM). The findings revealed through the Johansen Co-integration results depict a long-run relationship between the variables. The Fully Modified Least Square depicts that Mobilepay and Webpay have a significant negative effect on NIM (Net Interest margin) while POS (Point of Sale) has a significant positive effect on NIM (Net Interest Margin). The bank should make sure POS (Point of Sale) and Website/Internet transactions are made available to rural and urban areas, so has to encourage different classes of account holders to transfer and receive cash quickly.

Keywords:

electronic banking; bank performance; automated teller machine; point of sale

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INTRODUCTION

Before the emergence of the modern banking system, banking operations was done manually, which led to a slowdown in the settlement of transactions. This manual system involves posting transactions from one ledger to another by human beings, and due to technological changes, e-banking evolved (Benedict, 2013). The evolvement of technology has enabled financial institutions to offer electronic banking (Karuru, 2013). This implores the use of new technologies such as personal computer (PC) banking, mobile banking, automated teller machines (ATM), electronic funds transfer, account-to-account transfer, paying bills online, online statements, and credit cards, among others (Mwaura, 2013; Okiro & Ndungu, 2013).

However, with the rapid improvement in modern informational technology, new IT innovations have become or are continuously becoming a very imperative feature in the future expansion and development in recent days, especially in the banking and financial industry. Its modernization and improvement in this sector contribute to the economic increase of any nation. The outstanding development in modern technology and the persistent merge of information technology has created severe awareness and brought a great deal to banking operations. For the banking sector, modernized technology has become a tactical way of realizing higher efficiency, control of the operation, higher yield, and most importantly, profitability.

Taiwo & Agwu (2017), Ajayi & Olalekan (2016), and Amu & Nathaniel (2016) have given supportive credence to the adaptation of electronic banking by banks that it is an innovative phase that has the enablement to improve the overall performance of banks and balance their scorecard in terms of operational efficiency while Chibueze et al. (2013), Oyewole et al. (2013) gave slightly contradictory support to the various empirical studies that the use of electronic banking should be used rationally since over-dependence of the innovative wave of the concept should not put the banks to more advanced fraud either internally or externally by perpetrators of such fraud. Studies have not investigated this phenomenon from the secondary data perspective due to the unavailability of data in the Nigerian context. This study will fill the methodology gap by taking electronic banking services proxies from the 2017 Statistical bulletin from 2009-2017.

However, it will break the data down to quarterly data, so it has to fulfill the ordinary least square requirement of 30 years of observation, which allows for secondary data study instead of the primary data studies of previous work on the research title. Moreover, check the effectiveness of electronic banking in Nigeria. Since neglecting the traditional banking system, which was virtually bricks and mortar prototype, after electronic banking channels were launched in Nigeria, five years to its usage in US banking operations.

The genesis of e-banking propelled financial institutions to invest more in providing the customers with new technologies such as personal computer (PC) banking, mobile banking, automated teller machines (ATM), electronic funds transfer,

account to account transfer, paying bills online, online statements, credit cards among others (Benedict, 2013). This banking mode is considered a complimentary service delivery channel rather than a substitute for brick-and-mortar banking branches. It is envisaged that a host of benefits ranging from regulation, operational costs, and accessibility of services will accrue to the institution and customers that adopt the technology, which will, in turn, impact the bank's performance (Magboul & Abbad, 2018; Simpson, 2002).

Electronic banking or internet banking can be defined as the recent banking delivery channel for their products and services (Okombo, 2015). E-banking, also referred to as internet banking and used interchangeably, involves creating banking services for individual and corporate customers to perform all their financial transactions online via network availability (Malhotra & Singh, 2009). Internet banking allows for detailed assessment of customers' accounts, making necessary inquiries, and undertaking banking transactions. With the famous usage of personal computers, easy access to the internet, and the World Wide Web, the use of the internet has provided an accessible channel for accepting orders and a medium for delivering products and services to the entire customer. This innovation has been on the increase in these recent times (Nwobodo, 2011).

Recent changes within the banking sector foster a different view of banks as Internet Banking expands. The completion of banking deregulation, cost reductions in lending applications, innovative use of electronic banking products, and a shift in competitive focus beyond geographically isolated financial markets have set the stage for a changing structure of banks. This has increased the competition in the small business lending markets. This technological shift has impacted banks' performance (Mateka et al., 2016). While Internet Banking (IB) has overgrown, there is not enough evidence of its impact on the performance of banks, particularly within the Nigerian banking industry. Internet Banking is the latest in the series of technological wonders of the recent past. ATMs, Tele-Banking, Internet Banking, Credit Cards, and Debit Cards have emerged as effective delivery channels for traditional banking products.

Internet banking which is now a necessity for the banking industry, has been moving slowly. Most users and observers would attest that its development has been steady. The initiation and rising usage of internet banking had offered a prospect and adjustment to banks to adopt modern technology to meet ever-changing customer demands at a quick time. Customers in these present-day not only want to do only online transactions, but they also need the bank to send them SMS and email messages of all their financial account activities and their newest financial updates anytime and whenever requested. Banks know that the internet opens up new horizons for them and moves them from local to global frontiers (Athanasoglou et al., 2008; Malhotra & Singh, 2009). E-banking is mainly driven by the prospects of operating cost minimization and operating revenue maximization. A comparison of online banking in developed and emerging markets reveals that lower costs and higher revenues are more noticeable in developed markets.

The use of electronic banking in a bank is of profound importance due to the customer demographics that the banks serve. In this context, Atavachi (2013) notes that E-banking has the potential to revolutionize access to financial services, and there is a growing consensus that e-banking offers a unique opportunity to address mainstream banks' two significant barriers to serving the low-income market. These barriers include the need for a branch infrastructure and managing high volumes of low-value transactions. The services offered through electronic banking include opening accounts, transferring funds to different accounts, online viewing of the accounts, online inquiries and requests, and online salary payments (Kahinga, 2014; Salehi, 2014). Others include clearing cheques status query, online loan application, an online deposit of funds, loan repayment, and instant alerts of account or transaction status (Ketere, 2014). All these stimulate profitability, an intrinsic component of bank performance.

Bank performance is a multidimensional construct that consists of four elements. Customer-focused performance, including customer satisfaction and product or service performance; financial and market performance, including revenue, profits, market position, cash-to-cash cycle time, and earnings per share; human resource performance, including employee satisfaction; and organizational effectiveness, including the time to market, level of innovation, and production and supply chain flexibility. However, E-banking or internet banking is related to customer-focus performance because it is the effectiveness and accuracy of the e-services provided that will determine the profitability of the banking institution (Kithaka, 2011).

Based on the above premises of electronic banking and financial performance, this study added to the compendium of knowledge by investigating the impact of electronic banking services and tools on bank performance in Nigeria. The rest of this paper is organized as follows. The second part discusses the literature review, the third part deals with methodology, part four presents the empirical results, and the last part concludes.

METHODS

The study aims to analyze the effect of electronic banking on bank performance of listed Deposit money banks in Nigeria, utilizing some components from the study of Benedict (2013). The linear equation is given below:

$$PROF_{t(NIM)} = f(EB_t) \quad 1$$

$$EB_{i,t} = f(ATM_t, POS_t, WEB_t, MOB_t) \quad 2$$

$$NIM_{i,t} = (\alpha_0 + \beta_1 ATM_{i,t} + \beta_2 POS_{i,t} + \beta_1 WEB_{i,t} + \beta_2 MOB_{i,t} + \mu_t) \quad 3$$

The data used for this study is mainly secondary data and time series from 2009-2017 but was converted to quarterly data to meet the Ordinary least Square requirement. The data were obtained from the CBN Statistical Bulletin. Performance is represented

by Net Interest Margin, the dependent variable, while the independent variable is (ATM Volume pay, Point of Sale pay, Webpay, and Mobilepay). The independent variables are the total sum up and transaction of the overall deposit money banks operating in Nigeria.

The study employed the inferential analysis with the Augmented Dickey-Fuller (ADF) test for unit root and Johansen Co-integration and Fully Modified most small Square for the existence of long-run relationship among the variables. The error correction model (ECM) was also used to determine the short-run relationship between the dependent and independent variables. The (ECM) error correction model is used in measuring the correction of disequilibrium of the period, which has a very good economic implication. The fact that the variable is cointegrated implies a painful adjustment process that prevents the long-term relationship error from becoming more significant.

The Descriptive statistics method is employed to illustrate, summarize and analyze the data in a meaningful way and to know if the data are normally distributed through their skewness, kurtosis, average (mean/median), and Jarque Bera Values. The Augmented Dickey-Fuller (ADF) unit root will also be employed because non-stationary regressors nullify empirical results. It also aids in depicting the random trend in a time series data. The Johansen Co-integration will be employed to obtain the optimal lag length because the Johansen Co-integration test is sensitive to lag length. The test will give spurious results if the lag length is too much. The Fully Modifies Least Square shows the variables' personal effects, indicating they have a long-run relationship with each other. The Error-Correction model is a test on short-run and long run dynamics between the variables.

Table 1. Description of variables

Variables	Description
Dependent Variable	
NIM	It is the interest component of a bank from the interest differentials (interest received-interest charged) of a bank operating with the economy's surplus and deficit sectors.
Independent Variables	
ATM	It is a payment terminal for convenient money transactions (Benedict, 2013)
MOB	It is a form of electronic banking that aid balance checks, accounts transactions payments, credit application, and other banking transactions (Benedict, 2013)
POS	It is the electronic banking mechanism that allows buying and selling to be made at any point and where (Kitavi, 2014)
WEB	It is the internet payment mode done outside the bank's internal environment.

RESULTS AND DISCUSSION

This part of the paper presents the descriptive statistics, correlation matrix, unit root test results, Johansen Cointegration Test, Fully Modified Least Square, and Vector

Error Correction Model. Mean is the average value of the series, which is determined by dividing the series' total value by the number of observations. Mean value of NIM (Net Interest Margin) is 114%, Mobilepay is 152%, ATM is 2009%, POS is 173% and Webpay is 52.4%. The median is the middle value of the series when the values are arranged in ascending order.

From the Table 2, the median for NIM (Net Interest Margin) is 152%, Mobilepay is 139%, ATM is 1802%, POS is 152%, and Webpay is 46.9%. Maximum and minimum are the maximum and minimum values of the series in the current sample. The maximum and minimum values for NIM (Net Interest Margin) is 179.32 & 731.2, Mobilepay is 442.3 & 1.27, ATM is 3970 & 399.7, POS is 448 & 11.03, Webpay 91.58 & 25.05. Standard deviation is a measure of spread or dispersion in the series. The table above shows that the NIM (Net Interest Margin) standard deviation is 364.06, Mobilepay is 139.1, ATM is 1187.9, POS is 146.4, and Webpay is 18.98.

Table 2. Descriptive Statistics

	NIM	MOBILEPAY	ATM	POS	WEBPAY
Mean	114.2288	152.7360	2099.645	173.4864	52.45489
Median	104.2934	139.0197	1802.875	152.8883	46.94517
Maximum	179.3257	442.3538	3970.252	448.5125	91.58129
Minimum	731.2726	1.270000	399.7100	11.03000	25.05000
Std. Dev.	364.0631	139.1069	1187.947	146.4472	18.98803
Skewness	0.506635	0.545806	0.238810	0.390390	0.542941
Kurtosis	1.777014	2.033290	1.712408	1.727562	2.164273
Jarque-Bera	3.783616	3.189217	2.829020	3.343077	2.816367
Probability	0.150799	0.202988	0.243045	0.187958	0.244587
Sum	411.2237	5498.496	75587.24	6245.510	1888.376
Sum Sq. Dev.	4.64E+08	677275.8	49392644	750637.4	12619.09
Observations	36	36	36	36	36

Skewness is a measure of the asymmetry of the distribution of the series around its mean. The skewness of a normal distribution is zero. Positive skewness implies that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail. From Table 2, we observe that NIM (Net Interest Margin) is normal skewness at 0.50, Mobilepay is normal skewness at 0.54, ATM is normal skewness at 0.23, POS is normal skewness 0.39, Webpay is normal skewness 0.54. Kurtosis measures the peakedness or flatness of the distribution of the series.

NIM (Net Interest Margin) is leptokurtic at 1.7, since $(1.7 < 3)$, Mobilepay is leptokurtic at 2.03, since $(2.03 < 3)$, ATM is leptokurtic at 1.7, since $(1.7 < 3)$, POS is

leptokurtic at 1.7, since $(1.7 < 3)$ and Webpay is leptokurtic at 2.16, since $(2.16 < 3)$. The Jarque-Bera Statistics include: NIM (Net Interest Margin) is 3.783 at 0.15, indicating the variable is normally distributed. Mobilepay is 3.18 at 0.20, indicating the variable is normally distributed. Atm is 2.82 at 0.24, which indicates the variable is normally distributed. POS is 3.34 at 0.18, which indicates the variable is normally distributed. Webpay is 2.81 at 0.24, indicating the variable is normally distributed.

Table 3. Correlation Matrix of the Data Set

	NIM	ATM	MOBILEPAY	POS	WEBPAY
NIM	1				
ATM	0.47	1			
MOBILEPA	0.61	0.65	1		
POS	0.71	0.65	0.90	1	
WEBPAY	0.23	0.54	0.50	0.36	1

However, testing of correlation among variables of estimates would make the researchers detect whether the variables have high multicollinearity among themselves. As a result, the parameter estimates may contradict the theory's conclusions due to the unexpected effect of multicollinearity among the independent variables. Table 3 depicts ATM has a positive relationship with Mobilepay at 0.65, POS at 0.65, and Webpay at 0.54. Mobilepay has a positive relationship with POS at 0.90 and Webpay at 0.50. POS has a positive relationship with Webpay at 0.36. If the relationship between the dependent variable or independent variable depicts a collinear of 0.85, it shows that if the variables are used together, it will reveal spurious results.

Table 4. Unit Root Test

Variable	Level T-Stat	Critical Value @ 5%	First Difference t-Stat	Critical Value @ 5%	Order of Integration
NIM	-1.0076	-2.9810	-----	-----	I(0)
ATM	-1.4878	-2.9484	-4.7838	-2.9511	I(1)
MOB PAY	-1.3106	-2.9484	-4.7522	-2.9511	I(1)
POS	-1.1726	-2.9540	-2.8770	-2.9540	I(1)
Webpay	-3.1064	-2.9484	-----	-----	I(0)

Augmented Dickey Test (ADF) was employed for this study to determine the order of integration of the time series data. The unit root test helps to determine the nature of data used to prevent spurious results and will aid the technique appropriate for analysis. The unit root result was presented in Table 4. The Augmented Dickey-Fuller

test (ADF) unit root result showed that variable NIM and Webpay are stationary at level, but ATM, Mobpay, and POS are all non-stationary at levels, but after first differencing, they become stationary at the first difference I(I) and none of the variables is integrated at the order I(2).

This suggests that the ordinary least square technique will not be applicable, as it will generate spurious and unreliable regression results (Granger & Newbold, 1974). Therefore the co-integration technique of analysis is applied to examine the long-run dynamics of the variables, and (VECM) Vector error correction model will be used to examine short-run relationships among the variables. This will help to nullify spurious results. The results mean that there is a long-run relationship between NIM, ATM payment, Mobile pay, Point of Sale (POS), and Webpay. This warrants the determination of the short-term relationship.

Table 5. Long-Run Estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	0.083046	0.384504	0.215981	0.8305
MOBILEPAY	-4.843044	5.675379	-0.853343	0.0102
POS	21.98839	5.154943	4.265496	0.0002
WEBPAY	-4.796989	23.79232	-0.201619	0.8416
C	8841.405	948.3886	9.322555	0.0000
R-squared	0.487702	Mean dependent var		11494.62
Adjusted R-squared	0.419396	SD dependent var		3667.877
SE of regression	2794.827	Sum squared resid		2.34E+08
Durbin-Watson stat	0.410233	Long-run variance		2886054.

The long-run result revealed that ATM (Automated Teller Machine) has an insignificant positive effect on NIM (Net Interest Margin). The co-efficient further showed that a percentage increment in ATM (Automated Teller Machine) would lead to a 0.08 increase in NIM (Net Interest Margin). Mobilepay has a significant negative effect on NIM (Net Interest Margin). The co-efficient further showed that a percentage decrease in Mobilepay will lead to a 4.84 increase in NIM (Net Interest Margin). POS (Point of Sale) significantly negatively affects NIM (Net Interest Margin). The co-efficient further showed that a percentage increase in POS (Point of Sale) would lead to a 21.9 increase in NIM (Net Interest Margin). Webpay has an insignificant positive effect on NIM (Net Interest Margin). The co-efficient further showed that a percentage decrease in Webpay would lead to a 4.79 increase in NIM (Net Interest Margin).

The study investigated the short-run relationship using an error-correction mechanism (ECM). ECM shows the speed of adjustment of variables towards equilibrium (see Table 6). The ECM co-efficient result showed a correct sign at 18%,

which measures the speed of adjustment between NIM and Webpay, POS (Point of Sale), Mobilepay, and ATM at the equilibrium level. The coefficient of ECM is negatively significant. This implies that an 18% speed of adjustment towards equilibrium exists and that the relationship between NIM and Webpay, POS, Mobilepay, and ATM has an automatic mechanism.

The study's findings revealed that ATM (Automated Teller Machine) and POS (Point of Sale) long-run relationship with bank performance (see Table 5). The result of the short-run in Table 6 indicates that an ATM (Automated Teller Machine) and POS (Point of Sale) have a negative and positive significant effect on NIM (Net interest margin). Mobile pay and Webpay have a negative and positive insignificant effect on NIM (Net interest margin). The value of the adjusted R^2 0.88 indicates that ATM (Automated Teller Machine), Mobilepay, POS (Point of Sale), and Webpay explain 88.53% of the variation in NIM (Net interest margin), while the remaining 11.47% is captured outside the model. The findings of the study are consistent with Kashmari et al. (2016) and Ketere (2014), but inconsistent with Simpson (2002), Okombo (2015).

Table 6. Short-Run Analysis (Error-Correction Model)

Dependent Variable = D(NIM)				
Variable	Coefficient	Std. Error	T-Statistic	Prob.
ECM(-1)	-0.189879	0.058366	-3.253282	0.0038
D(NIM(-1))	0.704650	0.119313	5.905915	0.0000
D(NIM(-2))	-0.399019	0.153353	-2.601958	0.0166
D(ATM(-1))	-3.144670	0.670387	-4.690825	0.0001
D(ATM(-2))	0.397115	0.358720	1.107032	0.2808
D(Mobilepa(-1))	-4.668786	2.359775	-1.978487	0.0611
D(Mobilepa(-2))	-9.587379	2.088291	-4.591018	0.0002
D(POS (-1))	7.243447	2.208505	3.279797	0.0036
D(POS(-2))	22.33164	3.275079	6.818657	0.0000
D(Webp (-1))	14.88393	12.25341	1.214676	0.2380
D(Webp(-2))	-1.447058	11.52563	-0.125551	0.9013
C	88.27518	83.08657	1.062448	0.3001
R-Squared 0.8853			F-Statistics 14.7413	
Adj-R ² 0.8252			Prob (Statistics) 0.00000	
Durbin-Watson Stat 2.403				

CONCLUSION

The study investigated the impact of electronic banking on bank performance of deposit money banks in Nigeria, employing secondary data analysis to investigate the particular phenomenon based on the limitation of data due to when the mode of electronic banking commenced in the Nigeria banking sector. The deposit money banks will benefit from adopting automated teller machines in their intermediation operation since it will aid them in performing extra operational activities without the customer coming into the bank promises.

The introduction and usage of point of sale by the deposit money banks have improved banks' financial gain and reduced the level of financial exclusion in the economy. The banking industry can invest in the innovative prowess of electronic banking in the following forms above because it will enhance all components of performance that the deposit money measured in the long run. It is therefore recommended that the banking institutions should create more ATMs (Automated Teller Machine) and POS (Point of Sale) in the country because it can improve the net interest income of the deposit money in Nigeria and is advantageous to the fact that the country is the largest African country in the world so charges on ATM (Automated Teller Machine) and POS (Point of Sale) will enhance the financial performance of the entity.

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Non-Cash Instruments and Money Supply in Indonesia During Pandemic Covid-19

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Abstract

The emergence of the Covid-19 pandemic phenomenon at the end of 2019 caused non-cash transactions to increase, but several macro variables decreased. The study investigates the relationship between Non-Cash Transactions (through APMK and E-money proxies), National Income (GDP), Money Supply (M0), and Velocity of Money with the Vector Auto Regression method. The data was used from 2010 to 2021 at three different times, before Covid-19 and during Covid-19. Our result confirms that there was a relationship between money supply and non-cash transactions, the positive response occurred in all periods, and the negative response occurred during the Covid-19 pandemic. National income positively impacts money supply and velocity of money during all periods and Covid-19. It implicates that electronic money should be increased because it accelerates the circulation of money and can increase the flow of goods and services.

Keywords:

e-money; APMK; national income; money supply; velocity of money; covid-19

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INTRODUCTION

The current flow of technology has caused changes in various sectors in every country in the world, including Indonesia. For the economic sector, the payment system has not escaped technological advances. Changes in people's lifestyles and increased efficiency lead to the availability of facilities supporting acceleration to reduce distance and time barriers. The development of transportation and telecommunications facilities will considerably impact transactions related to payments made by economic actors (Ginting et al. 2018).

The use of cash as a means of payment has slowly been shifted due to payment system technology that gives rise to cashless transactions that are considered safer, faster, easier, and more efficient. Formal institutions as regulators and supervisors of payment systems in Indonesia, namely Bank Indonesia, support the existence of a system that can be applied as a non-cash payment through its delivered instruments, namely Paper Based, Card Based, and Electronic Based (Rahmawati et al., 2020). In this study, the authors will focus on payment using cards (APMK) and e-money transactions as non-cash payment instruments commonly used by society today because a smooth payment system can directly affect the circulation of money (velocity of money) in the economic economy of a country (Berger & Humphrey, 1997).

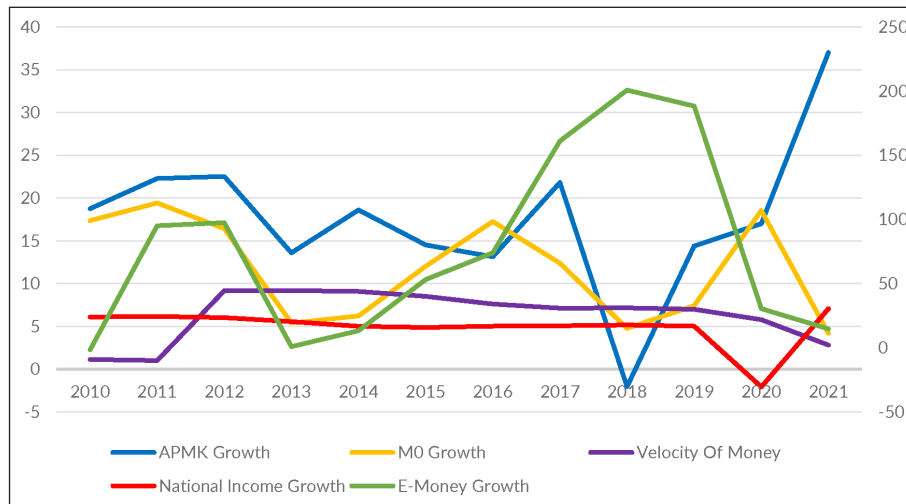
The year 2020 began with a phenomenon that caused the economy and all its structures to experience shocks. The phenomenon is the Covid-19 outbreak caused by the SARS-CoV-2 virus since the end of 2019. The outbreak has caused 238,521,855 confirmed cases and 4,863,818 deaths worldwide (WHO, 2021). The government, in various ways, seeks to minimize the spread of the virus, including in the field of payment systems. The implementation of Large-Scale Social Restrictions and Implementation of Restrictions on Community Activities) reduced economic activity outside the home. Almost everything is done from home, including transactions. Therefore, many transactions carried out by the community are non-cash, which led to an increase in non-cash transactions that, in this study, were proxied through the value of e-money and APMK transactions (Revate, 2021). The Covid-19 pandemic significantly changed consumers' purchasing decisions and payment processes (Manoharan et al., 2021).

Figure 1 illustrates the growth of non-cash transactions, namely E-money (green line) and APMK (blue line). It can be seen that the e-money trend line in 2010-2019 continues to increase. A drastic increase occurred in 2018 of 200.73 percent from 2017 before the Covid-19 pandemic. This increase in transactions is in line with the program launched by Bank Indonesia known as National Non-Cash Movement (GNNT) in 2014. APMK in 2021 was the highest growth during the study period, which was 37 percent. This is the impact of innovation in the form of facilities, functions, and various facilities offered by the bank.

In the Baumol model adopted by Igamo & Falianty (2018) regarding the demand for money through the modification of cashless payments, financial innovations related to the function of payment instruments, particularly, have an impact on cash. The development of cashless payments encourages individuals to make a wide selection of

payment instruments to minimize costs. Another thing that caused the growth of APMK is the increasing number of total merchants serving transactions with Electronic Fund Transfer-Point of Sales (EFT-POS), whose mechanism is to transfer cardholder funds online to the relevant merchants (Istanto & Fauzie, 2014).

Figure 1. Trends in E-Money, APMK, Money Supply, National Income, and Velocity of Money in Indonesia



This study focuses on the Covid-19 pandemic that has swept the world since the end of 2019, which has led to more changes in people's behavior in consuming digital needs (Pambudi & Rahadi, 2021). Based on the phenomenon seen in figure 1, it can be seen that the growth of APMK increased drastically from 2019 to 2021. This shows the behavior of people increasingly rampant in using non-cash instruments in transactions. On the growth of E-money, it can be seen that from 2019 to 2021, it continued to experience growth, only not too drastically, which was 188.31 percent, 30.44 percent, and 14.71 percent, respectively. The value of electronic money transactions was recorded not to decrease during the pandemic. Instead, the value increased. This proves that this type of money is increasingly in demand by the public to transact during the pandemic.

The development of technology that causes people to increasingly use cashless causes the increased use of non-cash instruments in Indonesia. As a result of the use of non-cash instruments, payments become faster and smoother, which will affect the velocity of money (Lu & Su, 2017). According to Irving Fisher's theory, when the use of non-cash payments is more widely used, it will make the payment less using cash so that the use of Kartal money (M0) will decrease and the turnover of money will increase. The velocity of money will be related to economic activities. As the velocity of money increases, it can be attributed to the developing economy through its rising national income. From another point of view, the impact of the money supply on the economy has been expressed by Classical and Keynesian economists. Classical economists have the view that money will not affect increasing economic output. It is interesting whether electronic money produces efficiencies affecting consumption growth so that GDP increases (Igamo & Falianty, 2018).

Based on the description above, the relationship between non-cash instruments, money circulation, the velocity of money, and national income can be drawn.

Previous researchers have conducted various studies on electronic transactions, money supply, money turnover, and national income. Research from the country of Indonesia conducted by Lukmanulhakim (2016) resulted in the findings that E-money, Credit Cards, and Debit Cards have a long-term effect on changes in money turnover but do not affect in the short term so that in the short term, the turnover of money in Indonesia tends to remain. The research was supported by Fauzukhaq et al. (2019) that the amount of electronic money spread and the quantity of EDC machines affected the turnover of money in Indonesia significantly.

The results of the study are not in line with the implementation of research by Ginting et al. (2018) and Lintang Sari et al. (2018) that e-money, credit, and debit card transactions do not significantly affect the velocity of money in Indonesia but affect the money supply (M1) significantly. Another study by Tee & Ong (2016) showed that the impact of the implementation of non-cash payments in five EU countries on economic development could only be observed significantly in the long term. Therefore, any policy to affect non-cash payments cannot directly affect the economy.

Another study by Igamo & Falianty (2018) found that electronic money positively impacts consumption growth and negatively impacts M1 growth in the long run. While according to Djaballah (2020), mobile money positively and significantly affects the money supply, both in little money and broad money. Pambudi & Rahadi (2021) found that E-money can be affected by money supply, EDC, other non-cash payments (debit cards and credit cards), and customer income during Pandemic Covid-19 in line with Revate (2021) that digital payment systems are increasing during the Covid-19 pandemic in India.

In contrast to previous studies, the novelty in this study is the comparison of the overall period and the Covid-19 pandemic period, as well as the relationship between each variable, all of which are considered endogenous variables. Based on the differences in the results of previous research and the methods, places, and times of research, researchers now want to analyze the comparison of the relationship between non-cash transactions through e-money and APMK, which stands for means of payment using cards, the amount of money circulation (M0), the velocity of money and national income in Indonesia before and during the Covid-19 pandemic.

This research is fundamental because it can contribute to the economy, especially during the Covid-19 pandemic as it is now so that non-cash payments are more widely used by the community and can decrease M1 growth to create payment system stability and increase national income. Policymakers can set policies related to non-cash to launch and improve the economy. In addition, this study was conducted by researchers as a filler for previous research gaps due to the lack of research references that discuss the relationship between non-cash instruments, national income, the velocity of money, and money turnover in Indonesia before and during Covid-19, this is done to realize an efficient payment system and finally be able to increase national income in the country of Indonesia.

METHODS

This study examined the relationship between cashless payment instruments (e-money and APMK), national income (GDP), money supply (M0), and the velocity of money. The data collection technique in this study is secondary data. The discussion in this study includes two analyzes there are time series data in the period 2010-2021 (quarterly) and comparisons before and during Covid-19 taken in data from May 2018 to November 2019 (Before Covid-19) and December 2019 to July 2021 (during Covid-19) in Indonesia. The data source was obtained from the Website of Bank Indonesia and the Badan Pusat Statistik Indonesia.

The relationships between variables are analyzed through the Vector Auto Regression (VAR) analysis technique which aims to see whether there is a reciprocal relationship between economic variables and the long-term response based on data where all variables are considered endogenous variables. In this testing, VAR is tested through stationarity test, Granger Causality test, Cointegration test, Lag optimum Test, Impulse Response Function, and Variance Decomposition Test. The equation model used is as follows:

$$\begin{aligned} EM_t &= a_1 + a_2 EM_{t-1} + a_3 APMK_{t-1} + a_4 JUB_{t-1} + a_5 VOM_{t-1} + a_6 PDB_{t-1} e_{yt} \\ APMK_t &= a_1 + a_2 APMK_{t-1} + a_3 EM_{t-1} + a_4 JUB_{t-1} + a_5 VOM_{t-1} + a_6 PDB_{t-1} e_{yt} \\ JUB_t &= a_1 + a_2 JUB_{t-1} + a_3 EM_{t-1} + a_4 APMK_{t-1} + a_5 VOM_{t-1} + a_6 PDB_{t-1} e_{yt} \\ VOM_t &= a_1 + a_2 VOM_{t-1} + a_3 EM_{t-1} + a_4 APMK_{t-1} + a_5 JUB_{t-1} + a_6 PDB_{t-1} e_{yt} \\ PDB_t &= a_1 + a_2 PDB_{t-1} + a_3 EM_{t-1} + a_4 APMK_{t-1} + a_5 JUB_{t-1} + a_6 VOM_{t-1} e_{yt} \end{aligned}$$

Where EM is the transaction value of E-money, APMK is the number of Circulating APMK, JUB is M0 or primary money, VOM is the velocity of money, and PDB is GDP on a constant price basis. The above equation shows the relationship between E-money, APMK, Money Supply, Velocity of Money, and Gross Domestic Product, and each variable affects those variables in the previous period and other variables.

RESULT AND DISCUSSION

Based on the results of causality tests that have been carried out, it can be concluded that overall, E-money has a one-way causality with APMK and VOM, while before the pandemic, E-money had a one-way causality with M0. During the overall period and before the pandemic, APMK has one-way causality with VOM, whereas, during the pandemic, APMK has a one-way causality to E-money and M0. M0 has a one-way causality to E-money, APMK, GDP, and VOM. Before the pandemic, M0 also had a one-way causality with E-money, while during the pandemic, M0 had a one-way causality to GDP. Overall GDP has a one-way causality against APMK, M0, and VOM, while before the pandemic, GDP has a one-way causality only to VOM. Before the pandemic, VOM variables had a one-way causality to the E-money variable, and the same thing also happened in the period during the pandemic. During the pandemic, VOM has a one-way causality to APMK and GDP.

Table 1. Causality Granger Test

Period	Hypothesis	Prob.
All Period	E-money has Granger Cause APMK	0.0205
	M0 has Granger Cause E-money	0.0004
	E-money has Granger Cause VOM	0.0294
	PDB has Granger Cause APMK	0.0183
	M0 has Granger Cause APMK	0.0015
	APMK has Granger Cause VOM	0.0037
	M0 has Granger Cause PDB	0.0055
	PDB has Granger Cause M0	0.0002
	PDB has Granger Cause VOM	0.0099
	M0 has Granger Cause VOM.	0.0191
Before Pandemic Covid-19	M0 has Granger Cause E-Money	0.0224
	E-money has Granger Cause M0	0.0580
	VOM has Granger Cause E-money	0.0533
	APMK has Granger Cause VOM	0.0556
	PDB has Granger Cause VOM	0.0193
During Pandemic Covid-19	APMK has Granger Cause E-Money	0.0370
	VOM has Granger Cause E-Money	0.0041
	APMK has Granger Cause M0	0.0027
	VOM has Granger Cause APMK	0.0493
	M0 has Granger Cause PDB	0.0530
	VOM has Granger Cause PDB	0.0082

Table 1 shows that all variables, namely E-money, APMK, GDP, Money Supply (M0), and money turnover (VOM), have been stationary at the first difference level. This is done because the data has not experienced stationarity at the level. In the first difference, all variables are stationary at critical values $\alpha = 5\%$ or prob $< 5\%$, which means that all variables are stationary at the first difference.

Table 2. Stationarity Test

Variable	Prob. 1 st difference			Description
	All Period	Before Covid-19	During Covid-19	
E-Money	0.0000	0.0001	0.0018	Stationer
APMK	0.0000	0.0824	0.0085	Stationer
PDB	0.0000	0.0069	0.0123	Stationer
M0	0.0054	0.0003	0.0038	Stationer
VOM	0.0000	0.0002	0.0000	Stationer

Table 2 and Table 3 shows that lag 3 is the most optimal. This is based on the consideration that lags three recommended by the test methods IR, FPE, AIC, and HQ are indicated by the number of asterisks (*) indicating optimal lag among other lags.

Table 3. Lag Optimum Test All Period

Lag	Testing Methods					
	LogL	LR	FPE	AIC	SC	HQ
1	210.0509	106.2067	1.31e-10	-8.573852	-7.332659*	-8.118906
2	243.9718	50.07368	9.05e-11	-8.998656	-6.723136	-8.164588
3	278.4706	42.71278*	6.62e-11*	-9.450979*	-6.141132	-8.237789*

Based on Table 4 shows that before the Covid-19 pandemic took place, lag 2 was the most optimal. This is based on the consideration that lags two are recommended by the test methods, namely LR, FPE, AIC, and SC, indicated by the number of asterisks (*) indicating optimal lag among other lags.

Table 4. Lag Optimum Test Pandemic Covid-19 Period

Method/Period	Lag 1		Lag 2	
	Before Covid-19	During Covid-19	Before Covid-19	During Covid-19
LogL	209.4112	221.7245	316.1043	284.0872
LR	35.76637	43.16004	66.68314*	38.97667*
FPE	1.52e-16	3.26e-17	2.18e-20*	1.20e-18*
AIC	-22.426	-23.966	-32.63803*	-28.63590*
SC	-20.978	-22.517	-29.98226*	-25.98012*

Based on the results of the Johansen test in the Table 5, it appears that *the Trace Statistic > Critical Value* with $\alpha = 0.05$ ($179.5085 > 69.81889$) and *Max-Eigen Statistic > Critical Value* with $\alpha = 0.05$ ($93.56714 > 33.87687$). This indicates the existence of a cointegration relationship between variables. The existence of cointegration among variables indicates that the variables in the model have a relationship between balance and similarity of movement.

Table 5. Cointegration Test (Trace Statistic)

Period	Eigenvalue	Trace Stat.	Critical Value	Prob.**
All Period	0.892234	179.5085	69.81889	0.0000
Before Covid-19	0.991693	197.1358	69.81889	0.0000
During Covid-19	0.959945	120.2795	69.81889	0.0000

Based on the results of the Johansen test before the Covid-19 pandemic, it appears that the Trace Statistic > Critical Value with $\alpha = 0.05$ ($197.1358 > 69.81889$) and the Max-Eigen Statistic value > Critical Value with $\alpha = 0.05$ ($120.2795 > 69.81889$). This shows that during the study period, there was a cointegration relationship between variables.

Table 6. Cointegration Test (Max-Eigen Statistic)

Period	Eigenvalue	Max-Eigen Statistic	Critical Value	Prob.**
All Period	0.892234	93.56714	33.87687	0.0000
Before Covid-19	0.991693	81.44200	33.87687	0.0000
During Covid-19	0.959945	54.69757	33.87687	0.0001

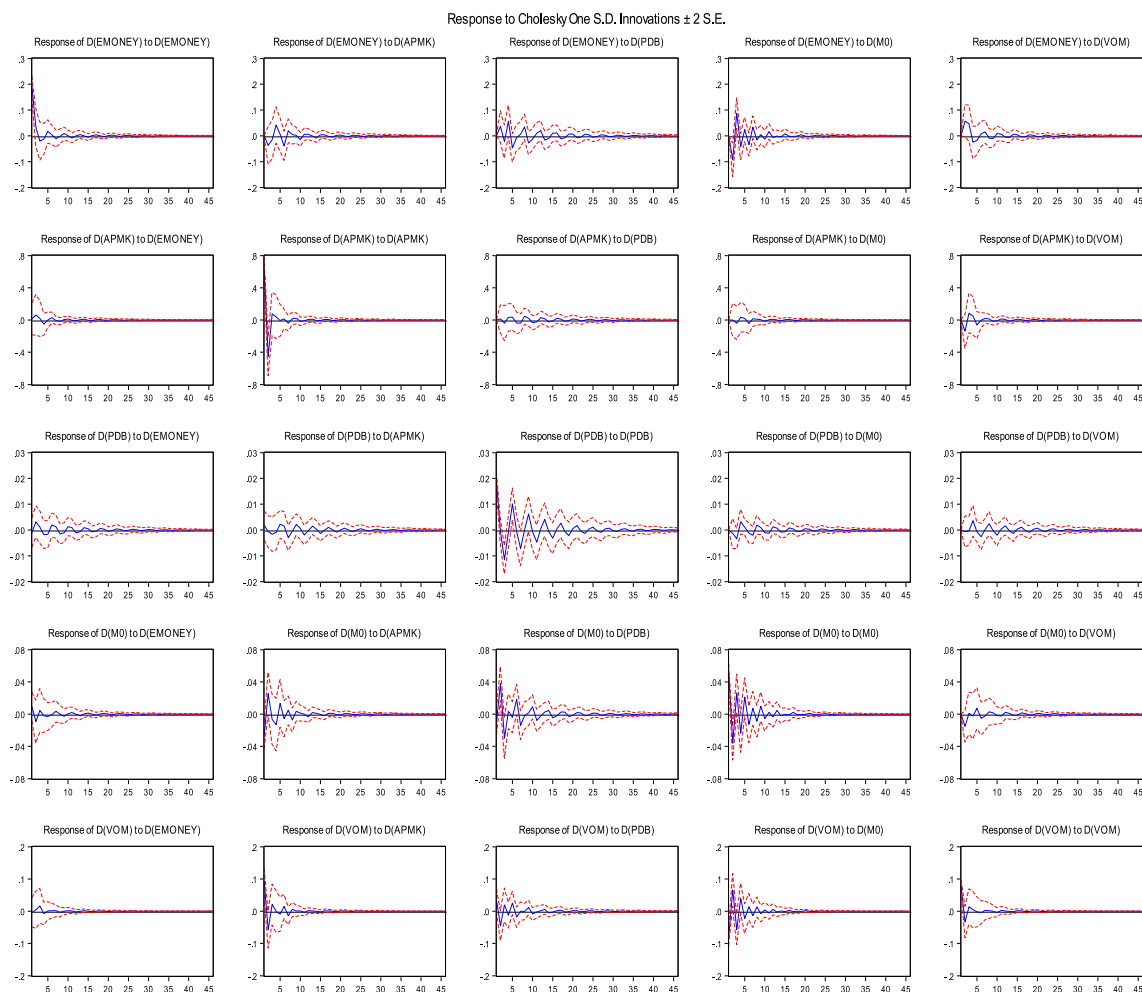
Table t is obtained by 1.67866. Based on the estimates in Table 7, an analysis can be carried out on the relationship of GDP with e-money, APMK, M0, and VOM. The estimation results show that variables that have a significant relationship to the value of e-money, namely variables APMK(-1) and VOM(-1), are evidenced by the value of t-calculate > t-table. Variables that have a significant relationship with APMK are the APMK(-1) variables themselves. Variables that have a significant relationship with GDP are pbd(-2) variables themselves. Variables that are significantly related to M0 are variables APMK(-2), GDP(-1), and M0(-1). Based on the results of VAR estimates, no variables were found that were significantly related to VOM. If the change in APMK in the previous quarter increased by 1 percent, it would cause the change in E-money in this quarter to increase by 3.10474 percent, and if the change in money turnover one quarter ago increased by 1 percent, it would cause e-money to increase by 1.85668 percent.

Table 7. Vector Auto Regression

Period	Variable	EM	APMK	PDB	M0	V
All Period	APMK(-1)	-3.10474	-2.75678	Not sig.	Not sig.	Not sig.
	APMK(-2)	Not sig.	Not sig.	Not sig.	2.27340	Not sig.
	PDB(-1)	Not sig.	Not sig.	Not sig.	4.16172	Not sig.
	PDB(-2)	Not sig.	Not sig.	-3.58162	Not sig.	Not sig.
	M0(-1)	Not sig.	Not sig.	Not sig.	-4.06733	Not sig.
	FROM(-1)	1.85668	Not sig.	Not sig.	Not sig.	Not sig.
Before Covid-19	E-Money(-1)	2.58891	Not sig.	4.14799	Not sig.	Not sig.
	E-Money(-2)	Not sig.	Not sig.	3.09798	1.95279	Not sig.
	APMK(-1)	Not sig.	Not sig.	Not sig.	-3.07145	Not sig.
	APMK(-2)	Not sig.	4.52590	4.26771	Not sig.	Not sig.
	PDB(-1)	Not sig.	Not sig.	10.0133	3.97571	Not sig.
	PDB(-2)	Not sig.	Not sig.	Not sig.	-3.35421	Not sig.
	M0(-1)	-2.30116	-0.64048	1.85858	-2.84189	Not sig.
	M0(-2)	Not sig.	Not sig.	3.58847]	-2.95830	Not sig.
	FROM(-1)	Not sig.	Not sig.	2.66155	-1.76090	Not sig.
	FROM(-2)	1.80965	0.08764	1.78650	-3.05395	Not sig.
During Covid-19	APMK(-1)	1.73356	Not sig.	Not sig.	1.85897	Not sig.
	PDB(-1)	Not sig.	Not sig.	3.12127	Not sig.	Not sig.
	FROM(-1)	-2.50914	0.13132	2.07608	0.15897	-3.13544
	FROM(-2)	Not sig.	Not sig.	Not sig.	Not sig.	-1.87886

If the previous two-quarter APMK change increases by 1 percent, it will cause the M0 change in this quarter to increase by 2.27340 percent, and if the GDP change one quarter ago increased by 1 percent, it would cause E-money to increase by 4.16172 percent. When the previous month's M0 change increased by 1 percent, it would cause the M0 change in the quarter decreased by 4.06733 percent. In determining dependent variables, it can be seen from the information in the table where there is R-squared whose value is the largest. The most extensive R-squared result is from the variable M0, which is worth 0.708746. It concludes that their independent variables can explain 71 percent of M0 variables. Then 29% of M0 variables can be explained by other variables outside the model.

Figure 2. Impulse Response Function All Period



Reaching the balance. Based on Figure 2, it can be seen that the M0 variable response to E-money continues to fluctuate but more dominantly looks like a positive response, and it takes about four years for M0 to occur. It is also seen that E-money's response to APMK fluctuated over 35 research periods or about eight years for E-money to reach its balance. E-money variables respond positively to VOM variables and achieve

balance in the 25th or 5th period. APMK's response to VOM is also seen in the graph above, continues to fluctuate but shows a positive response, and it takes 20 quarters or five years for APMK to reach the balance.

The GDP response to APMK is highly volatile, and it takes 24 periods of regulation or about six years for GDP to reach its balance, in addition, as well. It has seen a response to fluctuating GDP to M0, which tends to experience a positive response and shake during the 30 study periods. It was also seen that the GDP response to VOM was dominant in responding positively and experiencing shocks during the 25 study periods. The M0 response to APMK continued to be contradictory but predominantly negative and shook during the 20 study periods, while the M0 response to GDP experienced a strong response. The M0 response to VOM fluctuated over 15 periods of the study and tended to show a negative response.

Figure 3. Impulse Response Function Before Covid-19

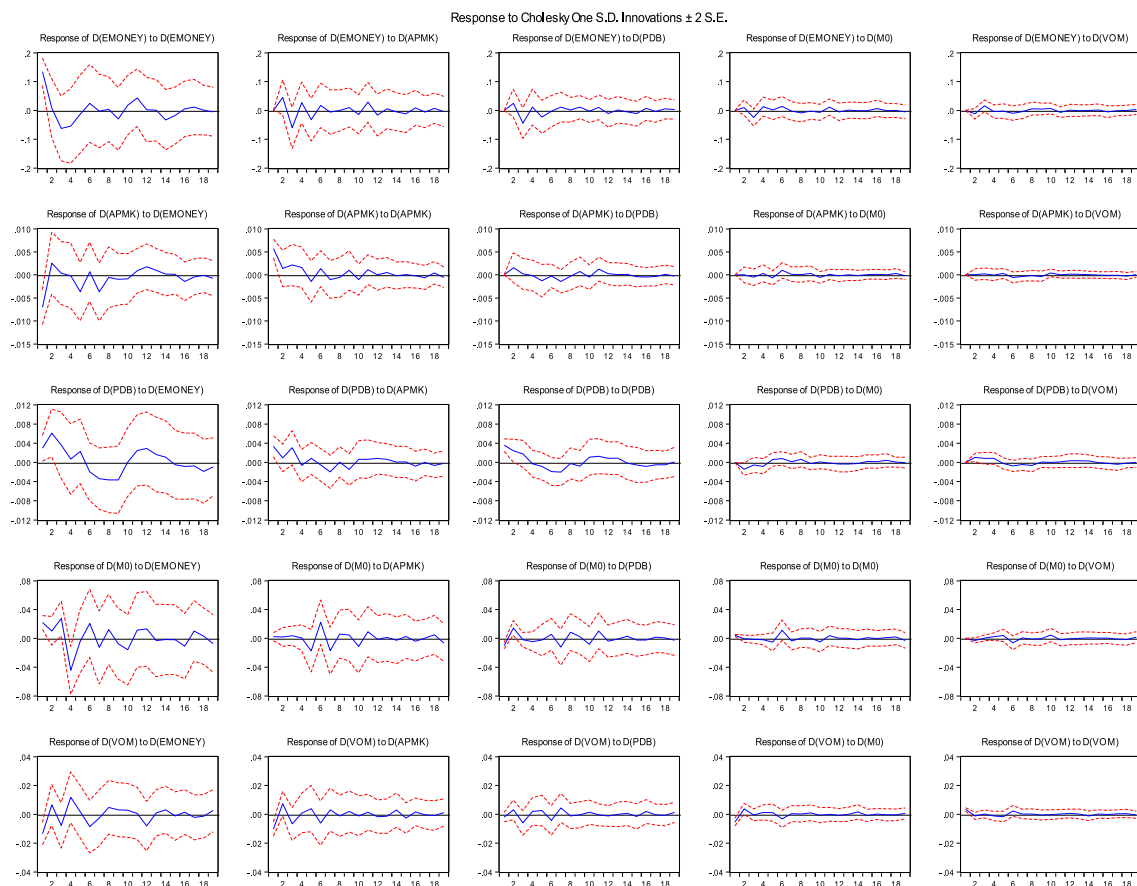
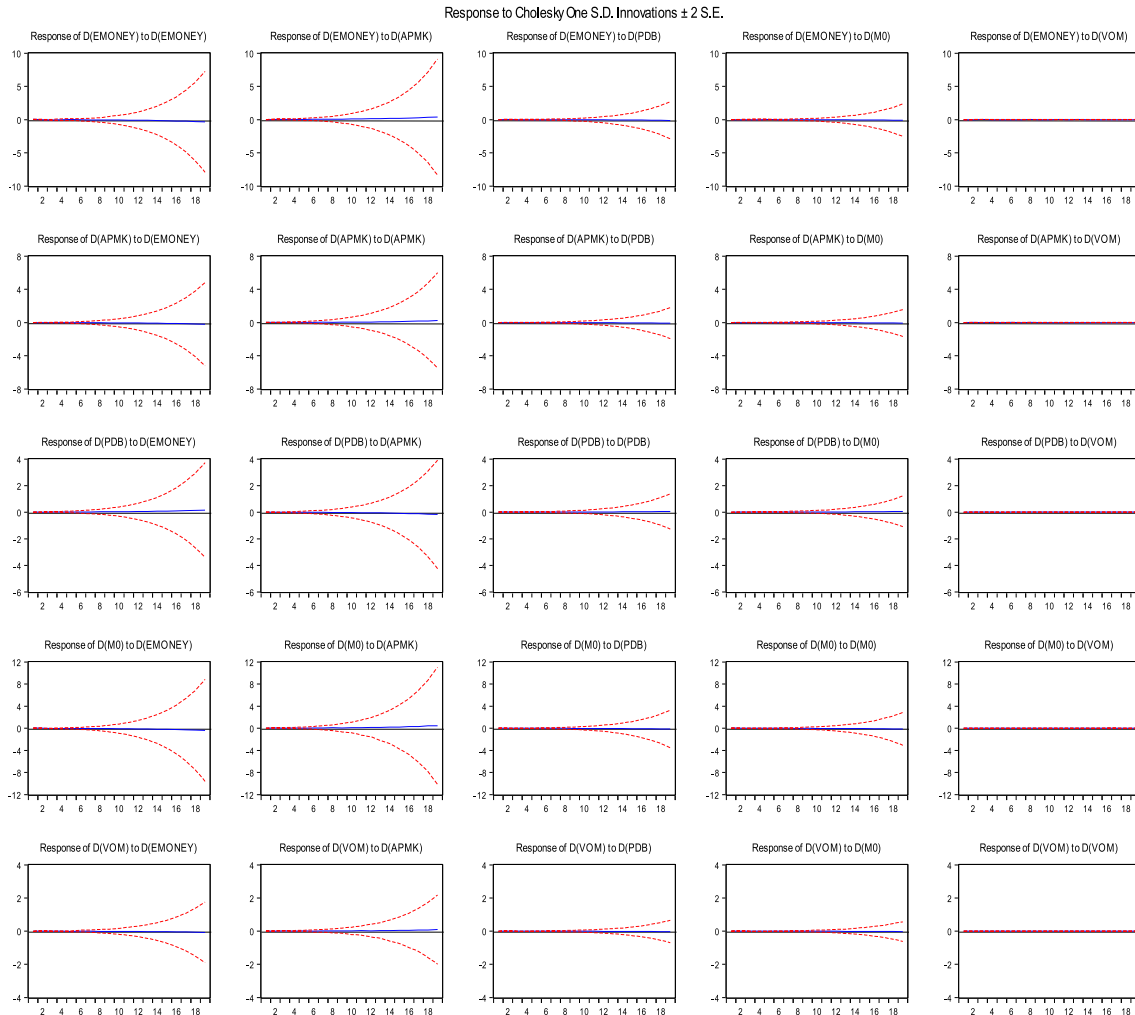


Figure 3 shows that E-money's response to M0 fluctuates but is predominantly negative, and it takes 11 months of research period for E-money to strike a balance. An APMK response to VOM shows a positive response and experiences shocks for ten months to achieve equilibrium. The GDP response to VOM was shaking during the 8-month study period but predominantly showed a positive response. The M0 variable showed a

negative response to the E-money variable and was seen to experience shocks during the 19 study periods. A positive response was shown by VOM variables to E-money and experienced shocks during the 19 years of the study.

Figure 4. Impulse Response Function During Covid-19



Based on Figure 4, it can be seen that APMK's response to E-money was on balance during the nine months of the study period and began to show a negative response until the end of the period. It was also seen that the APMK response to M0 did not experience shocks and positive response for ten months, then showed a negative response at the end of the period. The M0 response to GDP was seen in balance during the 9-month study period, and then GDP responded negatively. At eight months, the VOM variable research period reached its equilibrium point, then responded positively to e-money. The VOM variable indicates a negative response to APMK after the previous eight months reaching the equilibrium point. The variable response of VOM to GDP was seen during the 9-month study period to strike a balance, then VOM responded to GDP with a positive response.

Based on the error variance value from table 8, it can be concluded that E-money changes are more dominantly influenced by e-money itself than by M0 (money supply), GDP (national income), VOM, and APMK. Changes in APMK variables are more dominantly influenced by APMK itself, VOM, GDP, E-money, APMK, and M0. The percentage contribution to variable GDP is more influenced by GDP, M0, VOM, E-money, and APMK. Changes in the dominant M0 variable are influenced by the M0 variable, GDP, APMK, VOM, and E-money. More dominant VOM variables are formed by the contribution of variables M0, APMK, VOM, GDP, and E-money.

Table 8. Variance Decomposition Test All Period

Dep Ind	EM	APMK	PDB	M0	VOM
EM	46.95939	6.622143	11.67029	26.13486	8.613317
APMK	1.257869	91.47510	1.533051	0.793424	4.940554
PDB	3.643680	3.567326	84.39400	4.512345	3.882653
M0	2.003982	16.27787	26.56251	52.21964	2.935991
VOM	0.853266	29.98392	11.77348	38.70060	18.68872

Based on the error variance value from table 9, it can be concluded that before the Covid-19 pandemic, E-money changes were more dominantly influenced by GDP, E-money itself, than by APMK, M0, and VOM. Changes in APMK variables are more dominantly influenced by the APMK variables themselves, GDP, E-money, M0, and VOM. The percentage contribution to variable GDP is more influenced by E-money, GDP itself, APMK, M0, and VOM. Changes in the dominant M0 variable are influenced by E-money, GDP, M0 itself, APMK, and VOM. The velocity of money is more dominantly formed by the contribution of variables E-money, GDP, M0, APMK, and VOM.

Table 9 Variance Decomposition Test Before Covid-19

Dep Ind	EM	APMK	PDB	M0	VOM
EM	29.51039	23.54082	33.38549	12.93369	0.629605
APMK	14.12224	40.88699	31.68606	13.21867	0.086036
PDB	58.79123	9.453228	26.70249	4.336334	0.716721
M0	55.18591	8.050704	19.70715	15.59702	1.459218
VOM	31.95524	10.35759	29.53043	25.54358	2.613166

Based on the error variance value from table 10, it can be concluded that during the Covid-19 pandemic, E-money changes are more dominantly influenced by E-money itself than by M0, GDP, VOM, and APMK. Changes in APMK variables are more dominantly influenced by the variables of APMK itself, VOM, GDP, E-money, and M0. The percentage contribution to variable GDP is more influenced by GDP, M0, VOM, E-money, and APMK. Changes in the dominant M0 variable are influenced by M0 itself,

GDP, APMK, VOM, and APMK. Vom variables are more dominantly formed by the contribution of variables M0, APMK, VOM, GDP, and E-money.

The findings obtained from the results of the estimate that there is an all period of found one-way causality of the monetary base to E-money with a positive response in line with Fatmawati & Tuliana (2019) and Saraswati & Mukhlis (2018) when a monetary base increase causes E-money increase too, it is because a complementary effect when E-money and monetary base complement each other, while in the period before the Covid-19 pandemic there was a relationship between monetary base and E-money with a negative response. The negative response shown by the monetary base to E-money shows that when the monetary base increases, there is a decrease in E-money because E-money is a substitution of the monetary base following the theory that indicates the substitution of payment instruments caused by transactions using electronic money (Igamo & Falianty, 2018).

Table 10. Variance Decomposition Test During Covid-19

Dep Ind	EM	APMK	PDB	M0	VOM
EM	46.95939	6.622143	11.67029	26.13486	8.613317
APMK	1.257869	91.47510	1.533051	0.793424	4.940554
PDB	3.643680	3.567326	84.39400	4.512345	3.882653
M0	2.003982	16.27787	26.56251	52.21964	2.935991
VOM	0.853266	29.98392	11.77348	38.70060	18.68872

During the Covid-19 pandemic period, there was a one-way relationship between the velocity of money towards E-money with a positive response in line with Kartika & Nugroho (2015) research that when the velocity of money increases, it will also be followed by an increase in the development of digital finance in a country that accelerates the rate of velocity of money such as with the presence of money electronics. It was also found that APMK's relationship with E-money with negative responses before and during the pandemic was in line with Pranoto & Salsabila (2018) research that e-money is easier and faster to use than AMPK and many promotions that can be obtained by using e-money.

In the all period found one-way causality of the variable E-money to APMK with a negative response following Pambudi & Rahadi (2018) and Tee & Ong (2016) that the use of electronic money in Indonesia can shift the number of credit card users whose users are getting smaller because they are replaced with electronic money whose transaction process is faster, easier and liquid. It was also found that the relationship of GDP to APMK with a positive response supported by the research of Arifin & Oktavilia (2020) that the increase in national income was also accompanied by an increase in public transactions towards electronic payments (APMK) because the amount of public income became a benchmark for the significant level of consumption expenditure through non-cash payments.

It was also found that the monetary base relationship to APMK with a negative response was in line with Saraswati & Mukhlis (2018) and Zahara (2018). In Indonesia, the use of cash is increasing and is still in demand as a tool to transact, but the use of

APMK tends to decrease because, in non-cash transactions, people prefer to use electronic money, as evidenced by the increase in electronic transactions in Indonesia. While during the pandemic, money turnover has a one-way causality with APMK with a negative response, this is to value of APMK transactions grows negatively in the rapid velocity of money.

In all periods found, two-way causality between monetary base and GDP in a positive manner in line with research Alam et al. (2020) and Mishchenko et al. (2018) show that GDP causes the monetary base to increase to balance the demand for money, whereas the increased monetary base encourages an increase in GDP. During the Covid-19 pandemic period, there was a one-way relationship between money turnover to GDP in a positive manner because during the *Covid-19* pandemic, government and household consumption played an active role in boosting economic growth, the ethics of people's purchasing power increases, the turnover of money will increase through transactions carried out by the community.

During the Covid-19 pandemic period, non-cash instruments affect the monetary base. During the pandemic, APMK had a one-way causality towards the monetary base with a positive response in line with Fatmawati & Yuliana (2019) research where the use of non-cash transactions was more carried out for cash withdrawals because there were still many ordinary people and not all shops, MSMEs, markets and mini markets that imposed non-cash payments. In the all period found one-way causality of E-money to the velocity of money positively in line with Lukmanulhakim (2016), Fauzukhaq et al. (2019) research that e-money can increase the velocity of money through the ease and efficiency created from these payment instruments because the time of hand transfer between sellers and buyers (Rahmawati et al., 2020).

In the all period found one-way causality of GDP to the velocity of money positively, similar things happened in the period before the pandemic following Keynes Theory and in line with Sari & Greek (2019) research that when GDP increases mean that people also experience an increase in income that will encourage people to transact so that consumption increases. In all periods found, one-way causality of the variable monetary base to the velocity of money negatively in line with Irving Fisher's theory that if in transacting more cash or checks, then more money is used to make payments generated through the same nominal income so that the acceleration of the velocity of money will fall (Ginting et al., 2018).

CONCLUSION

During the general period and the pandemic period, there was a relationship between money supply and non-cash transactions (APMK and E-money), a positive response occurred in the period in general, and a negative response occurred during the Covid-19 pandemic period. In general and during the pandemic, national income is positively affected by the money supply and velocity of money. In general and during the Covid-19 pandemic period, GDP affects the velocity of money positively, while in the general period, non-cash instruments (E-money and APMK) affect the velocity of money positively.

This research implies that people as money users can choose the type of money

used based on the place and situation, but now electronic money is starting to be favored because of its ease and convenience in transacting so that it will increase the velocity of money in Indonesia. Electronic money can reduce the money supply M0 and increase goods and services so that all work becomes efficient. Financial institutions and related authorities can support and facilitate electronic payments with regulation, protection, and equitable distribution of electronic money to various regions in Indonesia that can attract people to use it to increase efficiency at various levels of society.

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The Effect of Public Awareness on the Islamic Financial Industry's Development

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Abstract

The development of Islamic finance is not related to the size of the Muslim population as a potential demand. Awareness is a crucial factor in the demand for Islamic banking services. This research investigates the effects of knowledge, regulation, and public awareness on Islamic finance development. This study considers awareness as the mediator variable of knowledge and regulation in supporting Islamic finance development. The study used secondary data published by ICD and Refinitiv, with data from 2013-2019 from 62 countries. Data were analyzed using panel data path regression. The research findings show that knowledge, regulation, and awareness significantly affect the development of the financial industry. The importance of awareness in promoting the Islamic financial industry is indicated by the positive and significant value of awareness as a mediator of knowledge and regulation. This study recommends the synergy between the government and Islamic financial education institutions in strengthening public awareness in encouraging the development of the Islamic finance industry through disseminating research results and government policies.

Keywords:

knowledge; asymmetric information; Islamic financial; regulation

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INTRODUCTION

Total Islamic finance assets are expected to reach \$ 2.88 trillion by 2019. Iran, Saudi Arabia, and Malaysia rank as the top three countries by the value of Islamic finance assets (Dinar Standard, 2020). The assets experienced an average growth of 6.6 percent per year (IFSB, 2020). Islamic commercial banking is responsible for most of the Islamic finance assets, Islamic capital (Islamic bonds and funds), and the Takaful (insurance). Islamic banking has a 72.4 percent share of the Islamic finance segment (IFSB, 2020).

The potential for growth in the Islamic financial industry is undoubtedly expected to align with the growing Muslim population. However, the size of the Muslim population does not support the development of the Islamic industry. For example, Indonesia has the world's largest Muslim population but based on the publication of (Dinar Standard, 2020), Indonesia ranks 4th in the global competitiveness of the halal industry. Nevertheless, Malaysia is ranked first in the competitiveness of the global halal industry and second to Saudi Arabia.

Malaysia occupies the first position in four types of industries: finance, food, travel, and pharmaceuticals. The UAE took first place in the other types of industries, namely: fashion and media. Religiosity drives customers' decisions in selecting Islamic financial services, but not always adequate (Bananuka et al., 2019; Ozair et al., 2019; Rusydiana & Hasib, 2019; Siregar et al., 2021). Religious obedience is a rational motive because it requires information to underlie the demand (Santoso, 2020). Muslims and non-Muslims accept Islamic financial services due to their knowledge of Islamic finance. Therefore religion is not the primary factor in adopting an Islamic bank (Selvanathan et al., 2018).

The Muslim population's significant potential has been unable to encourage the development of the Islamic finance industry because of some problems faced by the Islamic financial industry. Financial markets are imperfect. The imperfect financial markets are characterized by asymmetric information, agency problems, moral hazard, and Islamic banks (Fakhfekh et al., 2016). The rational choice theory assumes that consumers can make mistakes if the information is imperfect. Producers know their products, including hazards, better than consumers and can exploit consumers to achieve benefits (Mathis & Steffen, 2015).

Under these conditions, regulation is required to minimize hazards due to imperfect information. Alam et al. (2019) found that regulatory variables are positively significant with Islamic banks' performance in the Asian region but not in the Gulf Cooperation Council. The role of the government can also encourage technical efficiency in Islamic banking (Alam, 2013). Furthermore, the role of government can also encourage public awareness of the Islamic financial industry. Chapra et al., (2018) recommends that relevant stakeholders create awareness. Awareness plays a vital role in society's adaptation to the Islamic financial industry, not merely religious factors.

Several studies examine non-religious factors in determining the criteria for selecting Islamic financial services from the perspective of consumers or demand in an industry and a country, consisting of knowledge (Firmansyah et al., 2020; Widityani et al., 2020); awareness (Aziz & Afaq, 2018; Basheer et al., 2017; Firmansyah et al., 2020; Mahdzan et al., 2017);

and demographics (Widityani et al., 2020). Another finding examines the development of the Islamic finance industry across countries (Asri et al., 2021; Ernawati & Asri, 2020).

However, previous findings are still limited to the correlation or direct effect of the estimated variables on the development of the Islamic financial industry. We argue that knowledge and regulation are crucial factors to study in the imperfect condition of the Islamic financial industry and assume that these factors also indirectly affect the development of the financial industry through increasing public awareness. Our paper will examine the importance of public awareness as a mediator of knowledge and regulation to encourage the development of Islamic finance.

Therefore, this study aims to reveal the effect of knowledge, regulation, and public awareness on the development of the Islamic financial industry and whether the position of public awareness is essential as a mediator of knowledge and regulation in promoting the development of the Islamic financial industry. This research is expected to contribute to the government in making regulatory decisions, strengthening knowledge, and creating public awareness in driving the development of the Islamic financial industry.

METHODS

This study uses secondary data obtained directly through Islamic Finance Development Indicator (IFDI) publications by The Islamic Corporation for the Development of the Private Sector (ICD) and Refinitiv for the 2013-2019 period with data obtained from an estimated number of 62 countries. Data were analyzed by panel data regression as the formulation in equation (1), where Y_{it} is the dependent variable, X_{it} is the independent variable, i and t are indices for individuals and time, and e_{it} is the error cross-section.

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_n X_{nit} + e_{it} \quad (1)$$

The proposed model is based on the theory of rational decision-making, where decision-making is highly dependent on the availability of information (knowledge, Kn). Given that imperfect financial markets are characterized by asymmetric information so that the available information is incomplete, regulations and Reg are needed, which will minimize asymmetric information for investors. The initial research model was formulated by:

Model 1

$$DIF_{it} = \beta_0 + \beta_1 Kn_{it} + \beta_2 Reg_{it} + \beta_3 Aw_{it} + \mu_{1it} \quad (2)$$

Where:

DIF : Development of Islamic Finance

Reg : Regulation

Kn : Knowledge

Aw : Awareness

μ_{1it} : Error

β_0 : Constant

$\beta_{1,2,3}$: Coefficient

i : Country

t : Year

On the other hand, knowledge, Kn influences the formation of awareness, Aw . Likewise, with regulations, Reg , which will impact raising awareness, Aw if it can be appropriately disseminated. Based on this, the second research model is formulated by:

Model 2

$$Aw_{it} = \alpha_0 + \alpha_1 Kn_{it} + \alpha_2 Reg_{it} + \mu_{2it} \quad (3)$$

Based on models 1 and 2, the reduced form is derived as in equation (4), which shows the direct, indirect, and total effects of knowledge and regulation variables on the development of Islamic finance. The importance of awareness in promoting the Islamic financial industry's development is indicated by the indirect effect of regulatory and knowledge variables on the development of the Islamic finance industry.

$$DIF_{it} = (\beta_0 + \alpha_0\beta_3) + (\beta_1 + \alpha_1\beta_3)Kn_{it} + (\beta_2 + \alpha_2\beta_3)Reg_{it} + (\beta_3\mu_{2it} + \mu_{1it})$$

where:

- $\alpha_1\beta_3$: The indirect effect of knowledge on the development of Islamic finance through awareness level transmission
- $\alpha_2\beta_3$: The indirect effect of regulation on the development of Islamic finance through the transmission of awareness levels
- $\beta_1 + \alpha_1\beta_3$: The total effect of knowledge on the development of Islamic finance
- $\beta_2 + \alpha_2\beta_3$: The total effect of regulation on the development of Islamic finance

The measurement of the development variables of Islamic finance, knowledge, awareness, and regulation by The Islamic Corporation for the Development of the Private Sector (ICD) and Refinitiv is done using index numbers. The quantitative development indicator is a weighted index of Islamic finance institutions, by country, that provides Islamic financial products and services. A knowledge Indicator is a weighted index of two main sub-indicators of education and research. The Governance indicator is a weighted index of three factors: regulations, corporate governance, and shariah governance. The market awareness indicator is a weighted index of Islamic finance market awareness per country that is measured by assessing three components: conferences, seminars, and news volumes. All data in this study were taken directly from the Islamic finance development indicator (IFDI) Interactive Map of The Refinitiv.

Data were analyzed using panel data path regression. The data processing uses Eviews 10 with EGLS estimation techniques. The panel data test model is used to select the best model, whether the Common Effect model or Fixed Effect Model (FEM). It tests the validity of FEM assumptions using the Chow test. The basis for selecting the model is by looking at the chi2 probability of the cross-section data. If the probability of chi2 < 0.05, then the method used in panel data processing is the fixed effect; conversely, if the probability of chi2 > 0.05, then the best model of panel data is the common effect. Testing to use a significant level of 0.10 or $\alpha = 10\%$. If the significant value < 0.10, the regression coefficient is significant. The probability of indirect effect uses the Aroian criteria. As for the specific test of the indirect effect of the knowledge and regulatory variable through the level of awareness variable, it is carried out through the Sobel test,

which is calculated through an interactive calculation tool for mediation tests, with the formula:

$$(z - value = a * b / \sqrt{b^2 * s_a^2 + a^2 * s_b^2})$$

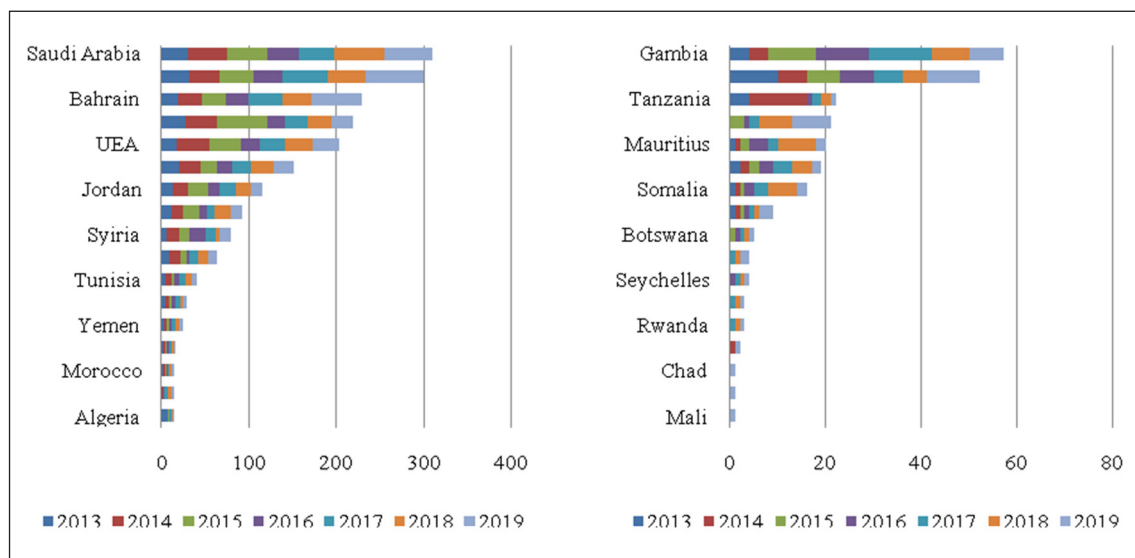
where:

- a : the raw regression coefficient for the association between regulation, knowledge, and awareness
- S_a : standard error of a
- b : the raw coefficient for the association between the awareness and development of Islamic finance
- S_b : standard error of b

RESULT AND DISCUSSION

The development of the Islamic finance industry in the GCC (Gulf Cooperation Council) and MENA (the Middle East North Africa) regions, as presented in Figure 1, shows that although on 2013-2019, the highest development was experienced by Iran, then Saudi Arabia and Kuwait, in terms of scores in 2019, the Islamic financial industry developed rapidly in the countries of Kuwait, followed by Iran, then Bahrain. In addition to those, including the Middle East and North Africa (MENA), in 2019, the Islamic financial industry is developing rapidly in Kenya, South Africa, and Nigeria in the African continent. In the State of Gambia, the Islamic Finance Industry developed rapidly in 2017 and beat the scores of all countries.

Figure 1. Development of the Islamic Finance Industry in the GCC, MENA, and African Continent Countries

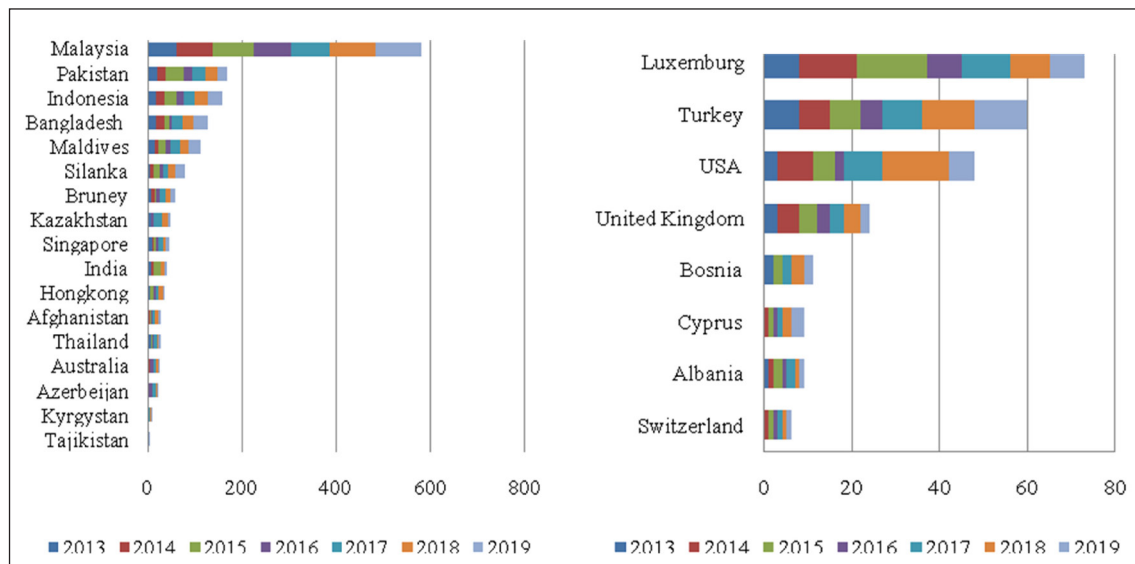


Source: IFD (2019), processed

Malaysia ranked first, followed by Pakistan and Indonesia, Singapore ranked 9th, while Hong Kong ranked 11th, which is still more developed than Afghanistan in the

Asian region during the 2013-2019 period. However, on an annual basis, especially in 2019, Malaysia, then Bangladesh, and Indonesia still occupy the rapidly growing Islamic finance industry in Asia. In parts of the American and European continents, as Figure 2 shows, Luxembourg occupies the first rank, then Turkey, the USA, and then the United Kingdom.

Figure 2. Development of the Islamic Finance Industry in Asia, Europe, and the America Continent



Source: IFD (2019), processed

Globally, the top ten ranking countries in the development of the Islamic financial industry, on an average period of 2013-2019, are as follows: Malaysia, Iran, Saudi Arabia, Kuwait, Bahrain, Qatar, UAE, Pakistan, Indonesia, and Sudan. While on an annual basis, especially in 2019, the ranking countries are Malaysia, Kuwait, Iran, Bahrain, and Saudi Arabia, while Indonesia, Bangladesh, and UAE are ranked next with the same score, as well as the Maldives, Sudan, and Qatar having the same score, and are in the following position. The ranking of the development of the Islamic financial industry, based on average figures and achievements in 2019, shows that several countries have experienced a leap in the development of Islamic finance, namely Kuwait, Bangladesh, and the Maldives. Of the 62 countries studied, 21 countries experienced positive growth in 2019, and as many as 24 countries experienced a slowdown; the rest is stagnant. Countries experiencing a slowdown are indicated by negative growth of up to 50 percent, namely: Hong Kong, Australia, Mauritius, Kazakhstan, Somalia, India, USA, Djibouti, Tanzania, and the USA.

Table 1 shows that knowledge measured by Islamic financial education and research institutions developed in the GCC and MENA regions with the central pillars (as indicated by the average value), namely Jordan, Bahrain, UAE, Tunisia, and Saudi Arabia. In the Continent of Africa, in addition to the countries that are members of the MENA, the progress of Islamic finance education and research has been demonstrated in the State of Nigeria, followed by Kenya and Ethiopia, while in the Continent of Asia, the pillars

of Islamic finance education and research are in the countries of Malaysia, Pakistan, Indonesia, Brunei, and Sri Lanka. In the Americas and Europe, Islamic finance education and research are based in the State of Bosnia and the United Kingdom.

As for public awareness, as measured by conferences, seminars, and news volumes related to the Islamic financial industry, the GCC and MENA countries are very actively implemented in Bahrain, the UAE, Oman, Qatar, and Saudi Arabia, while in the African Continent, namely Mauritius, Kenya, and Djibouti. As for countries that are very active in organizing events related to Islamic finance in Asia, namely: Malaysia, Pakistan, and Brunei, while the countries of Albania, Bosnia, and Luxembourg led to the rapid activity of the conference in the American and European regions than other countries. In terms of regulation, globally, Bahrain is a country that has the highest regulatory index, which implies that the country has the complete sharia ecosystem, which consists of regulations, corporate governance, and sharia governance, followed by Malaysia, Pakistan, Kuwait, Oman, Indonesia, and UAE.

Table 1. Statistic Descriptive

Countries	Kn				Reg				Aw			
	Max	Min	Mean	Stdev	Max	Min	Mean	Stdev	Max	Min	Mean	Stdev
GCC & MENA												
Algeria	9	4	6.1	2.0	11	1	4.4	3.7	12	2	6.7	2.9
Egypt	17	5	10.9	3.9	26	10	20.0	4.9	36	10	17.4	8.5
Iran	20	3	11.0	7.0	38	28	31.3	3.4	18	4	7.7	5.0
Irak	9	1	4.1	3.2	36	2	13.3	13.0	7	1	5.0	1.9
Jordan	71	34	60.9	13.5	54	17	34.1	15.8	45	16	27.7	8.9
Lebanon	30	21	25.0	3.2	31	17	23.4	5.4	11	4	8.0	2.8
Libya	10	0	3.4	3.4	23	9	15.6	5.3	17	5	11.3	5.1
Morocco	33	5	15.7	11.0	25	0	10.9	9.3	42	13	23.9	10.0
Mauritania	2	0	0.6	1.0	6	0	2.6	2.7	39	5	16.3	11.4
Sudan	21	10	13.7	4.5	65	35	55.3	9.5	34	11	21.3	7.3
Syria	10	7	7.6	1.1	49	26	34.7	10.4	12	3	8.4	3.3
Tunisia	68	14	43.1	19.0	25	0	12.4	11.4	44	13	31.9	10.4
Yemen	10	1	6.7	3.5	27	0	19.0	9.1	19	8	12.1	4.5
Saudi	47	13	29.4	12.0	39	16	31.7	8.6	67	14	41.1	17.9
UEA	60	27	44.6	12.3	72	37	57.4	11.1	162	53	124.6	36.3
Qatar	27	6	17.6	7.4	52	38	46.6	4.4	84	25	61.7	18.3
Kuwait	21	15	17.3	2.2	72	32	61.7	13.3	73	29	52.0	17.8
Bahrain	78	48	57.1	10.3	108	84	94.6	8.2	195	73	137.7	41.6
Oman	32	13	22.7	5.9	81	25	61.4	18.9	156	63	115.4	31.8
AFRICA												
Benin	0	0	0.0	0.0	0	0	0.0	0.0	16	6	10.1	3.9
Botswana	4	0	1.7	1.8	0	0	0.0	0.0	18	2	9.1	5.0
Cameroon	4	0	1.0	1.4	0	0	0.0	0.0	21	5	10.0	5.7
Chad	0	0	0.0	0.0	0	0	0.0	0.0	16	6	9.1	3.7
Djibouti	0	0	0.0	0.0	26	6	13.4	8.2	37	17	28.3	8.5
Ethiopia	1	0	0.4	0.5	15	0	5.4	5.9	9	0	3.3	3.1
The Gambia	9	1	6.1	3.3	22	3	12.3	5.9	21	6	12.4	4.8
Kenya	23	1	9.9	8.3	31	0	15.3	13.1	29	6	20.3	8.6
Mali	0	0	0.0	0.0	0	0	0.0	0.0	14	6	8.7	2.9

Countries	Kn				Reg				Aw			
	Max	Min	Mean	Stdev	Max	Min	Mean	Stdev	Max	Min	Mean	Stdev
Mauritius	11	3	6.9	3.0	49	17	23.0	11.7	45	7	18.1	13.1
Niger	2	0	0.6	1.0	0	0	0.0	0.0	14	6	9.0	2.9
Nigeria	28	7	15.7	8.3	64	17	44.0	17.6	29	6	11.4	8.1
Rwanda	0	0	0.0	0.0	6	0	1.6	2.7	12	0	5.0	5.0
Senegal	6	1	4.9	1.8	5	0	0.7	1.9	22	8	15.4	5.4
Seychelles	0	0	0.0	0.0	0	0	0.0	0.0	13	0	6.4	6.1
Somalia	7	2	5.1	1.6	23	6	10.0	6.3	15	7	11.0	3.2
South Africa	8	2	4.1	2.1	43	16	24.6	9.8	10	4	6.9	2.0
Tanzania	8	0	4.1	4.0	8	0	3.3	3.4	19	0	8.6	8.0
ASIA												
Brunei	56	22	35.6	14.3	70	36	49.6	13.1	93	10	47.0	30.3
Indonesia	173	10	51.0	58.9	65	46	58.0	6.1	40	6	19.9	14.1
Malaysia	228	107	181.3	42.5	94	76	86.6	5.9	243	51	168.9	64.1
Singapore	6	3	4.6	1.3	45	27	34.3	7.3	14	5	9.9	2.9
Thailand	3	0	1.0	1.2	15	0	7.6	6.1	4	1	2.7	1.3
Afghanistan	19	1	10.7	6.7	39	0	20.1	17.8	15	3	8.7	5.5
Bangladesh	22	7	13.9	6.0	57	32	46.4	7.6	16	4	7.9	4.1
India	4	2	3.0	0.8	19	0	6.3	6.4	1	0	0.7	0.5
Maldives	21	9	14.0	4.4	68	17	47.9	18.5	46	4	23.7	15.2
Pakistan	77	39	52.1	14.8	67	54	64.7	4.8	116	17	75.3	40.7
Srilanka	28	13	20.3	6.9	40	19	26.0	8.7	37	9	23.6	9.8
Australia	6	3	4.4	1.1	26	8	17.0	6.6	4	0	1.6	1.5
Azerbaijan	3	0	1.4	1.1	5	0	1.3	2.2	25	3	16.6	7.1
Hongkong	2	0	0.9	0.7	0	0	0.0	0.0	5	1	2.3	1.4
Kazakhstan	8	4	5.1	1.6	39	22	29.9	6.1	32	2	14.1	10.3
Kyrgyzstan	3	0	0.7	1.1	22	17	18.4	2.4	26	3	11.4	7.8
Tajikistan	0	0	0.0	0.0	17	0	9.0	7.9	29	2	14.3	9.5
AMERICAN & EUROPE												
USA	2	1	1.6	0.5	5	0	2.4	2.2	1	0	0.1	0.4
Albania	0	0	0.0	0.0	3	0	1.3	1.6	16	1	6.9	6.1
Bosnia	17	8	12.6	3.8	10	0	4.6	3.3	22	4	11.3	5.8
Cyprus	1	0	0.4	0.5	0	0	0.0	0.0	10	1	5.0	3.7
Luxemburg	4	2	2.9	0.9	10	1	4.4	4.2	17	2	5.3	5.2
Switzerland	3	1	1.9	0.7	9	0	3.6	3.8	3	0	1.9	1.1
Turkey	24	2	8.7	8.3	35	10	20.6	9.3	24	9	18.1	5.0
United Kingdom	24	9	15.4	5.6	33	11	21.1	8.1	14	4	7.7	3.8

Source: Research Results, 2021

Variations in the development of the Islamic financial industry, of course, have correlations with other factors, namely: knowledge, regulations and governance, and public awareness. Table 2 shows a positive correlation between the development of the Islamic financial industry with public awareness, knowledge, and regulatory variables. The correlation between financial industry development and public awareness and knowledge is vital, while the correlation with regulation is in the medium category. On the other hand, regulation has a moderate category correlation with the variable of public awareness and

knowledge, while the variable of knowledge and public awareness has a strong correlation. However, all variables show a correlation of <0.80 , thereby showing that they do not have multicollinearity between variables.

Table 2. Correlation Variable

Variable	Kn	Reg	Aw	DIF
Kn	1.0000			
Reg	0.4928***	1.0000		
Aw	0.7319***	0.5464***	1.0000	
DIF	0.7175***	0.5769***	0.6384***	1.0000

Source: Research Results, 2021

The estimation of the development of the Islamic finance industry begins with a test of the model. The Chow test results, as presented in Table 3, show the probability of Cross-section F probability of the two models <0.05 so that the best model chosen is the fixed effect model (FEM). However, both models have cross-sectional dependence and heterogeneity shown by the probability of Pesaran CD, and the LR test is 0.000 in both models. Therefore, the model is estimated with a cross-section of SUR (seemingly unrelated regressions).

Table 3. Chow Test

Test Summary		Model 1	Model 2
Statistic	Cross-section F	12.6228 (0.0000)	30.0045 (0.0000)
Selected model		FEM	FEM

Source: Research Results, 2021

The estimation results of model 1, as presented in Table 4, show that the variables of knowledge, public awareness, and regulation have a positive and significant effect on the development of the Islamic financial industry:

- An increase of 1 point in public knowledge will encourage Islamic finance development by 0.0869 points.
- Increasing public awareness by 1 point will encourage Islamic finance development by 0.0224 points.
- The increase of 1 point in government intervention will encourage the development of the Islamic financial industry by 0.0894 points.

Thus, of the three variables estimated to influence the development of the global financial industry, regulatory variables directly have the highest impact on the development of the global Islamic financial industry.

Table 4. Results of Estimation

Variable	Coefficient (Prob)	
	Model 2 (Dependent Awareness)	Model 1 (Dependent Financial)
Constant	15.1098 (23.2132)***	6.4651 (14.3990)***
Knowledge	0.4218 (7.1437)***	0.0869 (3.7756)***
Regulation	0.0888 (2.9572)***	0.0894 (9.3564)***
Awareness		0.0224 (3.0914)***
R-squared	0.8483	0.9151
Adjusted R-squared	0.8225	0.9003
F-statistic	32.8448	62.1080
Prob(F-statistic)	0.0000	0.0000
Durbin-Watson stat	1.6850	1.9016

***Significant at alpha 0.01; ** alpha 0.05; * alpha 0.10

Source: Research Results, 2021

Furthermore, model 2 shows that regulation and knowledge have a positive and significant effect on the level of public awareness.

- Increasing 1 point of knowledge will increase public awareness of the Islamic financial industry by 0.4218 points.
- Increasing 1 point of regulation by one unit will increase public awareness of the Islamic financial industry by 0.0888 points.

Compared to the coefficient of the effect of regulation and knowledge on awareness, it appears that knowledge has a higher effect on driving the level of awareness of the Islamic financial industry. To find out the importance of awareness in encouraging the Islamic finance industry, apart from studying the direct influence of awareness on the development of the Islamic finance industry (as the significant positive value is in Table 4), it is shown that the ability of the public awareness is a variable as a mediator of knowledge and regulation variables which is indicated by the significance of the indirect effect of regulatory and knowledge variables on of the development of the Islamic finance industry.

The results of this mediation test show the importance of the awareness variable in encouraging the development of the Islamic finance industry, as presented in Table 5.

- The indirect effect of knowledge on the development of Islamic finance through awareness is $(0.4218 \times 0.0224) = 0.0094$. The value of the indirect effect coefficient of knowledge on the development of Islamic finance is significant and positive with Prob. 0.0045.

- b. The value of the indirect effect coefficient of regulation on the development of Islamic finance is significant and positive with Prob. 0.0326. The direct effect of regulation on the global Islamic financial industry is 0.0894, while the indirect effect through awareness is $(0.0888 \times 0.0224) = 0.0020$.

Table 5. Direct and indirect effects of regulation and knowledge on the development of Islamic finance

Variable	Effects	Symbol	Coefficient	t-statistic	SE	Prob.
Knowledge	Direct	β_1	0.0869	3.7756	0.0230	0.0000
	Indirect	$\alpha_1\beta_3$	0.0094	2.8374	0.0033	0.0045
	Total	$\beta_1 + \alpha_1\beta_3$	0.0964			
Regulation	Direct	β_2	0.0894	9.3564	0.0096	0.0000
	Indirect	$\alpha_2\beta_3$	0.0020	2.1370	0.0009	0.0326
	Total	$\beta_2 + \alpha_2\beta_3$	0.0914			

Source: Research Results, 2021

Ideal Islamic financial system, but this objective could not be achieved because of a lack of the political will to introduce and implement Shari'ah-compliant (Anwer et al., 2020). The research findings show that regulation has the highest direct effect on the development of the Islamic financial industry. Regulation is an entry point for the implementation of financial business because the imperfect Islamic financial industry (Fakhfekh et al., 2016) is challenging to be implemented and develop without regulation. Regulation is one of the obstacles to applying Islamic financial products (Ansari et al., 2021; Khan et al., 2020).

Therefore regulations should be reviewed regularly to support the development of Islamic finance. The regulation brings sound effects to the financial industry. The regulation can improve market discipline, and through the supervision from the higher authority, they will increase cost and profit efficiently. This finding is in line with those of Hamza (2013), who found an increase in the effectiveness and credibility sectors of the Islamic banks. Alam (2013) found that regulations, strict monitoring of banking operations, and higher supervisory power by authorities improve technical efficiency for Islamic banks. The reverse effect has been observed in the case of Islamic banks' risk-taking behavior applying higher restrictions results in a reduction in risk-taking of Islamic banks.

The results also show that knowledge can drive the development of the Islamic financial industry. This finding is in line with the results of Muslichah & Sanusi (2019) and Ansari et al. (2021). The knowledge is relevant not only in Muslim-majority countries but also in non-Muslims. One of the preferences of non-Muslims using Islamic banks is knowledge (Hariyana & Arsyianti, 2019). The findings of Su'un et al. (2018) show that perceived knowledge, perceived benefits, perceived innovativeness, perceived religious promotion, one's attitude, and readiness to comply with sharia were significant determinants of Islamic Banking adoption for Muslim Christians and Africa Traditional

Religion (ATR). Marketing and media exposure as a significant source of knowledge influence the buying behavior of halal products/services among Muslims and Non-Muslims (Ismail et al., 2017; Yasid et al., 2016). From the supply aspect, the findings of Elias et al. (2016) show that there is a relationship between halal knowledge of the product and its production.

Research findings also indicate that the influence of knowledge on the Islamic financial industry can be transmitted through increasing public awareness. This finding is in line with the result of Hidayat (2015), which shows that education plays a vital role in enhancing public awareness of Islamic finance, especially Takaful. This finding implies the importance of raising public awareness through disseminating research produced by Islamic financial education institutions in seminars, conferences, and news.

The publication of Islamic finance news will encourage the dissemination of Islamic financial knowledge, not only limited to academics and practitioners but also to the public, which will increase the potential of the community to choose the services of Islamic financial institutions. Ernawati & Asri (2020) research findings show that knowledge has a positive and significant correlation to public awareness of the financial industry. The existence of Islamic finance education and research institutions is correlated with the high activity of conferences and seminars related to the Islamic finance industry. Education, research, seminars, and conferences positively correlate with the Islamic finance industry, especially the Islamic Bank, sukuk, and takaful segments.

The results also show that awareness can drive the development of the Islamic financial industry. This finding is in line with the result of Ansari et al. (2021) which states that awareness can be a significant determining factor in the decision process for the selection of halal products (Hasan, 2016; Yuhanis & Nyen, 2013). The forms of Muslim and non-Muslim awareness about Islamic finance are different. For a Muslim, the form of awareness in the form of sharia principles is part of the command of the Almighty. While for non-Muslims, the awareness of the Islamic financial industry is closely related to the benefits derived from the service of that industry.

The results of Hidayat & Al-bawardi (2012) show that although most respondents believe in the social benefits that can be obtained from the principles of interest-free Islamic banking, it is not the main reason for the use of Islamic banking services. However, with lower transaction costs and services, it is better to be an essential consideration for them in choosing Islamic financial services. The findings of Joseph & Mahalakshmi (2021) show that 73% of the respondents studied do not have any awareness of Islamic banking. The results of research by (Naser et al., 2013) reveal that customers are unaware of many of the products on offer in Islamic banking, and they choose Islamic banking to diversify investment.

The research findings also show that the effect of regulations on the Islamic financial industry can be transmitted through increasing public awareness, which is in line with recommendations from Chapra et al., 2018. This finding is significant considering that religious factors are not the primary driver of society in making requests for financial

services based on sharia principles. It is precisely awareness that drives the financial industry (Aziz & Afaq, 2018; Bodibe et al., 2016; Mahdzan et al., 2017).

This finding implies that regulatory knowledge is essential in increasing public awareness of the Islamic financial industry. Because promotions and advertisements carried out by individual bank scales are less effective at driving the level of public awareness (Sarbo, 2016). Moreover, in the condition of the still low level of public awareness of the Islamic financial industry (Latif, 2019), research findings indicate that public awareness is essential in the transmission of regulations in driving the Islamic financial industry and implies the importance of regulation is disseminated in seminars, conferences, and news. Dissemination results are also a consideration for policymakers in developing Islamic financial regulations to achieve best practices in the Islamic finance industry.

CONCLUSION

Public awareness is essential in the development of the Islamic financial industry. Awareness can be a medium of transmission of knowledge and regulation in driving the development of the Islamic financial industry. In order to achieve optimal potential, a large number of the Muslim population in the world needs to be followed and increase their knowledge of Islamic business principles, especially the Islamic financial industry, in conjunction with regulations, corporate, and sharia governance. On the other hand, the development of Islamic finance needs to be disseminated apart from the principles of Islamic finance since it is also directed at the suitability of the products offered to the needs of financial services, such as product variation, and lower transaction costs, security, and convenience.

The research findings showed that knowledge has a higher effect on driving awareness of the Islamic financial industry than regulation. This implies the importance of increasing awareness to support knowledge and regulation. Educational institutions, while regulation produces knowledge by the government. Educational institutions, the community, and the government carry out the increase in public awareness. Public awareness is increased through knowledge and regulation dissemination. Therefore, this study recommends a policy of synergy between educational institutions and the government in encouraging the dissemination of research results and regulations to increase the potential of the community in choosing the services of Islamic financial institutions. The government is also expected to establish policies that provide a more conducive space for developing the Islamic financial industry.

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The Response of Financial Performance to The Market Power of Islamic Banking in Indonesia

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Abstract

This study aims to analyze the response of financial performance to the market power of Islamic banking in Indonesia. This study contributes to filling the gap in the literature by combining the variables under the analysis of impulse response friction (IRF) about the relationship between market power, efficiency, liquidity, profitability, and stability. The data of this study covered Islamic banking in Indonesia from the period January 2010 to 2019 and used IRF from the VAR/VECM panel. This study found that shock/innovation of market power of Islamic banking in Indonesia is responded positively by efficiency, liquidity, and profitability. Meanwhile, financial stability responds negatively to shock/innovation of market power. These findings suggest that innovation in market power in Indonesian Islamic banking will lead to an increase in efficiency, liquidity, and profitability. This result poses a dilemma because competition increases stability but reduces efficiency, liquidity, and profitability. The balance between market power and stability at the macro and industrial levels becomes crucial because it is necessary to maintain the financial system's stability and national economic growth.

Keywords:

market power; stability; liquidity; profitability; impulse response function

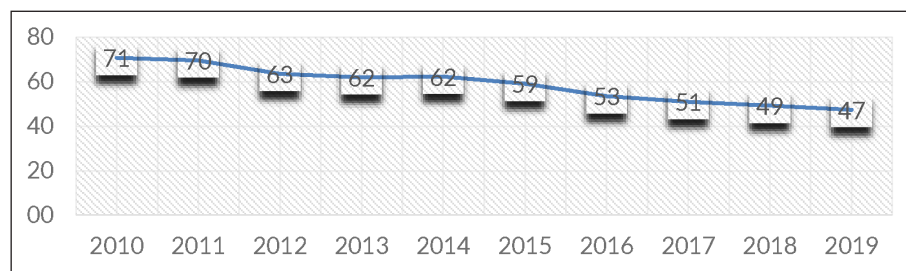
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INTRODUCTION

Theoretically, Islamic banking in Indonesia has a high opportunity for larger market power. The demand among Muslim customers is driven by religious values that result in a greater market power compared to conventional banks (Kasri & Iman, 2010; Masykurah, 2017). On the other hand, increasing market power and competition are two opposite cases. Market power will increase profitability of a firm but it can affect prices, which is contrary to the public welfare (Smirlock, 1985; Van Hoose, 2010; Christopher, et al. 2020). Tight competition in the banking sector will increase access to lower-cost credit that can trigger the likelihood of corporate credits and increase the growth of the companies' assets (Nuralyza, et al. 2022). The structure of Islamic banking in Indonesia can be stated as oligopoly and it is concentrated in the power of the large banks (Al Arif & Awwaliyah, 2019). Figure 1 shows the CR4 of Indonesian Islamic banking that ranged from 40% to 70% during the 2010-2019 periods. Although Islamic banking in Indonesia is concentrated, CR4 for the ten years has shown a downward trend. This decrease shows that the Indonesian Islamic banking market is going to be competitive.

Figure 1. Trend of CR4 of Islamic Banking in Indonesia during 2010-2019



Sources of processed data: Publication of annual reports

Although Islamic Banking in Indonesia has an oligopoly structure, the trend toward decreased CR4 denotes the potential competition in the Islamic banking industry. This indicates that competition among Islamic banks is getting tougher while market power is decreasing. In Islam, a competitive market is an ideal condition because it creates fairness in determining the price (Mukaromah & Wijaya, 2020). Under such a condition, price is entirely determined by the interaction between supply and demand, not by government intervention because Islam respects price-fixing resulted from the market mechanisms more highly than from government intervention (Rahmi, 2015; Hakim, 2016).

Some literature has suggested that competition is closely associated with efficiency. Therefore, efficiency plays a crucial role in competitive behavior among banks. They need to be efficient to win the global competition. More efficient banks will manage to increase profitability, and in turn banks with high profitability will survive in competing with other banks (Demsetz, 1973; Yin, 2021). If the efficiency level of the banking industry in a country is low, the banking industry in the country will not be able to compete with that of other countries that employ more sophisticated technology and offered lower interest rates (Remolona & Shim, 2015). In addition, competition will

make the company work more efficiently so it will have implications for the profitability increase.

The relationship between competition and profitability can be viewed from the structure-conduct-performance (SCP) paradigm which suggests that the greater market power will trigger market power authorities to fix the prices which will affect increasing profitability (Smirlock, 1985; Berger, 1995). In its application to the banking industry, the level of concentration as a proxy for large market structures will influence behavior of banks on which banks will increase lending rates and reduce deposit rates to generate bigger profits (Van Hoose, 2010). The positive relationship between market power and profitability means that a greater level of concentration in the banking industry will increase bank profits due to collusion by market authorities in the banking industry to determine prices.

Apart from efficiency and profitability, competition is also closely related to financial stability. In this case, there are two different paradigms. First, the competition-fragility paradigm argues that excessive competition can result in financial fragility because it reduces market power, profit margins, and reduced franchise value that encourage the banks to take higher risks (Keeley, 1990; Ariss, 2010). The second is the competition-stability paradigm which entails that competition ensures bank stability through new product innovations, financing efficiency, and diversification of the credit portfolio (Caminal & Matutes, 2002; Boyd & De Nicolo, 2005). Kabir & Worthington (2017) used Vector autoregression and Double-stage quantile regression to estimate the relationship between competition and stability. The results of the study support the competition-fragility hypothesis in Islamic and conventional banks. Furthermore, Albaity, et al. (2019) found that banks that face less intense competition tend to have a lower likelihood of bankruptcy and credit risk and enjoy higher profitability. The results of this study reveal that the competition-fragility effect is more pronounced in Islamic banks than in conventional banks in MENA countries.

Increased competition is also associated with liquidity. According to the view of the fragility channel, enhanced competition among banks will reduce the creation of liquidity (Petersen & Rajan, 1995). Competition will reduce the profit of the banks and the capital will also decline. Consequently, banks will limit financing to avoid loss. The second view is called price channel, which is an assertion that banks will enhance liquidity creation through the fixing price policy that is reduced lending rate- and increased deposit rate-oriented. This will lead to increased demand for financing and deposits (Carbo et al., 2009; Love & Martinez Peria, 2012).

The earlier studies have partially investigated the relationship between market power and financial performance. For instance, there have some studies had discussed that examined the relationship between market power and profitability. Besides that there are examined the relationship between market power and efficiency that stated in the efficiency hypothesis. The other studies also examine the relationship between market power and stability that stated in the competition-fragility and competition-stability paradigm. Next, the other studies also investigated the relationship between market power and liquidity

which is stated in the theory of price channel and fragility channel. The present study fills the gap in the literature by combining these variables in the analysis of impulse response function (IRF) on the relationship between market power, efficiency, liquidity, profitability, dan stability. This study is critical in determining the effect of shock of one variable on the other variables for the present and future periods.

METHOD

This study used a quantitative approach that combined time-series and cross-sectional data of Islamic banking in Indonesia and Malaysia from January 2010 to December 2019. The data were collected from Bankscope and annual reports of each bank that meet our criteria namely, active banks and annual reports that contain data about the variables investigated in the present study.

In this study, market power was measured using the Lerner Index, while efficiency was measured based on X-efficiency, liquidity was measured from the net stable funding ratio (NSFR), stability was measured from Z-score, and profitability was measured using return on assets (ROA). This research model was developed from the analysis of the existing model on the impact of competition which is suspected to increase the liquidity risk of banks with significant market power in assets to charge high-interest rates despite the low-risk profile of the borrowers so that the customers are on interested in becoming the partners of the banks (Khan et al., 2017). For this model, PVAR/VECM was used to identify the causal relationship among the variables.

$$\begin{aligned} ROA_{i,t} &= a_0 + \lambda ROA_{i,t-1} + \sum_{i=1}^k a_1 Zscore_{i,t-1} + \sum_{i=1}^k a_2 LI_{i,t-1} + \sum_{i=1}^k a_3 NSFR_{i,t-1} + \sum_{i=1}^k a_4 XEFF_{i,t-1} + e_{i,t} \\ Zscore_{i,t} &= a_0 + \lambda Zscore_{i,t-1} + \sum_{i=1}^k a_1 LI_{i,t-1} + \sum_{i=1}^k a_2 NSFR_{i,t-1} + \sum_{i=1}^k a_3 XEFF_{i,t-1} + \sum_{i=1}^k a_4 ROA_{i,t-1} + e_{i,t} \\ LI_{i,t} &= a_0 + \lambda LI_{i,t-1} + \sum_{i=1}^k a_1 NSFR_{i,t-1} + \sum_{i=1}^k a_2 XEFF_{i,t-1} + \sum_{i=1}^k a_3 ROA_{i,t-1} + \sum_{i=1}^k a_4 Zscore_{i,t-1} + e_{i,t} \\ NSFR_{i,t} &= a_0 + \lambda NSFR_{i,t-1} + \sum_{i=1}^k a_1 XEFF_{i,t-1} + \sum_{i=1}^k a_2 ROA_{i,t-1} + \sum_{i=1}^k a_3 Zscore_{i,t-1} + \sum_{i=1}^k a_4 LI_{i,t-1} + e_{i,t} \\ XEFF_{i,t} &= a_0 + \lambda XEFF_{i,t-1} + \sum_{i=1}^k a_2 ROA_{i,t-1} + \sum_{i=1}^k a_3 Zscore_{i,t-1} + \sum_{i=1}^k a_4 LI_{i,t-1} + \sum_{i=1}^k a_4 NSFR_{i,t-1} + e_{i,t} \end{aligned}$$

Note: π_{it} : profitability (ROA) of bank i during the period t || $\pi_{i,t-1}$: profitability (ROA) of bank i during the period $t-1$ || $LRNRIDX_{it}$: Lerner index of bank i during the period t || $LRNRIDX_{i,t-1}$: Lerner index of bank i during the period $t-1$ || $NSFR_{it}$: net funding stable ratio of bank i during the period t || $NSFR_{i,t-1}$: net funding stable ratio of bank i during the period $t-1$ || $Zscore_{it}$: financial stability of bank i during the period t || $Zscore_{i,t-1}$: economic growth of banks during the period $t-1$

Where $NSFR_{it}$ is an independent variable that was calculated using modification of the substances in Islamic financial statements. Furthermore, LI_{it} was used to measure competition, while Z-score was used to measure financial stability, and ROA_{it} was used to measure profitability.

VAR/VECM remains a proper estimation technique because it enables the relationship among endogenous variables and does not require specific prior relationships among the variables. The impulse response function (IRF) and variance decomposition that passed through it were obtained and from this how the shock of one variable affects the other variables in the current and future periods can be examined. The response of a variable may occur at that time or sometime in the future depending on the significant lag. In an equation that receives a shock from a variable, at some point, an equilibrium will be reached where the response gets smaller and returns to the equilibrium point. The movement from the response to the equilibrium point is called the Impulse Response Function VAR.

Besides IRF, there is Variance Decomposition which is a method to examine how much impact the shock proportion of a variable has on the variable itself and the shock proportion from other variables. While IRF indicates how much influence a shock has on a variable, variance decomposition provides information about the effect of each shock that occurs on a variable and shows the reciprocal relationship among the variables.

RESULTS AND DISCUSSION

Response of Financial Performance to Shock/Innovation of Islamic Banking in Indonesia

This study found that the shock/innovation of the market power of Islamic banking in Indonesia is responded positively by efficiency, liquidity, and profitability (see Table 1 and Figure 2). Meanwhile, financial stability responds negatively to the shock/innovation of market power. This finding suggests that the presence of innovation in market power in Indonesian Islamic banking will be followed by an increase in efficiency, liquidity, and profitability.

Table 1. Summary of Financial Performance Responses to Market Power Islamic Banking in Indonesia

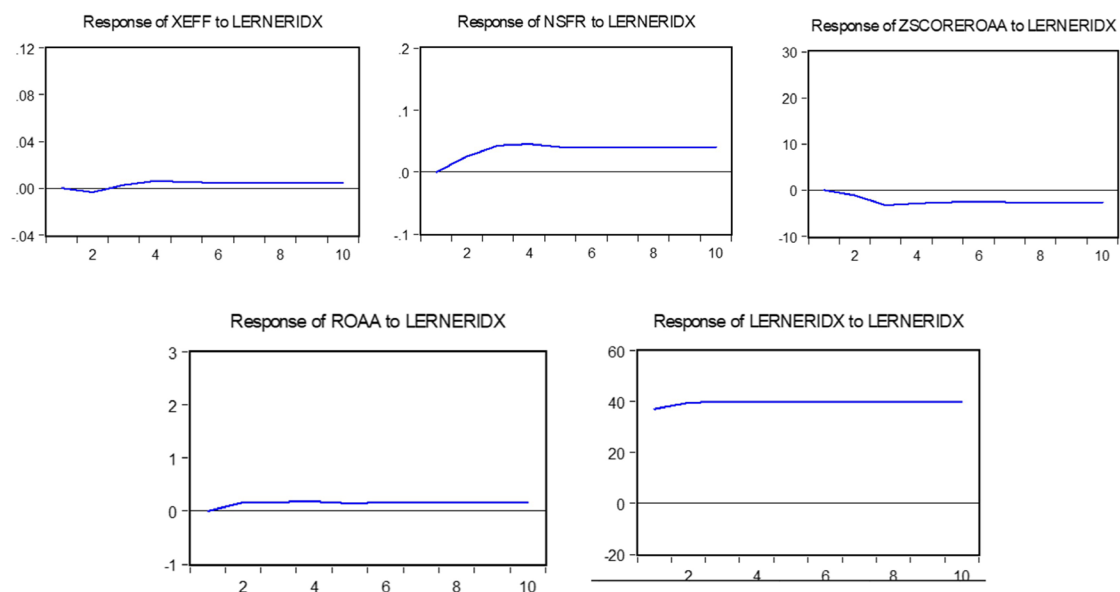
Variable	Response of Lerner Index	Response of XEFF	Response of NSFR	Response of Z-Score	Response ROA
Lerner Index Shock/Innovation	Positive and permanent, becoming stable from Period 2	Positive and permanent, becoming stable from Period 6	Positive and permanent, becoming stable from Period 3	Negative and permanent, becoming stable from Period 24	Positive and permanent, becoming stable from Period 6

Therefore, if the bank would like to improve performance in terms of efficiency, liquidity, and profitability, the bank needs to innovate in market power and reduce competition. However, the shock of market power reduces the financial stability of Islamic banking in Indonesia. In general, this means that competition cannot trigger the increase of the three performance variables of Islamic banking in Indonesia because these variables are enhanced by market power. Meanwhile, the negative response to shock of market power means that a shock of market power stability will decline.

The Response of Financial Performance on Shock/Innovation of Market Power

The response of efficiency (XEFF) on market power (Lerner Index) at the beginning of the period was still at zero, in other words, there had been no response from XEFF to the Lerner Index shock. Furthermore, XEFF began to respond negatively to shock of the Lerner index in period 2 with -0.003 and increased to positive by 0.002 in period 2. Furthermore, XEFF's response to NSFR began to be stable in period 5 with an average of 0.0043 . A positive response of efficiency in the presence of innovation in market power does not support a theory that posits the more competitive banks, the more efficient the bank. This is inconsistent with a phenomenon where competition among banks will make banks work efficiently without the power to determine the prices (Berger, 1995). This finding also contradicts to the quiet life theory where market power will lead to inefficiency because management feels they benefit from market power (Hicks, 1935). Such a banking condition that does not confirm the quiet life paradigm is in contrast to the findings of Koetter & Vins (2008), Asongu (2019), and Coccorese & Misra (2020). This condition will have implications for the welfare of customers because they feel efficient.

Figure 2. Response of Financial Performance to Shock/Innovation of Market Power of Islamic Banking in Indonesia



A shock of market power (Lerner Index) also will be responded positively by liquidity (NSFR). In the 1st period, the NSFR had not responded to the shock of the Lerner Index. However, in the 2nd period, the NSFR began to respond by 0.024 and started to be stable in the 3rd period with an average of 0.041 . Meanwhile, the positive response of liquidity to innovation of market power indicates that increasing market power or decreasing competition will increase the internal security of the availability of funds. This indicates that with an increase in market power (decreased competition), banks will disburse more financing to earn profits (Petersen & Rajan, 1995). In other words, competition will increase the creation of external liquidity. Such a condition is

in line with the price channel theory. This finding is consistent with Fadli et al. (2021) where increasing market power will lead to an increase in internal liquidity security in conventional banking in Indonesia. However, this finding contradicts the studies by Berger & Bouwman (2009), Beck et al. (2013), and Horvath et al. (2016) that found competition will impede the creation of external liquidity but increase the security of internal liquidity.

Profitability (ROA) reported a positive response to the shock of market power (Lerner Index). The response of profitability on (ROA) market power (Lerner Index) at the beginning of the period was zero. In other words, there was no response from ROA to the Lerner Index shock. Furthermore, ROA began to respond positively to the Lerner Index shock in the 2nd period at 0.104 and then increased to 0.114 in the 3rd period and decreased to 0.005 in the 5th period. Furthermore, the ROA response to the Lerner Index began to be stable in the 6th period with an average of 0.081. Meanwhile, the positive response of profitability to innovation of market power indicates that competitive conditions will lead to an increase in the profitability of Islamic banking in Indonesia. The banks under the highly competitive condition will be more efficient that in turn will have higher profitability. This finding is in line with the structure-conduct-performance (SCP) paradigm that suggests profitability of a company is determined by market power (Smirlock, 1985; Berger, 1995). This condition is unfavorable for customers because the interest rates will not be determined by the bank's power under competitive bank conditions. The results of this study are not in line with a study by Naylah & Cahyaningratri (2020) which demonstrated a negative and significant relationship between market power and profitability.

A shock of one standard deviation market power revealed negative response on stability (Z-Score). At the beginning of the period, the response of Z-Score on Lerner Index was still zero. In other words, there was no response from the Z-Score to the Lerner Index shock. Furthermore, the Z-Score began to respond negatively to the Lerner Index shock in the 2nd period with -1.117. In addition, the response of Z-Score to the Lerner Index began to be stable and permanent in the 4th period with an average of -2.695. Meanwhile, financial stability responds negatively to market power shock, which means that financial stability will respond negatively to shock in market power. In other words, if market power increases (competition decreases), financial stability will decrease. This condition is in line with the competition-stability perspective where increased competition can lead to stability through new product innovations, efficiency in financing, and diversification of credit portfolios (Caminal & Matutes, 2002; Boyd & De Nicolo, 2005).

The last, the response of market power (Lerner) on market power (Lerner Index) itself was positive which means shock in Lerner index will result in a positive response on Lerner index itself. Response of Lerner index to Lerner index in the first period was 37.083 and rose to 39.999 in the third period. Afterward, the response of Lerner index started to be stable in responding to the Lerner index shock itself.

CONCLUSION

This study's results conclude that efficiency, liquidity, profitability, and stability in Islamic banking have different responses to the parameters of impulse and decomposition. However, generally, they respond positively to changes or market power shock. Meanwhile, financial stability responded negatively to market power shock. Innovations in the market power of Islamic banking will be responded to positively by efficiency, liquidity, and profitability. The trade-off, in this case, indicates that the Islamic banking industry is faced with a dilemma of whether banks should prioritize stability or competition. While industry stability is needed to improve performance, market power is also necessary to make financial performance improve. Managing the balance between market power and stability at the macro and industrial levels is crucial because it is necessary to maintain Financial System Stability and national economic growth. Therefore, maintaining healthy competition among banks is necessary to ensure a more efficient industry, as mismanagement can lead to market failure. Furthermore, uncontrollable market power can produce collusive behavior that will harm the economy and public welfare.

For this reason, the Financial Service Authority (OJK) has implemented a macro-prudential banking policy that goes hand in hand with strictly efficiency-oriented supervision to optimize bank performance and stability. In Indonesia, the role of the Deposit Insurance Corporation and prudent banking practices under OJK supervision has become crucial. This supervision aims to boost the performance of Islamic banking and support financial system stability. The prevailing competition-stability paradigm also needs to be maintained because the increased competition conditions in the industry tend to increase stability towards a more efficient market. Competitive conditions that increase industrial stability are necessary because Indonesia has implemented the MEA in the banking sector since 2015. All banks in the ASEAN Region, including Indonesia, have more significant opportunities to expand their business scale, but they face a higher threat from increased domestic competition.

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The Impact of Fintech Payment on Bank Fee-Based Income

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Abstract

This study investigates the effect of the growth of financial technology payment on bank fee-based income by studying conventional banks in Indonesia from 2012 to 2019. We employ Random Effect (RE) to estimate our empirical model. Fintech payment is measured by using the log of volume transactions made by fintech payment firms. Our result shows a negative and significant relationship between fintech payment and bank fee-based income. This result indicating that, in general, fintech payment disrupts banks' fee based-income. In particular, we find that fintech is a complement for small commercial banks.

Keywords:

fintech payment; bank fee-based income, Indonesia

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INTRODUCTION

There are two primary income sources of traditional banks, interest income and non-interest income (Ghosh, 2019; Saunders et al., 2020; Smith et al., 2003). Interest income comes from the interest margin banks earn by lending activity, while non-interest income comes from activities that generate fees (Deyoung & Rice, 2004; Markova et al., 2018). Non-interest income activities include service fees, securitization, investment banking, brokerage activities, and trading activities (Saunders et al., 2020).

Banks generally diversify their source of income to reduce risk (Smith et al., 2003). Due to high competition in the banking industry and the advancement of communication and information technology, since 1980, banks have started to move into other activities that generate fees. Since then, non-interest income has generated more revenue for banks than interest-based revenue (Damankah et al., 2015; Rogers & Sinkey, 1999; Saunders et al., 2020; Smith et al., 2003). There is a positive relationship between non-interest income and profitability, which means that the higher the share of non-interest income, the higher its profitability (Saunders, Schmid, and Wolter, 2020). Saunders et al. (2020); and Stiroh (2005) found that the growth of non-interest income shares was higher than the interest income with the most significant increase in fees and other incomes (Stiroh, 2005).

The advancement of information and communication technology in the last decade has driven the financial market into using a financial technology innovation called Financial Technology (Fintech), which has made everything cheaper and more functional (Thakor, 2019). These innovations involve non intermediated transactions, such as peer-to-peer lending, cryptocurrencies, and mobile payments (Frame et al., 2018).

According to Alt et al. (2018), there are four phases of Fintech: first, Fintech in the 1500s – 1860s, this was a period when people did transactions through transferring documents or coins across distance using physical modes of transportation. Second, in Fintech 1860 – 1960, there was a transmission of financial information. People did transactions and payments using analog technologies such as the telegraph. Third, during Fintech 1960 – 2008, traditional financial institutions made use of digital technology. In this phase, people did transactions and payments using electronic banking such as ATMs and online banking. Fourth, from fintech 2008 – present, new entrance provides direct financial services without intermediates to the customer using their new technology.

In the third phase of Fintech, the role of e-banking methods such as ATMs, mobile banking, internet banking, and debit and credit cards increased significantly. People with a bank account have such payment instruments (Schuh & Stavins, 2013). Through these instruments, banks generate a transaction fee. Many banks adopted internet/online banking to reduce costs, increase revenue growth, and customer convenience. A bank that offers internet banking products to their customers has a higher performance because bank income increases through raising transaction fees (Ciciretti et al., 2009; Shahabi & Faezy Razi, 2019). In this phase, fee-based income has a considerable contribution to the bank's profit (Smith et al., 2003).

But recently, in the fourth phase, as the number of smartphone users has increased,

customers who initially were not reached by bank's services can access digital services from their phone, with a richer, value-added experience across the globe (Haddad & Hornuf, 2019). Transactions using Fintech are easier, cheaper, and faster because they eliminate existing intermediaries. Through smartphones, people can perform various types of activities, including financial transactions. This phenomenon has fueled people's excitement over the rapid development of Fintech, which is predicted to threaten traditional business banking (Thakor, 2019). In the fourth phase of Fintech, which started in 2008, new businesses enter the industry by providing new technology and non-intermediary financial services. People were able to make a financial activity without a bank as an intermediary. Fintech payment is one of these innovations.

Thakor (2019) found that payments, clearing, and settlement services are the highest number of fintech service providers, followed by credit, deposit, and capital-raising services. The innovations on payment, clearing, and settlement service, include mobile wallets, peer-to-peer transfers, digital currencies, B2B point of sale, F.X. wholesale, and digital exchange platforms. Haddad and Hornuf (2019) defined "fintech payment as the category payment which entails business models that provide new and innovative payment solutions, such as mobile payment systems, e-wallet, or cryptocurrencies."

The factors of rapid electronic payment growth are digital native expectations as well as the government's desire to boost financial inclusion and reduce the use of cash. They encouraged many fintech innovators to start entering the payment market (PWC, 2016). Mobile payment and mobile banking are two different things (Iman, 2018). Mobile payments are generally related to a universal service provided by service providers other than financial institutions. Contrastingly, mobile banking is a facility offered by a bank with a narrower scope than mobile payment. Another factor that led to mobile payments' rapid growth is the large number of people in the emerging market who do not have a checking account or debit and credit card because money transfer service was expensive. Their transactions are mostly low in value but high in volume, making mobile payment services cheaper. Mobile payment is also considered more convenient because the customer does not have to travel far from home to complete a transaction (Iman, 2018).

According to (Thakor, 2019), Fintech is an innovation in payment systems, including marketplace lending (P2P lending), investment, and insurance. P2P lending is a financial service platform that directly brings together the lender and borrower, without the bank as an intermediary. In December 2019, there were 164 lending platforms in Indonesia listed in OJK, for example, Modalku, Kredit Pintar, Mekar, Kreditpro, and Indodana. Digital wallet is one of the innovations in the payment system which provides safer transactions. This service enables people to make online payments without disclosing debit or credit card details and to make transactions without a bank account. Therefore, this service aims to replace both physical wallets and credit or debit card services. By February 2020, there were 179 payment platforms listed in Bank Indonesia, some of them are GoPay by PT Dompot Anak Bangsa, AtozPay by PT Finnet Indonesia, LinkAja by PT Fintek Karya Nusantara, PaymentGateway, Biller Gateway, mBayar by PT Ez2pay Global Utama, and Dana by PT Espay Debit Indonesia Koe.

Insurtech is a type of Fintech that operates in the insurance sector. One of the insurtech companies in Indonesia is FWD Life, which has adopted technology innovation in its business through FWD Mobile. FWD Mobile is a mobile application that allows people to buy insurance products easier and faster. Fintech in the investment segment included foreign exchange trading, financial advisory, and asset management service. Another type of fintech is the Robo advisor platform that provides digital financial advice with minimal human intervention.

Due to its rapid growth, it is unavoidable that Fintech will take some of the bank's market share. This phenomenon can be observed from how P2P lending in Indonesia has taken the banks' lending market and reduces the bank's interest income. The bank's income also experiences further threats from Fintech payment, which took its market for payment services, reducing its fee-based income. The latest study that examines the impact of fintech firms on the bank's performance concludes that it negatively affects bank's performance with state-owned banks receiving a more substantial effect than private banks (Phan, Dinh Hoang Bach et al., 2019). The current study examines a bank's performance more specifically on its fee-based income because, according to PWC (2016) and Thakor (2019), payment is one of the most likely disrupted areas by Fintech. The payment services fee is the largest source of non-interest income for a bank, which means that when this source of income is disrupted by Fintech payment, the bank faces the threat of losing its largest income source (Deyoung & Rice, 2004; Ozili & Outa, 2019).

The current study is conducted in Indonesia because, according to an eMarketer survey in 2018, Indonesia has the fourth-largest number of smartphone users in the world. The growth of the fintech industry in Indonesia is also considered phenomenal among emerging market countries (Phan et al., 2019). More than 100 million people in Indonesia are active smartphone users. Developed based on Bank Indonesia Statistics, Figures 1 and 2 show that between 2012 and 2017, both the volume and nominal of electronic transactions grow slowly, but in 2018 the growth was significant. Volume and nominal transactions experienced 210% and 300% growth respectively.

METHODS

The current study collected data directly from the target population to provide a more accurate estimation value in investigating the relationship between fintech payment firms and bank's fee-based income. In this research, the target population is all banks in the Indonesian banking industry, excluding the Islamic Bank because it has different characteristics from conventional banks (Beck et al., 2013).

The data were collected from multiple sources, including the Bankfocus database and www.ojk.go.id, which provides a complete balance sheet and income statement data from each bank. Bank-level financial data such as bank's fee-based income and characteristics are computed based on the data acquired from both data sources. www.bi.go.id provides the data on the volume of fintech transactions, and www.bps.go.id provides macroeconomics data, which are used to compute country-level datasets.

Unbalanced panel data on 97 commercial banks for the period between 2012 and 2019, resulting in 776 observations, is generated from the collected data. The financial data is collected from 2012 because fintech payment firms began to prosper in Indonesia then.

We employ the following regression model to investigate the impact of fintech payment on a bank's fee-based income:

$$FEE_{i,t} = \alpha + \beta_1 Log_finvol_t + INEXP_{i,t} + SIZE_{i,t} + LEV_{i,t} + ROA_{i,t} + INF_t + GDP_t + \varepsilon_{i,t}$$

FEE is the bank's fee-based income, the dependent variable in the current study. Following Tennant and Sutherland (2014), the ratio of bank net fee and commission to the total of customer deposits is used as the proxy of the dependent variable.

Fintech payment is the main independent variable in this study. It is defined as payment transactions made through a fintech firm. Following Chen et al. (2020), this variable was measured using the log of a payment transaction made through fintech firms (*Log_finvol*). A negative sign is expected because the fintech payment business was estimated to pose a threat to the bank business. Thus, it was expected to decrease bank fee-based income (Haddad and Hornuf, 2019; Phan et al., 2019; Thakor, 2019).

Country-level data is used to measure fintech transactions. Transactions made through fintech firms are not restricted by time and space since they run their business transactions through the internet. This industry can cover payments across the country. Therefore, a fintech firm located in a big city also has the power to affect the competition and performance at all types of banks (Chen et al., 2020).

Following Chen et al. (2020), the ratio of interest expense to total customer deposits (*INEXP*) is used to identify the financing cost and illustrate how fintech firms have influenced bank's performance.

Bank characteristics and macroeconomic variables are included as the control variables in the regression model. The bank characteristics include bank size, leverage, and profitability. Larger banks are set to gain from the economics of scale, offer more products to their customers, and have more cross-selling opportunities (Naruševičius, 2018; Phan et al., 2019; Rogers and Sinkey, 1999). Therefore, larger banks tend to offer lower deposit rates and charge higher retail fees than smaller banks (Tennant and Sutherland, 2014). Larger banks also more readily adopt new technologies (Rogers and Sinkey, 1999). Banks with larger assets have better technology that can increase service revenue and employ more specialized human resources than smaller banks. Bank size is expected to have a positive relationship with fee-based income. Following Ozili and Outa (2019); Phan et al. (2019); Trinugroho et al. (2018), total assets are used as the proxy of bank size.

Banks with high capital can absorb any negative shocks. It also has the resources to provide an incentive for its shareholders to monitor management activities, which lowers managers' probability of taking an excessive risk (Ahamed, 2017). Banks tend to be riskier if they hold a lower equity level in their asset-liability portfolio (Ghosh, 2019). Financial leverage (*LEV*) is expected to have a positive relationship with bank

profitability. This study used the Equity to Total Assets Ratio to control the degree of financial leverage.

In a highly competitive environment, banks have more diversification in their revenue (Trinugroho et al., 2018). The banking industry has never limited itself to the earning interest margin, and it has moved to increase non-interest income (Deyoung and Rice, 2004). Profitability is expected to have a positive sign on bank fee-based income. Following Chen et al. (2020), Return on Average Asset (ROA) is used as the proxy of bank profitability in this study.

For macroeconomic variables, inflation (INF) and Gross Domestic Product (GDP) are included in the model. According to Ghosh (2019), real GDP growth controls macroeconomic fluctuations and the overall performance of the economy. According to Naruševičius (2018), in a study regarding the determinants of bank profitability in Lithuania, there is a significant relationship between bank fee income and macroeconomic variables in the long term. A high level of inflation is expected to impact bank's interest revenues adversely and are more likely to increase bank's fee-based income (Tennant and Sutherland, 2014). The current study used Indonesia's Annual Inflation Rate to measure inflation and Annual GDP Growth as the measure of GDP (Phan et al., 2019).

RESULTS AND DISCUSSION

Table 1 summarized the descriptive statistics of the variables in the study. The mean value of fee-based income is 0.0107719, which shows that the total customer deposit fee-based income is 1.08%.

Table 1. Descriptive Statistics on Bank-Level Variables

VARIABLE	OBS	MEAN	STD. DEV.	MIN	MAX
FEE	657	0.0107719	0.0817251	1.97E-07	2.079292
INEXP	659	0.0665995	0.1599762	0.003207	3.958224
SIZE	765	23.56223	1.598368	1.598368	27.97939
LEV	669	15.44211	7.992568	-0.21	86.208
ROAA	714	1.233854	1.715581	-12.28423	4.656807

The generated panel data is analyzed using the panel regression method. Hausman Test is conducted to select the regression method that gives the most consistent and efficient estimation. Table 3 summarizes the result of the Hausman Test. The Prob>chi2 value is 0.4442, which is greater than 0.05 and indicates that Random Effect is the best regression method. In the baseline model, this study investigates whether fintech payment firms' development affects the fee-based income of banks. The empirical results are presented in Table 2.

The data in Table 2 suggest that fintech payment firms measured by fintech payment transaction volume negatively affect the bank's fee-based income (significance level of

10%). This finding is consistent with Christensen's (1997) disruptive theory, which explains that the disruptive innovation formed in a niche market may appear unattractive to industry incumbents, but eventually, the new product completely redefines the industry. It is also consistent with Haddad and Hornuf (2019); Phan et al. (2019); and Thakor (2019), who found that Fintech negatively affects bank income.

The regression result in Table 2 also shows the analysis results conducted after the data were split between BUKU 1, BUKU 2, BUKU 3, and BUKU 4. The empirical results show that fintech payment has a negative effect on banks' fee-based income in BUKU 2, BUKU 3, and BUKU 4, regardless of whether it is significant. This is consistent with the previous analysis result. The effect is not significant because 82% of fintech payment firms claim that they have difficulty penetrating the rural areas in Java and the region outside Java. The biggest challenge is the basic infrastructure problem, low financial literacy, and limited capital (AFTECH, 2018). However, a positive impact is observed in BUKU 1 banks' fee-based income, which is significant at a 10% level. This result means that fintech payment creates synergies with BUKU 1, especially in generating fee-based income.

Table 2. Baseline Regression

Variables	(all banks) fee	(BUKU 1) fee	(BUKU 2) fee	(BUKU 3) fee	(BUKU 4) Fee
log_finvol	-0.000382* (0.000218)	0.000576* (0.000317)	-0.000323 (0.000310)	-0.000988 (0.000638)	-0.000381 (0.000926)
inexp	0.0544*** (0.00119)	0.0531*** (0.000861)	0.0426*** (0.00988)	-0.0826* (0.0451)	-0.291*** (0.0854)
size	0.00258*** (0.000420)	0.000834* (0.000451)	0.00257*** (0.000943)	0.00645*** (0.00248)	0.000754 (0.00170)
lev	0.000123*** (4.07e-05)	0.000220*** (5.63e-05)	0.000177*** (6.19e-05)	-0.000545** (0.000222)	0.00101** (0.000413)
roa	0.000386** (0.000156)	0.000385** (0.000150)	0.000613*** (0.000199)	0.000354 (0.000759)	-0.00175 (0.00130)
gdp	-0.000159 (0.0114)	-0.0160 (0.0146)	0.0136 (0.0164)	-0.0488* (0.0288)	-0.0382 (0.0383)
inf	0.000132 (0.000120)	0.000112 (0.000162)	9.71e-05 (0.000159)	0.000314 (0.000307)	0.000419 (0.000452)
Constant	-0.0522*** (0.00934)	-0.0339*** (0.0114)	-0.0545** (0.0213)	-0.116** (0.0569)	-0.000628 (0.0402)
Observations	644	158	292	153	40
Number of Code	96	43	65	28	7

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In table 2, SIZE, LEV, and ROAA variables, under most circumstances, have a positive and significant effect at a 1% significance level for both SIZE and LEV and a 5% level for ROAA. Naruševičius (2018) also found a similar result of SIZE. It implies that bank fee-based income increased with growth in assets. The increased shares of equity increase the fee-based income. ROAA has a positive and significant effect at a 5% and 1% significance level only in BUKU 1 and BUKU 2 respectively. It implies that bank fee-based income increased with the growth in profitability.

The GDP coefficient reports a negative sign, while the inflation coefficient reports a positive sign, but both GDP and inflation have a non-significant effect. Ozili and Outa (2019) also find a similar result. This result implies that bank fee-based income in Indonesia does not exhibit significant cyclical behavior in response to changing economic conditions.

Damankah et al., 2015 found that non-interest income has heterogeneous compositions. The income consists of income generated from trust activities, service charges on deposit accounts, trading revenue, other fee income, and other interest income. Fees and commissions are the main components of this type of income, with approximately 55% of the total non-interest income.

According to Feldman and Anggeler (1998), fees earned from non-loan product services such as issuing money orders, selling insurance products, and servicing loans, contributed 40% to the total non-interest income. Besides, service fees on saving accounts and the use of ATMs contributed 26% to the total non-interest income.

Radecki (1999) analyzed the sources of bank revenue derived from transaction services. He defined transaction service as all customer support and transfer capabilities provided to a transaction account owner, which is considered a part of the service. This service is valid for the actual transfer, to clear and settle a personal check, to meet a cash withdrawal, card transactions, and web-based transactions. The study found that revenue derived from payment service has a substantial amount, accounting for between one-third and two-fifths of the combined operating revenue in twenty-five largest Bank Holding Companies. This finding indicates that payment services have a considerable contribution to the bank's total revenue.

In the third phase of Fintech in 1960 – 2008, financial services mainly became a digital industry by relying on electronic transactions between financial institutions, financial market participants, and customers worldwide (Alt et al., 2018). Banks also started to develop I.T. systems that enabled electronic interfaces to the customer such as ATMs and online banking. The role of e-banking tools significantly increased, including bank cards used in e-business to identify the owner and his/her bank account (Markova et al., 2018). The card serves as an instrument to access a bank account and as an instrument of withdrawal, payment, settlement, and fund transfer.

According to Markova et al. (2018), bank card service operation may increase the bank's fee income. It would allow the banks to achieve a competitive advantage, ensure the development of customer sentries approach, encourage banks to build a personalized customer service model, and increase customer loyalty to the bank. Shahabi & Faezy

Razi (2019) found a positive relationship between investment in e-banking and online customers, which caused transaction fees to rise and the bank income to increase. The expansion of e-banking can reduce physical and associated costs because of the increase in the number of traditional customers who use electronic banking services. Finally, the increasing income and cost reduction have increased bank profitability.

Fee-based income has a substantial and growing portion in the banking industry (Radecki, 1999). Subsequently, transactions made with fintech payments have increased in demand (Phan et al., 2019). This increase has led to the impressive growth of fintech payment transactions in Indonesia (Phan et al., 2019). Formal banking reached 40% of the population of emerging markets, while mobile phone penetration reached 90% (PWC, 2016). It means that 60% of people in the world are unbanked. Technology has transformed branch banking to electronic banking and then mobile payment to reach the unbanked populations (PWC, 2016). Based on the CEB insight statistic, mobile money incurred a considerably lower cost of serving customers than electronic banking, supporting its rapid development.

Mobile payments provide convenient, cashless, and cardless payment methods, so both credit and debit cards are no longer needed. Omarini (2018) classified mobile payment into three categories based on the purpose of use: (a) Mobile remote payment is a service that enables customers to pay for their e-commerce transactions and is performed independently by the mobile phone's location; (b) Mobile proximity payment is a service that allows customers to make payments to an offline merchant directly through their smartphone. This type of payment replaced card transactions; (c) Mobile P2P (Person to Person) and Mobile P2B (Person to Business). These payments allow people to make money transfers directly between two users and/or between merchants and customers.

Mobile money is an alternative payment tool for bank services, which has outstripped bank accounts in several emerging countries in terms of market penetration (PWC, 2016). The rapid growth of smartphones has driven merchants to replace their Electronic Data Capture (EDC) with tablets linked to the Mobile Point of Sale (POS) device (PWC, 2016). Integrating a mobile POS device is much cheaper and easier than integrating a traditional payment terminal. The market payment system has changed, triggered by the rapid growth of e-commerce coupled with the integration between e-commerce and mobile technology. Payment in the marketplace could be completed using an e-wallet. In the five-force theory, Porter stated that the number and power of substitution products might influence firm profitability. Fintech firms provide services that can substitute banking services. Therefore, the industry will affect bank profitability.

Following Chen et al. (2020), cost of fund (INEXP) is employed to detect the potential mechanism. Fintech payment influences bank business mainly through bank's customer deposits. The rapid growth of fintech payment has reduced bank's customer deposits (Chen et al., 2020). In the full banks in column 1, the fintech payment transaction has a significant positive effect on the banks' fee-based income, but there is a different effect on the small bank (BUKU 1 and BUKU 2) and large bank (BUKU 3 and BUKU 4). Fintech payment has a positive and significant effect at a 1% level

on the small bank, which is consistent with the previous analysis result that there is a positive impact between fintech payment and a small bank. It is also compatible with the previous analysis result that there is a synergy between fintech payment firms and small banks. However, fintech payment also has a negative and significant effect at the 10% and 1% significance levels on the large bank (BUKU 3 and BUKU 4). This result implies that the share of large bank's customer deposits has reduced, they have to raise their interest rate to attract depositors, thus the interest rate has increased.

CONCLUSION

According to our empirical results, several conclusions can be drawn. First, there is a direct effect of fintech payment on Indonesian bank's fee-based income. The result is negatively significant. In general, Fintech disrupts the banks' fee-based income. In particular, Fintech is a complement for banks in BUKU 1. The impact of fintech payment is negative but not significant for BUKU 2, BUKU 3, and BUKU 4. Second, there is a direct effect of fintech payment on bank customer deposits. The result was different between small and large banks. Fintech payment has a significant and positive impact on small banks but a significant and negative impact on large banks.

There is a different impact of fintech payment firms between small and large banks. However, they can create a mutual symbiosis through creating fintech-bank collaboration. Small banks need to increase their share of fee-based income to reduce their risk, while large banks' disadvantages come from interest. Fintech payment firms need to increase their brand awareness to increase market penetration, which requires a large investment, but most do not have the scale yet. Collaboration between fintech payment firms and small banks could expand fintech payment firms' market reach and increase bank fee-based income. By entering fintech-bank collaboration, banks will get additional profit from the fintech business. In return, fintech payment firms will obtain financial resources, infrastructures, access to customers, and a security reputation from banks. This study's limitation is that it does not include rural banks in the research subject, as they are smaller than BUKU 1. We suggest that future research further investigates rural banks as research subjects, aiming to examine the direct effect of fintech payment on rural banks' fee-based income.

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Does Economic Growth Mediate Investment, Inflation, and Human Development Investment on Poverty in Indonesia?

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Abstract

Poverty is a classic yet interesting topic of discussion because the problem of poverty has not been solved. This study analyzed the role of economic growth in mediating the effects of investment, inflation, and Human Development Investment (HDI) on poverty in Indonesia. Using the multiple regression method of path analysis and the data from 32 provinces in Indonesia, the results showed that investment had a positive effect on economic growth and poverty, but inflation had no effect on economic growth and poverty while HDI had a positive effect on economic growth but a negative effect on poverty. Economic growth mediated the effect of investment and HDI, but not the effect of inflation on poverty. Hence, it can be said that it is not enough for the government to only prioritize economic growth, optimal investment, a higher level of HDI, and a stable inflation rate. They must also strive to reduce inequality between regions, support labour-intensive, well-targeted and direct investments in the real sector, and involve all stakeholders to achieve an effective and efficient national development in the context of poverty reduction.

Keywords:

Economic growth, Investment, Inflation, HDI, Poverty, Mediation

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INTRODUCTION

Poverty is a classic, complex, and multidimensional problem in the development process which is still a tough task for the government to solve. Poverty in a certain period can increase, and it might trigger income inequality, leading to high crime rates and social gaps. The negative effects of poverty should not be allowed to drag on because it can cause various social, economic and even political turmoils that can threaten the stability of domestic security.

Figure 1 The Number of People Living in Poverty in each Province of Indonesia in 2012-2020 (in thousand)

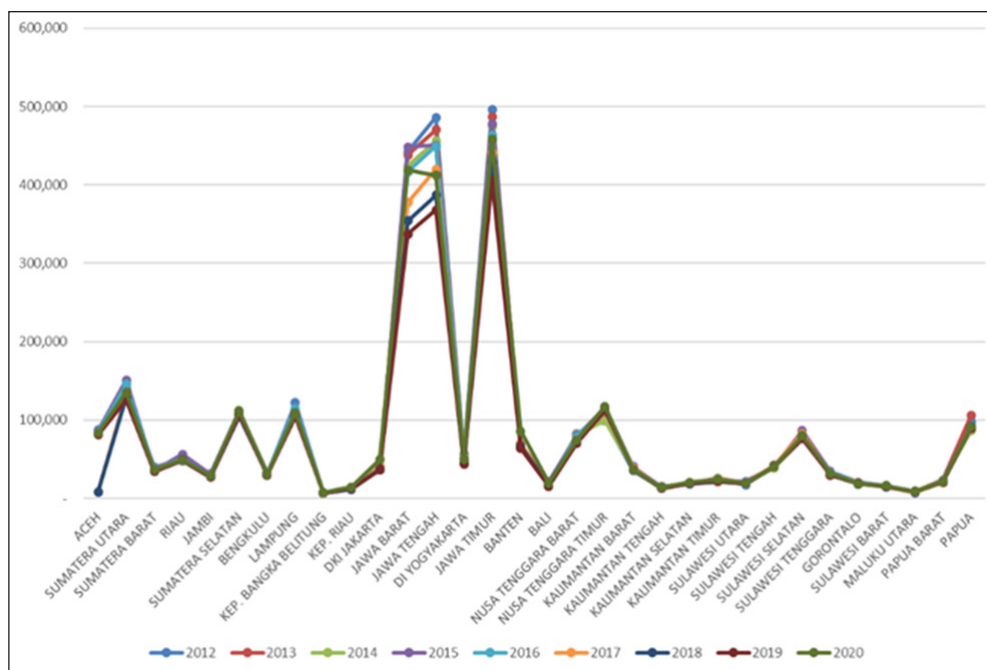
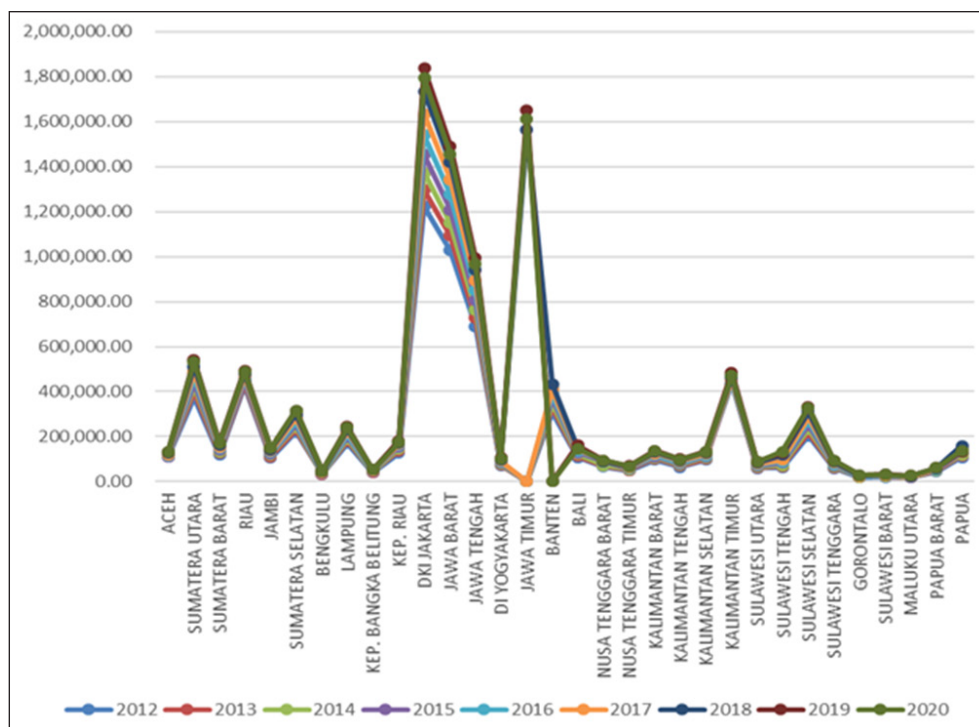


Figure 1 shows the number of people living in poverty in each province of Indonesia, except for the Province of North Kalimantan which was only established in 2012 and the Province of Maluku which did not have supporting data. The provinces that had the highest number of poor people are East Java, West Java and Central Java. The number of people living in poverty in those provinces was directly proportional to the total number of people living in the provinces. Meanwhile, the province with the least number of poor people was Bangka Belitung Province. This was also influenced by the total number of people living in the province.

One type of development that is a priority for the government in accelerating poverty reduction is economic development. Economic development carried out in Indonesia aims to accelerate the pace of economic growth and increase per capita income. Advances in science and technology as a means of accelerating development will improve people's welfare and the quality of human resources and reduce inequality and unemployment. Reducing disparities and equalizing the distribution of people's income are part of the economic growth targets.

The gross domestic product is the universal standard measure of a country's economic growth (GDP). GDP is a measure of an economy's total output of goods and services (Williams & Turton, 2014). Differences in the economic growth rates among regions can be influenced by geographical conditions, natural and human resources, government spending, regional original revenue, and other economic activities in each of these regions (Pratama et al, 2020). Economic growth is an important factor illustrating people's income and regional growth as measured by the indicator of Gross Regional Domestic Product (GRDP) per capita. The GRDP at current prices is used to determine the strength of economic resources, economic changes, and The GRDP at constant prices is used to calculate the real economic growth from year to year or the economic growth that is not influenced by price factors.

Figure 2 GRDP by Expenditure in Constant Prices in each Province of Indonesia from 2012 to 2020 (in Billion Rupiah)



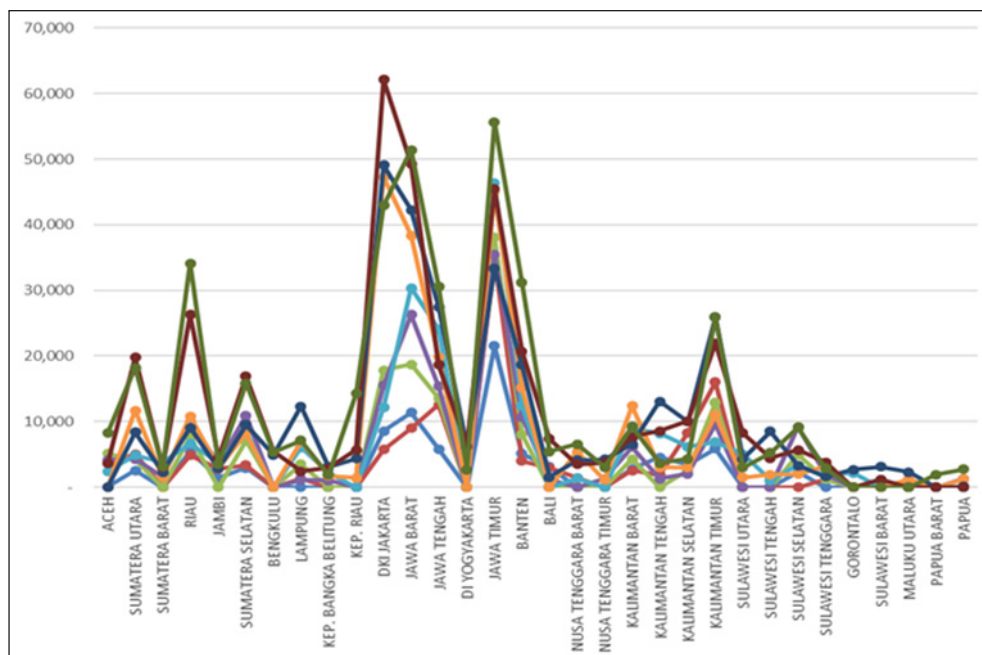
In Figure 2, it can be seen that out of the 32 provinces during the period of observation of 2012-2020, the largest GRDP by Expenditure in Constant Prices was found in three provinces consistently from year to year, namely Jakarta, East Java, and West Java while the provinces with the lowest GRDP by Expenditure in Constant Prices were North Maluku, Gorontalo and West Sulawesi. An interesting phenomenon was discovered. If a comparison is made between the GRDP data in Figure 2 and the poverty data in Figure 1, it can be seen that some provinces such as East Java and West Java that had the highest GRDP values also had the highest number of poor people. This is to the theory of "trade-off between growth and equity" which states that higher economic growth can result in greater inequality in the income distribution,

and vice versa. The efforts made to achieve equity can be realized in low economic growth (Todaro, 2000).

The sources of economic growth consist of enhancing the quality and number of workers, increasing capital through savings and investment, and improving technology (Mustika, 2009). Investment is strongly linked to economic growth and poverty alleviation (Ocaya et al, 2012). Almost all economists stress the significance of investment as a key factor and determinant of economic growth. Investment reflects effective demand on the one hand, and the ability of supplies to create production efficiencies for future production on the other (Munzir et al, 2017).

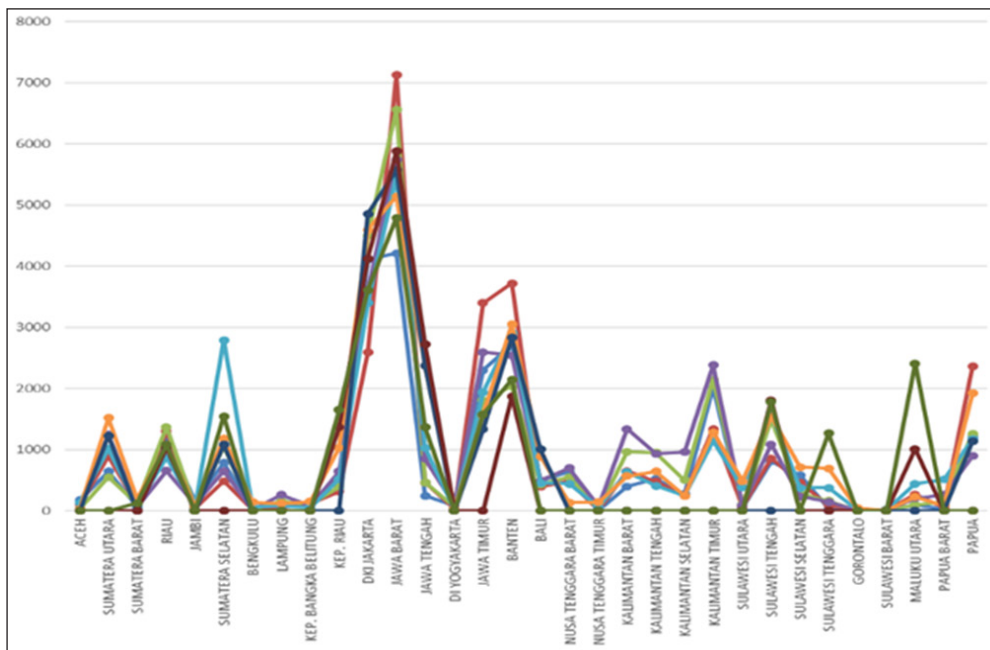
Figure 3 shows the domestic investment realization in 32 provinces from 2012 to 2020. The highest domestic investment realization from year to year was found in East Java, West Java and Jakarta while the lowest was in West Sulawesi, North Maluku and West Papua.

**Figure 3 Domestic Investment Realization in each Province of Indonesia from 2012 to 2020
(in Billion Rupiah)**



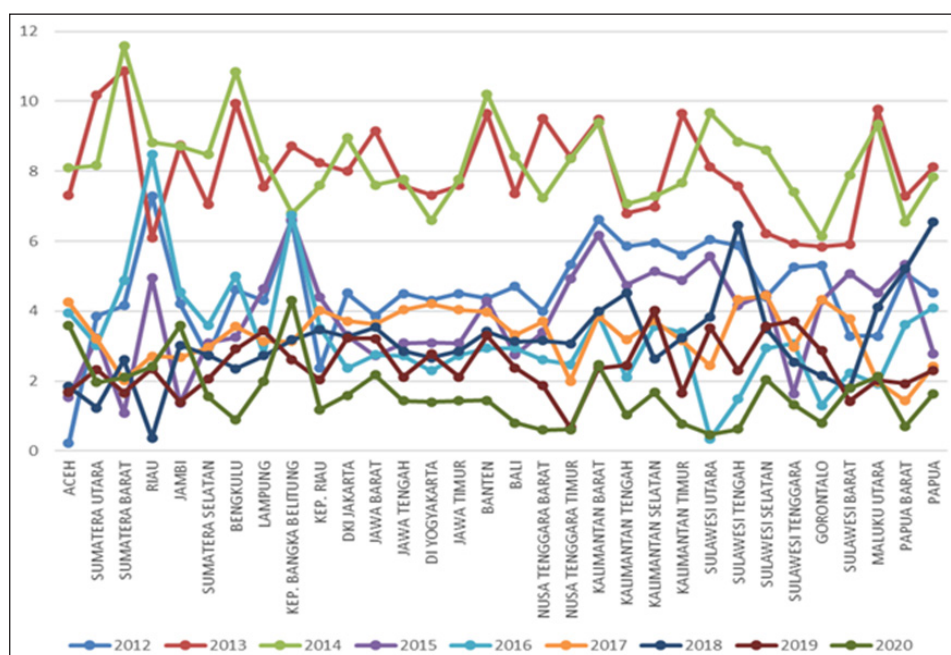
The foreign investment realization in 32 provinces from 2012 to 2020 can be seen in Figure 4. The highest foreign investment realization from year to year was found in Jakarta and West Java, while the lowest was found in West Sulawesi, Yogyakarta and West Papua. Similar to the phenomenon of the relationship between GRDP and poverty, the investment data, both the domestic and foreign investment presented in Figures 3 and 4 explain that several provinces with high domestic and foreign investment rates also had a relatively high number of people living in poverty. This might happen because the investments made were more devoted to the infrastructure sector that was not crowd-sourcing and used high technology or hi-tech so it was not optimal in absorbing human resources as a productive workforce.

Figure 4 Foreign Investment Realization in each Province of Indonesia from 2012 to 2020
(in US\$ Million)



Depending on the inflation rate, the effects of inflation on people's economies can be either positive or negative. The inflation rate should not be kept as low as possible because, in the economic systems of society, it is necessary to increase prices sometimes. Increasing the prices for goods and services will encourage people to engage in production activities, thereby stimulating the economy to increase national production activities (Suriani and Asra, 2014).

Figure 5 Annual Inflation Rate of each Province of Indonesia from 2012 to 2020 (in percent)

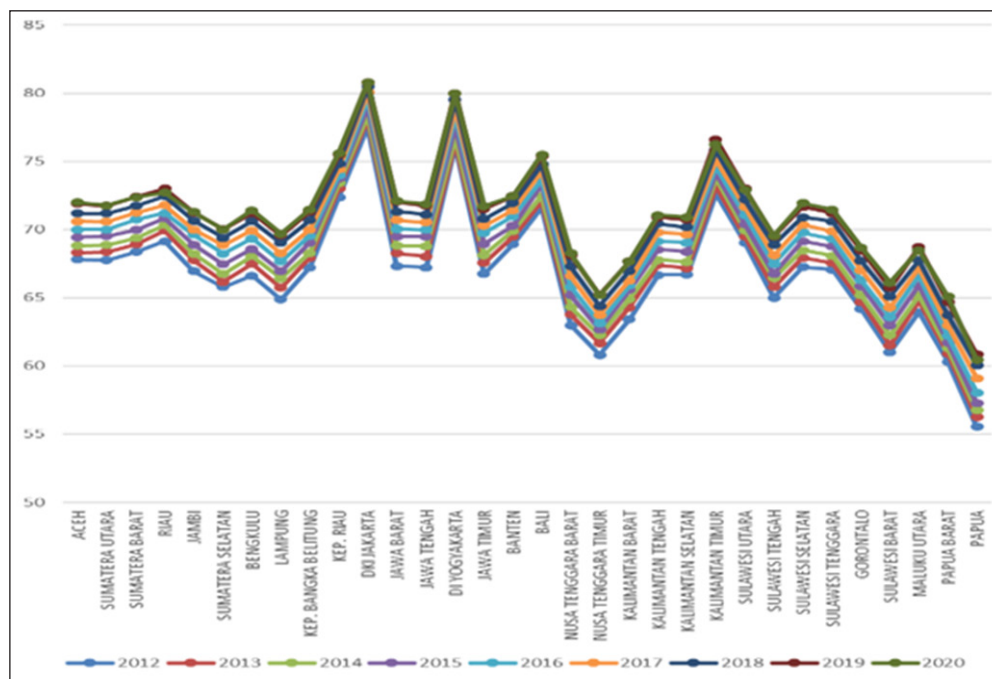


In 2020, the province with the highest annual inflation rate was Bangka Belitung with 4.31 percent, followed by Aceh with 3.59 percent and Jambi with 3.58 percent while the lowest inflation rate occurred in North Sulawesi with 0.47 percent, followed by West Nusa Tenggara with 0.6 percent and East Nusa Tenggara with 0.61 percent. Meanwhile, in 2013 and 2014 there were quite high inflation rates both in Indonesia as a whole and in most of the provinces in Indonesia. The phenomenon was caused by the rising fuel costs which had an impact on rising basic needs prices.

The success of a development program in a region, besides its income, can also be seen through the indicator of human development. The HDI values show the quality of human resources in an area. During the last 10 years, the trend of Indonesia's HDI has been increasing, and since 2016, Indonesia's HDI level has been classified as a high category. In 2020, the United Nations Development Programme (UNDP) officially released an HDI rank using the same assessment indicators as BPS, and Indonesia was ranked 107th out of the analyzed 189 countries. The index obtained by Indonesia was 0.718.

In Figure 6, Jakarta Province as the State Capital of the Republic of Indonesia consistently has the highest HDI level in Indonesia, and in second place is Yogyakarta Province, which is nicknamed the Student City or Book City. On the other hand, Papua Province consistently has the lowest HDI level, followed by its neighbouring province which was legally created as a province in 1999, West Papua, which is followed by East Nusa Tenggara Province.

Figure 6 HDI Level of each Province of Indonesia from 2012 to 2020 (in percent)



Low poverty rate, stable inflation, and high HDI level and economic growth rate are some of the important indicators to achieve successful development of a region

when it is supported by a high investment rate. The high investment rate will become a strong stimulus in achieving a high economic growth rate and is also expected to reduce poverty in Indonesia. The result of research conducted by Chani et al. (2011) showed that economic growth and investment rates significantly reduced poverty, while inflation and open trade Pakistan's poverty has increased as a result. Many studies on poverty have been carried out using various independent variables. However, there were very few studies that used intervening or mediating variables, especially the studies that used an economic growth rate as a mediating variable.

The author views research on macroeconomic variables on economic growth and poverty as a very interesting topic to discuss. Although many previous researchers both from within and from outside the country with various methods and variables have tried to analyze how the influence occurs between the variables such as those conducted by Ahmad & Riaz (2012), Ogunniyi and Igberi (2014), Ibrahim (2016), Akisik et al. (2020), Akhmad et al. (2018) and Aprina et al. (2021). Several previous poverty studies were also conducted by Mahfuzah et al. (2020), Suriani et al. (2020), Wintara et al (2021), and Fitriady et al. (2022) related households poverty, socio-economic and demographic, inequality, and macroeconomics variables by using the ARDL, Panel, and Panel Cointegration model.

This study has several contributions. First, the author has found a research gap where the results of several studies with the same variables turned out to be different. The gap was interesting to review. Second, there are two estimators namely Ordinary Least Square (OLS) and Generalized Least Square (GLS) used in this study to compare the results of both regressions and to display the data that are by factual or actual conditions. Third, the author uses the approach of Sobel test path analysis to see the mediating or indirect effects of the studied macroeconomic variables which to the knowledge of the researcher, have rarely been studied by previous researchers. Fourth, the research locus used is usually only the district/city level, while the author uses the secondary data from the provincial level.

The goals of this study were to examine the effects of domestic and foreign investment, inflation and HDI on economic growth in Indonesia, to analyze the effects of domestic and foreign investment, inflation and HDI on poverty in Indonesia, to analyze the effects of economic growth on poverty in Indonesia, and to analyze the role of economic growth in mediating the effect of investment, inflation and HDI on poverty in Indonesia. Based on the previously mentioned objectives, the following are the significances that can be obtained through this research. The first is that the research should have theoretical significance in the field of science, which can be a reference and additional information in the future for further in-depth research. The other one, the practical significance, is that the research can expectably contribute to the policy-making in overcoming the classic problem, namely poverty, in Indonesia by providing an overview of the impacts of investment, inflation and HDI either directly or through indicators of economic growth on poverty in Indonesia.

METHODS

The cross-sectional data in this study covers 32 provinces in Indonesia except for North Kalimantan and Maluku Provinces due to the absence of supporting data with the time series data of 9 years, from 2012 to 2020. The endogenous or dependent variable in this study is poverty while domestic investment, foreign investment, inflation and HDI are the exogenous or independent variables, and economic growth is the intervening or mediating variable. The data collected in this study were the secondary data obtained from the Central Statistics Agency (BPS) of each of the 34 provinces in Indonesia, the Investment Coordinating Board (BKPM), Bank Indonesia and other relevant agencies as well as from various other sources and literature related to this research.

In detail, the information used in this study included the data of poverty using the number of poor people in thousands, the data of economic growth using GRDP data at constant prices in 2010 according to the expenditures in billions of Rupiah, the data investment using combined data of realization of domestic and foreign investments in billions of Rupiah, the data of inflation using annual inflation data in percent, and the data of HDI in index units. To determine the role of economic growth in mediating the effects of domestic and foreign investment, inflation and HDI on poverty in Indonesia, it was analyzed using path analysis based on multiple panel regression models. A multiple regression model is a statistical tool used to determine the effects or relationship between two or more independent variables ($X_1, X_2, \dots, X_n$) and the dependent variable (Y), as well as the direction of the relationship between the independent and dependent variables (Silvia, 2020).

Based on theory and previous research findings, it could be estimated that the factors that could influence poverty in Indonesia included investment, inflation, HDI and economic growth which in this case could be seen from the GRDP. The influence could be seen either directly or indirectly by using the mediating variable. The variables of domestic and foreign investments, inflation and HDI showed direct effects on economic growth and poverty. The effect of mediation was the relationship between the variables of investment, inflation and HDI on poverty through economic growth. The relationship between these variables can be explained in Figure 7.

The generalized multiple linear regression model can be written as follows (Kutner et al, 2004):

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + e_i$$

In this study, there were three models of panel data regression equations carried out to obtain parameter coefficients, namely:

$$\text{Model 1 : } EG_{it} = \alpha_{1it} + \beta_{11} INV_{it} + \beta_{12} INF_{it} + \beta_{13} HDI_{it} + e_1$$

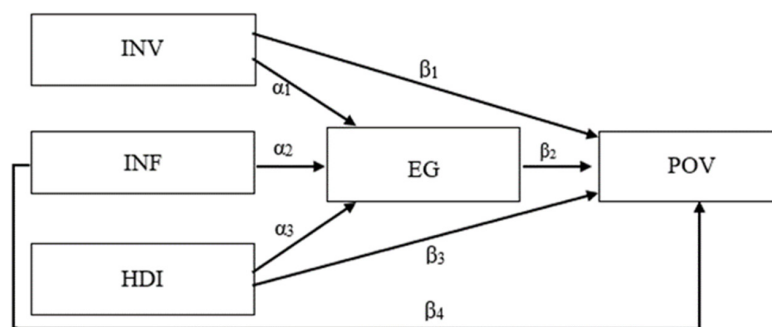
$$\text{Model 2 : } POV_{it} = \alpha_{2it} + \beta_{21} INV_{it} + \beta_{22} INF_{it} + \beta_{23} HDI_{it} + e_2$$

$$\text{Model 3 : } POV_{it} = \alpha_{3it} + \beta_{31} EG_{it} + e_3$$

Where EG_{it} is Economic Growth (of i -Province and t -Time), POV_{it} is Poverty (of i -Province and t -Time), $1it, 2it, 3it$ is Constanta, $\beta_{11}, \beta_{12}, \beta_{13}, \beta_{21}, \beta_{22}, \beta_{23}, \beta_{31}$ is Regression

Coefficient, INVit is Investment (of i-Province and t-Time), INFit is Inflation (of i-Province and t-Time), HDLit is HDI (of i-Province and t-Time), and e_1, e_2, e_3 is Error term. When performing panel data regression, the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) must first be chosen (REM). The Chow test is used to see if a model is CEM or FEM. CEM is the null hypothesis, and FEM is the alternative hypothesis. If REM is accepted, the Hausman test is used to select a model from FEM or REM. FEM is the alternative hypothesis, while REM is the null hypothesis. The Lagrange multiplier test is used to determine whether to use the CEM or REM model. The null hypothesis is CEM, and the alternative hypothesis is REM.

Figure 7 Path Analysis Model



RESULT AND DISCUSSION

Table 1 shows the test result of selecting the best model on panel data which was carried out through the Chow and Hausman tests. The results of the Chow test indicated that the P-value in equation model 1 was 0.000 so that the P-value < alpha 5 percent or 0.000 < 0.05. This showed that H_0 was rejected and H_a was accepted so the model chosen was the Fixed Effect Model (FEM). The Hausman test result showed the P-value < alpha 5 percent, that is 0.000 < 0.05 so that H_0 was rejected so that the chosen one in model 1 was FEM.

Table 1. Best Model Selection Test

Model	Probabilities			Selection Model
	Chow test	Hausman test	Breusch pagan LM test	
Model 1	136.891*** (0.0000)	89.254*** (0.0000)	-	FEM
Model 2	496.553*** (0.0000)	36.319*** (0.0000)	-	FEM
Model 3	533.254*** (0.0000)	64.495*** (0.0000)	-	FEM

Furthermore, in model equation 2 and model equation 3, the results of the Chow test obtained a P value < alpha 5 percent, which was 0.000 < 0.05, and the Hausman test also

obtained a P value < alpha 5 percent, which was $0.000 < 0.05$ so that the model 2 and model 3 also used FEM. For this reason, the Breusch Pagan Lagrange Multiplier test was no longer needed because the previous test results on the three models obtained the same value in both the Chow and Hausman tests so the model chosen was the FEM model.

According to the test results in Table 2, using the Ordinary Least Squares (OLS) estimator there was a violation of the classical assumptions, but it could be corrected by using the Generalized Least Square (GLS) estimator which has met the requirements in the classic assumptions. The OLS on panels could still be used but was less efficient. To correct these assumptions, the researcher has presented a comparison of estimations of FEM and GLS.

According to Beasley (2008), GLS can be used to solve cross-analysis problems with residuals between correlating equations. Meanwhile, according to Setyawan et al. (2019), OLS is the most commonly used method for estimating linear regression parameters. However, heteroscedasticity issues are frequently encountered in OLS, such as the error variance that is not constant but varies for all values of the independent variables.

Because of this, the OLS method is less effective. To overcome this, another parameter estimation method, the GLS method, can be used by adding weight to each parameter. According to Ekananda (2016), the GLS method can maintain an unbiased and consistent estimator. GLS can overcome the problem of heteroscedasticity, making it more effective and efficient than the OLS method in some cases (Greene, 2018).

Table 2. Classic Assumption Test Result

	Model 1	Model 2	Model 3
Normality	398.8*** (0.0000)	545.7*** (0.0000)	494.9*** (0.0000)
Heteroscedastisity	59909.05*** (0.0000)	55773.88*** (0.0000)	6900000*** (0.0000)
Autocorrelation	1.747,458*** (0.0000)	1.652,301*** (0.0000)	1.345,454*** (0.0000)

Tables 3 to 5 compare the results obtained between the FEM and GLS models for the three tested equations. The use of the GLS estimator was to meet the requirements of the classical assumption because the FEM model that uses the OLS estimator violates the classical assumptions on the heteroscedasticity and autocorrelation tests. Therefore, the value to analyze was the value generated by the GLS estimator while the FEM value was used to compare the values between the two estimator models used in this study.

In Table 3, the P value for the investment variable is smaller than the 1 percent significance level. This shows that investment had a significant effect on economic growth in terms of GRDP. The investment variable shows a P-value < 0.01 with a coefficient value of 13.44 meaning that the accumulation of domestic and foreign investment had a significant and positive effect on economic growth. When there is an increase in investment of 1 percent, then the economic growth increases by 13.44 percent *ceteris paribus*.

Table 3 First Equation Panel Data Regression Results (EG)

Variable	FEM	P. Value	GLS	P.Value
Investment	3.663***	0.000	13.44***	0.000
Inflation	-518.294	0.726	7118.584	0.104
HDI	11289.31***	0.000	10590.65***	0.000
Constanta	-554443.2	0.003	-726187.3***	0.000
R ²	0.799			
Adj R ²	0.797			
F-statistics	375.599		1142.64	
Prob (f statistics)	0.000		0.000	

At the same time, the independent variables had a significant impact on economic growth. The P value for the inflation variable was greater than the 1 percent significance level, so it did not affect economic growth. As for the HDI variable, because the P-value < 0.01, it indicated that HDI had a significant effect on economic growth. If there is an increase in HDI by 1 point, then economic growth will increase by 10 billion rupiahs. The value of the coefficient of determination (R²) was 0.799, so it could be interpreted that the independent variable in this model was able to explain the variation of changes in investment, inflation, and HDI variables by 79.90 percent, while the remaining 20.10 percent was associated with other factors outside the model.

Table 4. Second Equation Panel Data Regression Results (POV)

Variable	FEM	P. Value	GLS	P.Value
Investment	-0.253***	0.005	3.163***	0.000
Inflation	-629.371	0.114	-729.431	0.739
HDI	-2427.713***	0.001	-7252.257***	0.000
Constanta	-259202.1	0.000	527951.6	0.000
R ²	0.413			
Adj R ²	0.406			
F-statistics	66.485		202.26	
Prob (f statistics)	0.000		0.000	

In Table 4, the P value for the investment variable is smaller than the 1 percent significance level. This shows that investment also had a significant effect on poverty. The investment variable obtained a P-value < 0.01 with a coefficient value of 3.163 meaning the accumulation of domestic investment and foreign investment had a significant and positive effect on poverty. When there is an increase in investment of 1 percent, poverty will increase by 3,163 percent ceteris paribus. If the result of the investment variable in the GLS estimator is positive, it is inversely proportional to the FEM estimator where it is seen that the role of investment has a negative and significant effect on poverty.

Therefore, in these two results, there has been a considerable bias while the variables of inflation and HDI have had a consistent direction.

Simultaneously, the independent variables had a significant effect on poverty. The P-value for the inflation variable was greater than 1 percent significance so it did not affect poverty. As for the HDI variable, due to the P-value < 0.01, it was indicated that the HDI had a significant and negative effect on poverty meaning that if the HDI value increases, the poverty rate decreases. The value of the coefficient of determination (R^2) obtained was 0.413 so it could be interpreted that the independent variables in this model were able to explain the variations of changes in the poverty variable by 41.30 percent, while the remaining 58.70 percent could be explained by other factors outside the model.

In Table 5, the P value for the economic growth is smaller than the 1 percent significance level. This shows that economic growth has shown a significant effect on poverty. The economic growth variable has a P-value < 0.01 with a coefficient value of 0.203, meaning that the economic growth has indicated a significant and positive effect on poverty. It means that if the economic growth increases by 1 percent, poverty will also increase by 0.203 percent *ceteris paribus*.

Table 5 Third Equation Panel Data Regression Results (POV)

Variable	FEM	P. Value	GLS	P. Value
Pov	-0.104***	0.000	0.203***	0.000
Constanta	114335.7	0.000	23905.38	0.000
R^2	0.48			
Adj. R^2	0.479			
F-statistics	264.462		266.31	
Prob (f statistics)	0.000		0.000	

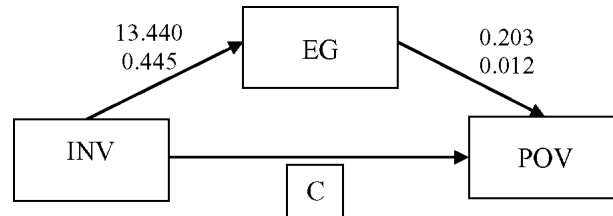
The estimation results of FEM and GLS on the economic growth variable did not show any consistency. The result of the FEM estimator showed a negative effect while the GLS estimator showed a positive impact. The value of the coefficient of determination (R^2) was 0.48, so it could be interpreted that the independent variables in this model were able to explain the variations of changes in the poverty variable by 48 percent, while the remaining 52 percent was explained by other factors outside the model.

Table 6. Economic Growth Mediation on Poverty

EG Mediation	Sobel stat	P-value
INV à	14.759	0,000
INF à	1.619	0,105
HDI à	3.904	0,000

The results of the Sobel test in this study can be divided into three models as shown in Table 6 and the details of this mediation are shown in Figures 8 to 10 which explain the roles of the economic growth variable in mediating the effects of investment, inflation, and HDI on poverty in Indonesia.

Figure 8. Investation Variable Path Analysis Model



In Figure 8, the first mediation was to see the extent of the roles of the economic growth variable in mediating the effects of investment on poverty in Indonesia. The results of the Sobel test showed a value of 14,759 with a P-value of 0.000 which is smaller than the 0.05 significance level, which means that economic growth significantly mediated the effects of investment, both domestic and foreign investment, on poverty in Indonesia.

Figure 9. Inflation Variable Path Analysis Model

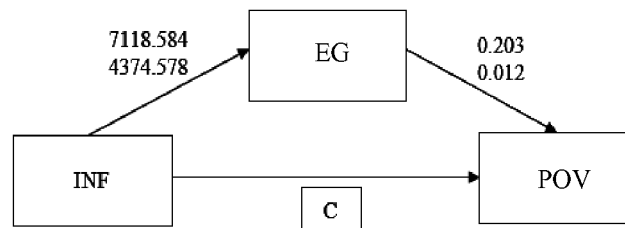


Figure 9 shows the second mediation was to determine how far the roles of the economic growth variable in mediating the effect of inflation on poverty in Indonesia. The Sobel test result showed a value of 1.619 with a P value of 0.105 which is greater than the 0.05 significance level. It means that economic growth did not mediate the effect of inflation on poverty in Indonesia.

Figure 10. HDI Variable Path Analysis Model

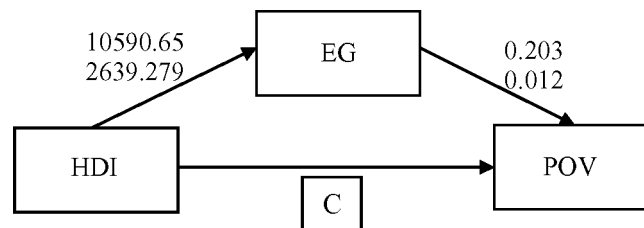


Figure 10 shows the third mediation was to see how far the role of the economic growth variable in mediating the influence of HDI on poverty in Indonesia. The Sobel

test result obtained a value of 3.904 with a P-value of 0.000 which is smaller than the 0.05 significance level, which means that economic growth significantly mediated the effect of HDI on poverty in Indonesia.

As previously explained, in the first equation, the investment variable obtained a P-value < 0.05 with a coefficient value of 13.44 which indicated that the accumulation of domestic and foreign investment had a significant and positive effect on economic growth seen from the GRDP. This result is by the theory described in the Harrod-Domar Model which was adopted from the Keynesian Theory regarding economic growth states that more savings and investments increase the economy.

This result is also consistent with the findings of the research conducted by Arshanti (2015), Ibrahim (2016) in Somalia, Akisik et al. (2020) in Africa and Aprina et al. (2021) in Indonesia. However, only foreign direct investments had a significant effect on economic growth while the effect of domestic investments was not significant in Indonesia. Various policies can be made by the government as an effort to increase investment rates including providing tax incentives, credit assistance and guarantees, strengthening a special task force for foreign investment, maintaining socio-political stability and security, as well as facilitating the process of applying for business permits accompanied by investment-friendly regulations and bureaucracy. By doing so, it is hoped that the role of investment can be optimized along with reconstructing labor-intensive investments as well as forging strategic and mutually beneficial partnerships with business actors, including MSMEs.

In addition, the P value for the inflation variable found was greater than the 5 percent significance level so inflation did not affect economic growth. But theoretically, The Keynesian Theory explains the relationship between inflation and economic growth. This finding is supported by research conducted by Aydin et al. (2016) and Lisani et al. (2020), which discovered that high inflation rates reduce economic growth and increase unemployment. Another study, conducted by Ferreira et al. (2010), discovered that proper inflation management resulted in a reduction in poverty in Brazil between 1985 and 2004.

To keep the inflation rates stable, apart from fiscal and monetary policies, other policies can be considered by the government, such as increasing production output, stabilizing people's incomes and encouraging people to use domestic products, prohibiting the hoarding of goods commonly carried out by traders, setting maximum prices, focusing on financing or credit facilities to MSMEs, and facilitating access to the entry of certain imported goods even though some imported goods need to be limited by increasing taxes.

As for the HDI variable, because the P-value was <0.05, it was indicated that it significantly had a positive effect on economic growth. This result is from the research conducted by Manzoor et al. (2021) in Pakistan and Lestari et al. (2021) that concluded that HDI had a positive effect on economic growth. The trend of increasing HDI from year to year measured with the dimensions of health, education and welfare must continue to be maintained with a positive consistency. HDI is also one of the variables that determine the amount of the General Allocation Fund given by the central government to the regions to reduce inequality in regional financing needs that this will motivate

local governments and related stakeholders to work together to improve the quality and quantity of macroeconomic and microeconomic variables. including HDI values.

In the second equation, the investment variable obtained a P-value of <0.05 with a coefficient value of 3.163 indicating that the accumulation of domestic and foreign investment significantly had a positive impact on poverty. This fact is interesting because theoretically when investment increases it has an impact on reducing poverty, but the regression result from the tested variables revealed a different condition where investment showed no impact on poverty reduction. This result is following the research conducted by Ali and Nishat (2009) in Pakistan, Ogunniyi and Igberi (2014) in Nigeria, Bharadwaj (2014) and Huang et al. (2010) that found that FDI inflows had a negative impact on poverty.

However, there are also several other studies whose results were in line with the theory, such as research conducted by Gohou and Soumare (2012) in Africa, Suwandi (2016) and Pateda et al. (2019). Targeted investments are needed, especially in the real and labor-intensive sectors. In addition to targeting the development of inter-regional liaison infrastructure so that connectivity can occur and production costs can be reduced, investment should also involve various stakeholders including the private sector and the community to work together to create a conducive investment climate. This is expected to attract foreign and domestic investors to create new job opportunities so that the poverty and unemployment rates will gradually decrease significantly.

The P-value for the inflation variable was found to be greater than the 5 percent significance level so inflation did not affect poverty. This is under the results obtained by Ahmad & Riaz (2012) in Pakistan which stated that inflation did not affect poverty. The research by Fujii (2013) also discovered that the impact of food inflation in the Philippines indirectly increased the number of poor people through food consumption, and Dako et al (2022) state that controlled inflation might generally reduce poverty. In addition, a study conducted by Cuong (2011) in Vietnam discovered that high inflation and economic stagnation have hampered poverty reduction, and Bittencourt et al. (2015) also found similar results in South Africa. The relationship between inflation and poverty can be directly explained through the changes in people's purchasing power. When inflation increases due to an increase in the prices of goods, public consumption will decrease.

A high inflation rate will raise the poverty threshold which causes an increase in the poverty rate while, conversely, a low inflation rate will prevent the poverty threshold from increasing so that it has the potential to reduce poverty. As a result, maintaining inflation stability is one of the most important factors in reducing poverty and unemployment.

As for the HDI variable, because the P-value was <0.05 , it was indicated that HDI significantly influenced poverty. This finding was consistent with the findings of Segoro (2016), who discovered that high-quality human resources reduce poverty, as well as Martinez et al (2019) which discovered that the increase in HDI through increasing human resources was one concrete effort to reduce unemployment and poverty.

The elements that make up the HDI value are closely related to the level of community productivity. If a community has good health and adequate education, the

community productivity will increase. The allocation of spending for consumption will also increase, and the poverty rate will decrease.

In the third equation, the P-value for the variable of economic growth obtained was smaller than the 5 percent significance level. It indicated that the economic growth variable had a significant and positive effect on poverty. These results are not in line with previous theories and research conducted by Niguyen and Pham in Vietnam (2018), Ruch and Geyer Jr in South Africa (2018) and Kouadio and Gakpa in West Africa (2022). However, this is similar to the results of research conducted by Mindayanti et al. (2021), as well as Perera and Lee (2013) who discovered new evidence that Asian economic growth is accompanied by an increase in relative poverty or income inequality. According to Mulok et al. (2012), economic growth is necessary but not sufficient for poverty reduction, particularly if the goal is rapid and sustained poverty reduction. High income inequality can slow poverty alleviation while also causing social unrest and anxiety, while Sukmawati (2018) finds that economic growth does not affect poverty reduction at all.

One of the primary goals of development is economic growth. However, this is insufficient to ensure that the community's well-being will increase evenly. As a result, the rate of economic growth must be accompanied by an equitable distribution of incomes, ensuring that the positive effects of economic growth benefit all levels of society.

According to the results of the path analysis, the first mediation to see how far the role of economic growth through GRDP in mediating the effects of investment on poverty in Indonesia found that the GRDP significantly mediated the effects of both domestic and foreign investments on poverty in Indonesia. The direct effect of the increasing investment rates was the rise of poverty and economic growth rates. However, by looking at the indirect effect of the relationship between investment and poverty through economic growth, the problem was that economic growth that increased caused poverty to also increase. For this reason, to mediate the economic growth to have a good impact on the relationship between investment and poverty, the economic growth to be pursued must be quality, effective and efficient by the strategic plans for poverty reduction.

The second mediation was to see how far the role of economic growth, particularly the GRDP in mediating the effect of inflation on poverty in Indonesia. The P-value obtained was 0.105, which was greater than the 0.05 significance level, meaning that the GRDP did not mediate the effect of inflation on poverty in Indonesia. Inflation had no direct or indirect effect on economic growth and poverty although, in theory, inflation is one of the macro variables that must be maintained consistently to maintain economic stability.

The third mediation was to see how far the role of economic growth, the GRDP in this case, in mediating the influence of HDI on poverty in Indonesia. The results of the Sobel test showed a value of 3,904 with a P-value of 0.000 which was smaller than the 0.05 significance level and indicated that GRDP significantly mediated the effect of HDI on poverty in Indonesia. The direct effect of the high HDI was the decreasing poverty rate and the increasing economic growth. However, by looking at the indirect effect of the HDI relationship with poverty through economic growth, it was found that economic

growth had no effect on reducing poverty, and that was a problem. Therefore, to have good mediating effects on the relationship between HDI and poverty, economic growth should be inclusive, comprehensive and proportional. It should be able to encourage the sectors that absorb a lot of labor, such as the agricultural and plantation sectors, revitalise the manufacturing industry, expand labour-intensive investments, create new economic growth centres outside Java Island, and build the main infrastructure needed by the community, especially in villages and isolated areas.

CONCLUSION

The results of the analysis of the direct effects of investment, inflation, and HDI on economic growth have discovered that the investment variable had a positive effect, that the inflation variable had no effect, and that HDI had a positive and significant effect. For the direct influence of the investment, inflation, and HDI variables on poverty, it was shown that investment had a positive effect, inflation had no effect, and HDI had a negative effect. Meanwhile, the direct effect of the economic growth variable on poverty showed that the economic growth variable showed a positive effect on poverty. While the indirect or mediating effect indicated that economic growth significantly mediated the effect of investment HDI on poverty, economic growth did not mediate the effect of inflation on poverty in Indonesia.

Several policies can be made by the government to reduce poverty, increase economic growth, maintain inflation stability, increase domestic and foreign investment rates and achieve an optimal HDI value. The policies can be in the forms of equitably distributing economic development, preparing infrastructure and superstructure, including human resources, especially in the areas that have potential but have not been fully utilized while promoting this potential both to external and domestic parties, involving local governments, private parties and local communities in formulating and implementing strategic development plans.

In addition, maintaining the availability and price stability of basic commodities by monitoring and periodically evaluating developments and the existing situation, providing public facilities such as education and health that can be reached by all levels of society in terms of both location and price, creating job opportunities that can recruit productive workforce, strengthening the home industry economy or MSMEs, and maximizing the use of domestically produced goods and services will also be helpful.

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Countries	2010	2015
ASEAN Countries		
Indonesia	5,814 (71)	5,54 (71)
Malaysia	6,608 (36)	6,62 (36)
Thailand	6,436 (42)	5,96 (50)
Filipina	6,403(44)	5,71 (63)
Singapura	7,719 (11)	8,00 (6)
Vietnam	6,080 (61)	5,64 (68)

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