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Contents

Determinant of Capital Efficiency and Its Impact on Economic Growth: Empirical Evidence in East Java

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Abstract

East Java is the engine of Indonesia's economic growth. Nevertheless, this region is still faced with the performance of industrial development, which has yet to increase consistently, thereby worsening efficiency and economic growth. As a result, this paper aims to investigate the causes and consequences of capital efficiency in the context of East Java. This paper produces three results by employing the 3SLS simultaneous equation estimation method. First, this paper demonstrates that industrial development in East Java improves efficiency. Second, improving the education level has a positive effect on capital efficiency. Lastly, an increase in capital inefficiency leads to a negative effect on economic growth in East Java. This study suggests three key policies for accelerating economic growth in East Java: providing incentives to industries that can increase capital efficiency, developing innovations to increase capital efficiency, and improving education quality to encourage increased human resource productivity.

Keywords:

capital efficiency; industrialization; economic growth

INTRODUCTION

Capital-Output Ratio (COR) is considered an important indicator in measuring production efficiency in the economy (Billings et al., 2021; Coutiño & Zandi, 2021; Franke, 2017; Taguchi & Lowhachai, 2014). Theoretically, the lower this ratio, the more efficient the economy is in using capital to produce output. If this ratio is high, it means that the economy is less efficient in using capital to produce output, which can indicate inefficiencies in resource management and indications of other structural problems in the economy. Examining the COR can provide an overview of the level of production efficiency and identify problems that may exist in the economy so that action can be taken to address them.

The neoclassical school of thought states that industrial development can improve COR values because industry generally has a higher level of productivity than other sectors (Hallward-Driemeier & Nayyar, 2017). Industrial development can increase productivity by improving equipment, technology, and workforce quality (Doherty & Stephens, 2021; Fuchs, 2014; Rodrik, 2013; Su & Yao, 2017). It can increase efficiency and productivity in the production process, thereby increasing output per unit of invested capital. Thus, industrial development is able to improve the COR, which shows the ratio between the capital invested and the output produced.

Figure 1. Economic Growth and Industrial Development in East Java
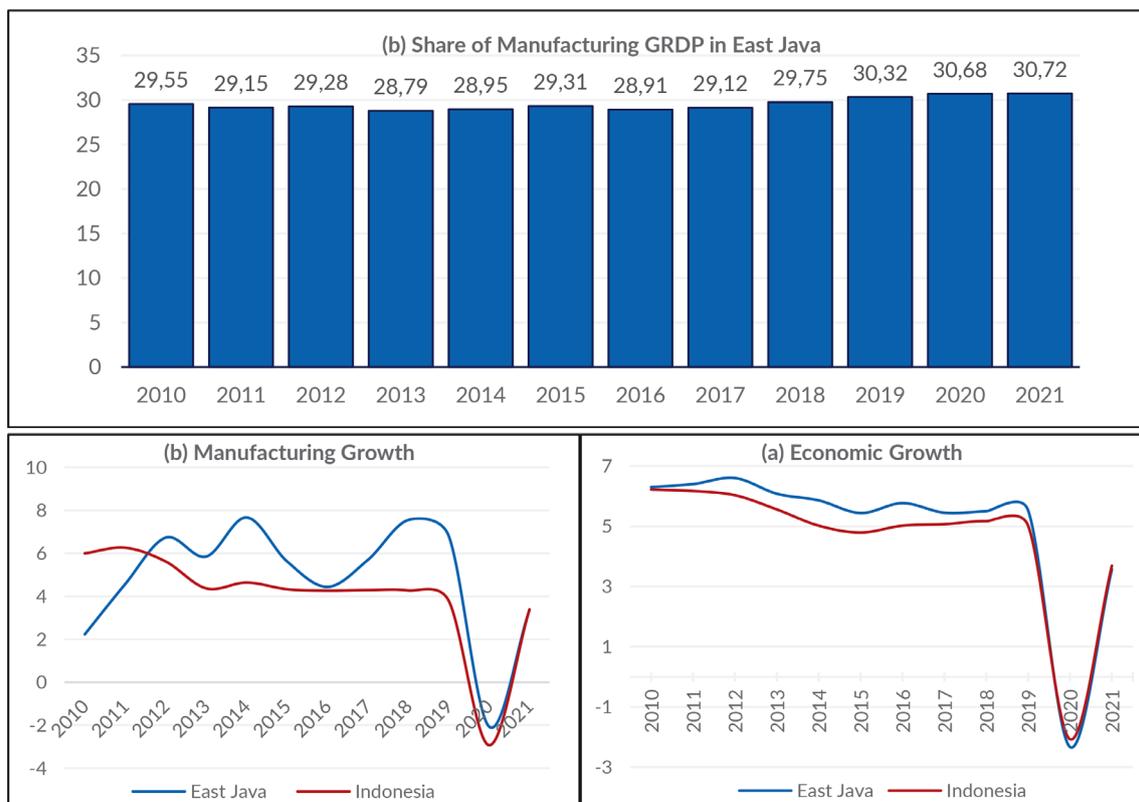
Source: (a) Indonesian Central Bureau of Statistics (2022); (b) East Java Central Bureau of Statistics, 2022); (c) (East Java Central Bureau of Statistics, 2022a).

East Java is an industrial-based area, and industrial development should be able to improve capital efficiency while accelerating economic growth in East Java. Even though East Java's industrial growth tends to be higher than the national one, its economic growth tends to experience a faster decline than the national one. Figure 1 explains that East Java can be said to be an industrial area with a growth rate that tends to slow down. For this reason, this paper aims to identify the determinants of efficiency and estimate how significant the impact of efficiency is on economic growth in East Java.

Most of the previous studies state that the level of efficiency is considered an exogenous variable, as in the study of Ikhsan (2007), Margono et al. (2011), Kurniawan & Managi (2018), and Musyawwiri & Üngör (2019). On the contrary, the approach of this study is different, where the level of capital efficiency is considered an endogenous variable. It is one of the latest from the study of efficiency. Consequently, this study develops a simultaneous analysis model consisting of two equations: (i) equations about the factors that influence the level of inefficiency in the use of capital; and (ii) the equation regarding the impact of inefficient use of capital on economic growth. Both equations are estimated using the Three Stage Least Square (3SLS) method. This approach will be explained in more depth in the Methods section. In addition, the update from this study results is to include the impact of the Covid-19 pandemic on per capita income growth, which of course has not been done much.

METHODS

This study generally discusses capital efficiency in 38 districts/cities of East Java $\{i = 1.2.3.....38\}$ in 2019 and 2021 $\{t = 2019.2021\}$, with two main objectives: i) to analyze the factors that determine the level of efficiency in East Java and ii) to estimate the impact of the efficiency level on economic growth in East Java.

The model built to answer the first research objective can be expressed in the following equation:

$$COR_{it} = \alpha_0 + \alpha_1 IND\_GRO_{it} + \alpha_2 EDU_{it} + \alpha_4 ROAD_{it} + \mu_{it} \qquad (1)$$

Where: the level of capital inefficiency is measured by *COR* is an endogenous variable that is influenced by the growth of the processing industry (*IND_GRO*); the education index calculated from the average length of schooling and expected length of schooling (*EDU*); the ratio of good and very good road availability to the area (*ROAD*).

Theoretically, the growth of the manufacturing industry can improve capital inefficiency because the industrial sector can apply the most efficient technology in capital utilization compared to other sectors in economic activity (Rodrik, 2013). Development of human resources through increasing access to quality education can improve capital efficiency because most of the workforce involved in economic activity is a highly skilled workforce, so technology adoption and transfer of knowledge can be done easily (Dinerstein et al., 2022; Lentini & Gimenez, 2019; Vollrath, 2014). The provision of public goods proxied by the availability of steady roads can also increase capital efficiency.

This infrastructure can reduce transportation and logistics costs borne by the business world, both in the mobility of production factors and final demand. (Álvarez et al., 2016; Arbués et al., 2015; Deng, 2013; Laborda & Sotelsek, 2019; Melo et al., 2013). Providing stable roads is considered necessary in reducing transportation and logistics costs because most of the mobilization of goods and services in East Java still relies on land transportation modes.

The estimation results in equation 1 are then substituted in equation 2 to answer the second research objective, which is to determine the magnitude of the impact of capital inefficiency on economic growth. The equation developed is as follows:

$$G\_Cap_{it} = \beta_0 + \beta_1 COR_{it} + \beta_2 COVID_{it} + e_{it} \qquad (1.2)$$

Where: level of inefficiency (COR) expected to affect the growth of per capita income (G_Cap). In addition to the level of inefficiency, it is assumed that the period during which Covid-19 occurred also affected the growth rate of per capita income ($COVID$). This assumption is based on studies by Olivia et al. (2020), which state that East Java is one of the regions in Indonesia whose economic activity has been most affected by the Covid-19 pandemic, both from the demand side in the form of a decrease in people's purchasing power and the supply side in the form of production restrictions on non-essential sectors.

Furthermore, the Three-Stage Least Square (3SLS) in this study is used to estimate equations 1 and 2 models simultaneously. Compared to another similar approach, Two-Stage Least Square (2SLS), Belsley (1988) states that 3SLS produces asymptotically relatively more efficient estimates by taking into account the error relationship between the equations. Greene (2018) emphasized that 3SLS can also overcome the endogeneity bias often encountered in OLS estimation methods.

RESULT AND DISCUSSION

Before reviewing the estimation results of the 3SLS simultaneous equation, it is necessary to review the reliability of the model developed in this study. The model's reliability can be seen from the Prob>chi2 value, indicating whether all explanatory variables significantly affect the endogenous variables in the 3SLS simultaneous equation. The Prob>chi2 value in the capital inefficiency equation and the GRDP per capita growth equation are 0.0080 and 0.0000, respectively. It indicates that all explanatory variables significantly influence the endogenous variables, with a significance level of 1%. For this reason, the interpretation of the simultaneous equation estimation results can be carried out.

Table 1 shows that industrial growth and educational development tend to improve capital inefficiencies in the East Java economy, while the availability of road infrastructure is not proven to have a strong enough influence on capital inefficiencies. Table 1 also shows that capital inefficiency and the period during which the Covid pandemic occurred tended to worsen East Java's GRDP per capita growth performance.

The explanation of the statistical estimation results in this study can be divided into two parts. *First*, findings regarding the impact of industrial growth, educational development, and road infrastructure provision on East Java's capital inefficiency. Increased industrial growth coupled with efficiency improvements means that industrialization policies in East Java have encouraged the use of technology in the industrial sector that utilizes capital efficiently. Increasing access to education coupled with improving efficiency means that the policy of developing human resources through formal education in East Java has encouraged an increase in skills and transfer of knowledge of the workforce, which has triggered an increase in labor productivity. Meanwhile, the provision of road infrastructure is not proven to have an effect on improving capital efficiency, meaning that regions with access to adequate or inadequate road infrastructure do not have a significant difference in terms of capital efficiency.

Table 1. Determinants of Capital Efficiency and Its Impact on GRDP Per Capita Growth in East Java

Variable	Endogenous Variable	
	Equation 1.1	Equation 1.2
	COR	G_Cap
Industrial Growth, **IND_GRO**	-0.0031**	
	(0.0015)	
Education Index, **EDU**	-0.1777***	
	(0.0648)	
The ratio of good and moderate road quality to area, **ROAD**	-0.0002	
	(0.0003)	
Capital Inefficiency, **COR**		-4.6754*
		(2.1073)
Dummy for the Covid-19 Period, **COVID**		-1.9352***
		(0.4239)
No. Obs	76	76
Chi^2	11.81	21.06
P> Chi^2	0.0080	0.0000

The figures in parentheses indicate the standard error. *, **, *** represent significance at the level of 10%, 5% and 1%, respectively. COR and G_Cap are endogenous variables, while the rest are exogenous variables.
Source: Author's Calculation Results (2023).

Second, findings regarding the impact of capital inefficiency and the period of the Covid pandemic on the growth performance of GRDP per capita in East Java. Increased capital inefficiency can exacerbate the growth performance of GRDP per capita, meaning that with the same level of capital, wasteful use of capital provides a much lower output of economic activity. Meanwhile, the period during which the Covid occurred resulted in a lower per capita GRDP growth performance than the pre-Covid period, indicating that the Covid pandemic has indeed proven to disrupt economic activity both from the aggregate demand and aggregate supply sides.

Based on the results of previous estimates, the discussion of research findings can be divided into two main parts. The first part reviews the determinants of capital efficiency in East Java. Furthermore, the second part explains the impact of capital efficiency on East Java's GRDP per capita growth performance, including the impact of the period of the Covid-19 pandemic.

This study found that industrial development tends to be accompanied by efficiency improvements, which means that the industrialization policies implemented encourage the use of more efficient technologies. The use of more efficient technology in East Java is due to the dominant industrial structure in East Java being the agricultural product-based industrial sector (agro-industry). East Java Central Bureau of Statistics (2022a) noted that more than 80% of East Java's industrial sector is agro-industry. Agro-industry encourages the use of more efficient technology because the growing industrial sector can utilize intermediate inputs originating from the agricultural sector, which incidentally corresponds to the potential of East Java's local resources. In other words, agro-industry that is efficient in capital utilization, on the one hand, increases economic growth and can also increase the added value of the agricultural sector.

This study's results align with research conducted by Otsuka (2021) in the case of Indonesia and Santoso (2015) in the case of East Java, particularly in forest plant commodities. Agro-industry is most likely to be developed as a basis for economic development in developing countries because the agro-industry does not require complex technology compared to other industrial sub-sectors. Hence, adjustments to technology adoption in this sector are easier to make. Simple technology in agro-industry is necessary considering that the workforce that moves to this sector is a workforce that comes from the agricultural sector.

In addition to industrial development, this research finds that human resource development in improving access to formal education tends to be accompanied by increased capital efficiency. These results indicate that improving access to formal education in East Java is followed by increases in labor productivity. A recent study by OECD & Asian Development Bank (2020) confirmed that East Java's education development policy is one of the best practices in Indonesia in developing education that is in line with labor productivity. One example of the most progressive education development policy in East Java is the implementation of a double-track system at Senior High Schools (*Sekolah Menengah Atas/SMA*) and Vocational High Schools (*Sekolah Menengah Kejuruan/SMK*). One of the main objectives of this program is to provide skills to high school/vocational school students so that if they graduate and are forced not to have the opportunity to continue studying at tertiary institutions, these students will have the provision to become independent entrepreneurs or work in their area according to the skills acquired.

In contrast to industrial development and human resources, the provision of road infrastructure has not proven to have an effect on capital efficiency. These results indicate that regions with access to adequate or inadequate road infrastructure do not have significant differences in capital efficiency. The findings of this study are different from the

research conducted by Álvarez et al. (2016), Arbués et al. (2015), Deng (2013), Laborda & Sotelsek (2019), Melo et al. (2013). One plausible explanation is that increasing the availability of steady access roads (good and medium quality) does not necessarily reduce transportation and logistics costs in the movement of goods. An efficient transportation and logistics system requires good coordination between different types of modes, such as road, sea, and air (Agamez-Arias & Moyano-Fuentes, 2017; Li et al., 2023), as well as a warehouse management system and distribution of quality goods (Karagiannis et al., 2022).

Furthermore, this study finds that capital inefficiency tends to exacerbate per capita GRDP growth performance. This result is quite reasonable considering that capital inefficiency means more capital is needed than in the previous period to achieve the same level of economic growth. (Billings et al., 2021; Coutiño & Zandi, 2021; Franke, 2017; Taguchi & Lowhachai, 2014). The need for more capital than before makes the investment cost per unit more expensive. More expensive investment costs will further inhibit investment and, in the end, lower the growth performance of GRDP per capita.

In addition to capital inefficiency, the period of the Covid pandemic also tended to worsen per capita GRDP growth performance. The period where Covid occurred resulted in a lower GDP per capita growth than the pre-Covid period, indicating that the Covid pandemic has indeed proven to disrupt economic activity due to policies restricting social mobility. Olivia et al. (2020) found that East Java's economic activity was disrupted both on the demand and aggregate supply sides. On the demand side, social restrictions due to the pandemic have reduced people's purchasing power as household income has contracted. On the supply side, social restrictions have hampered production expansion, especially in the non-essential sector.

Based on data released by the Indonesian Central Bureau of Statistics (2023), after the Covid-19 pandemic, East Java's economic growth required a high level of resilience. Considering that during the pandemic, the rate of economic contraction in East Java was relatively higher than the national average. Therefore, efforts to increase efficiency in the use of capital are critical in accelerating East Java's economic recovery after the Covid-19 pandemic through three development policy strategies. First, providing incentives to industries that are efficient in the use of capital. Referring to the research results of Otsuka (2021) and Santoso (2015), the agro-industry is an industry that can use capital efficiently. Thus, developing agro-industry in East Java is strategic for strengthening post-pandemic economic resilience. In addition, the accelerated growth of the agro-industry in East Java can provide benefits by increasing the value-added agricultural sector, which still has a prominent role at the national level.

Second, encouraging the growth of innovations that can increase the level of efficiency in the use of capital. Concerning agro-industry development, East Java has a fairly strong agricultural base. The innovations emphasized are innovations in the agricultural sector, especially in the use of agricultural tools and machinery, as well as digitalization. Thus, innovations that occur in the agricultural sector can increase

production efficiency in the agro-industrial sector. Third, strengthening education that can encourage increased productivity. East Java has developed better vocational schools (OECD & Asian Development Bank, 2020). However, this effort needs to be continuously increased, considering that the young population in East Java has considerable potential.

CONCLUSION

This study shows that the efficiency of the use of capital can be increased along with industrialization while increasing the level of education can also increase efficiency. In addition, accelerated growth in per capita income in East Java can be achieved through efforts to increase the efficiency of the use of capital. In this case, the government's success in increasing the efficiency of the use of capital will significantly affect the acceleration of economic resilience in East Java during the post-Covid pandemic period.

Three main policies can be implemented to accelerate per capita income growth in East Java in the post-Covid era. First, providing incentives to industries that are capable of increasing efficiency in the use of capital. Second, encouraging the growth of innovation to increase efficiency in the use of capital. Third, improving the quality of education to encourage increased productivity of human resources.

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Foreign Direct Investment, Abundance of Natural Resources, and Economic Growth

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Abstract

The impact of foreign direct investment (FDI) on the host country's economic growth is often discussed without considering the abundance of natural resources in the host country. The present study examines the relationship between FDI and economic growth while considering the presence of natural resources. Using panel data regression with data from 124 countries, the study finds that FDI inflows are increasing significantly, with pronounced differences between countries based on their per capita income levels. The results of the panel data regression analysis show that both FDI and natural resources positively affect economic growth. However, an increase in natural resources reduces the overall impact of FDI on economic growth. This result suggests that countries should attract FDI in sectors outside of natural resources to maximize the positive effects of FDI on economic growth.

Keywords:

foreign direct investment; natural resources abundance; economic growth; panel data regression

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INTRODUCTION

A country's economic development is measured through its economic growth. A variety of factors can influence a country's economic growth, including capital accumulation (investment in land, equipment, infrastructure, facilities, and human resources), natural resources, human resources, technological progress, access to information, and the desire to innovate and develop (Todaro & Smith, 2006). Governments, in both developed and developing countries, often implement policies to attract foreign direct investment (FDI) to stimulate economic growth. According to the World Trade Organization (WTO), FDI occurs when investors from one country (the home country) acquire assets in another country (the host country) and manage them. FDI is known to have a significant economic impact because it can benefit both the host and home countries (Kayani et al., 2021). Additionally, FDI is considered the most stable and prevalent foreign capital inflow in developing countries (Hobbs et al., 2021).

Foreign direct investment (FDI) can directly influence a recipient country's inflation rate, government spending, and GDP growth rate (Kayani et al., 2021). It is expected to stimulate domestic investment and complement limited savings and investment potential to drive economic growth (Mehic et al., 2013). According to Miao et al. (2021), the impact of FDI on economic growth is also influenced by improvements in institutional quality indicators. Besides, trade openness can promote economic growth through various intermediaries such as technology transfer, FDI attraction, access to foreign exchange, and access to capital equipment for development (Opoku et al., 2019).

According to the United Nations Conference on Trade and Development (UNCTAD) World Investment Report (WIR) in 2022, global foreign direct investment (FDI) flows reached $1.58 trillion in 2021, a 64% increase from the previous year's level of nearly $1 trillion. This return to similar investment levels as in 2019, before the COVID-19 pandemic, was not evenly distributed globally. Investment flows to developed countries grew by 134% in 2021, while developing countries only had a 34% increase. It is worth noting that developed countries were more negatively impacted by the pandemic in 2020 compared to developing countries, suggesting that developed countries are more sensitive to global shocks.

In 2021, global foreign direct investment (FDI) flowed generally improved across all regions of the world. The group of developed countries saw a significant increase, with FDI flows to European and North American countries growing by 171% and 145%, respectively. In the group of developing countries, FDI flows to developing Asian countries increased by 19%, a record high, with a total investment value of $619 billion. FDI drove this increase in flows to East and Southeast Asian countries. In addition, FDI flows also increased by 56% in Latin American and Caribbean countries and more than doubled in African countries. This condition suggests that countries worldwide use FDI as a tool for economic recovery following the COVID-19 pandemic.

In theory, foreign direct investment (FDI) benefits are crucial for the host country's economic growth. Many economists believe that FDI can benefit both the investor's

home country (usually a developed country) and the host country (often a developing country that is rich in natural resources and has cheap and abundant labor). However, FDI can also have negative consequences. For example, it can be used as a way for western industrialized countries to exploit and gain control over developing countries (Yuliani, 2019). According to Ali et al. (2019), FDI may not support the economic growth of developing countries because domestic industries cannot compete with foreign industries that offer low-priced products. Developed countries may only utilize the assets of developing countries to generate profits and use them as a source of production inputs. Developing countries may only serve as a source of cheap raw materials and a place to produce goods with cheap labor. They may also become the largest consumers of products from multinational corporations (MNCs) (Haryadi, 2008). MNCs can be seen as a tool used to strengthen the hegemony of capitalists in developing countries, leading to increasing dependence on MNCs in these countries (Damanhuri, 2010).

Empirically, the impact of foreign direct investment (FDI) on economic growth in both developed and developing countries is still debatable. Many studies have been conducted on this topic, with some finding that FDI can boost economic growth. Meanwhile, others have found no evidence or weak evidence of such an effect. Orji et al. (2021) found that FDI can increase economic growth, and therefore governments should aim at attracting FDI in all sectors, particularly the industrial and service sectors. This result is supported by the findings of Ahmad et al. (2022), who observed that FDI could drive economic growth. Gochero & Boopen (2020) found that FDI in the mining sector can increase economic growth in both the short and long terms. Awunyo-Vitor & Sackey (2018) also found that FDI in the agricultural sector can accelerate economic growth, which is supported by the research of (Chandio et al., 2019), which saw a solid causal relationship between FDI in the agricultural sector and economic growth. However, other studies have found different results. Bouchoucha & Bakari (2019) found that FDI harm short-term and long-term economic growth. Kolisi (2021) found that FDI in the manufacturing sector negatively impacts long-term economic growth, and Meivitawanli (2021) found that FDI negatively impacts economic growth.

Hayat (2018) studied the relationship between foreign direct investment (FDI) and economic growth, as well as the impact of natural resource abundance in the host country on this relationship, using data from 104 countries in the period 1996-2015. The results showed that FDI positively and significantly affects the host country's economic growth. However, the effect of FDI inflows on economic growth changes as the size of the natural resource sector changes. As the size of natural resources increases, the estimated positive impact of FDI inflows on economic growth decreases. A further increase in the size of the natural resource sector leads to a negative effect of FDI on economic growth. Adika (2022) investigated the complementary roles of economic integration, natural resources, and FDI in explaining economic growth in the Southern African Development Community (SADC) region. The study used OLS and IV estimators to control for potential endogeneity. The results showed that regional economic integration significantly increases economic growth in the region. Natural resources and FDI jointly and substantially impact economic growth

in resource-rich countries in the region. Additionally, domestic factors such as gross domestic savings and human capital significantly influence economic growth in the region.

The relationship between natural resource abundance and economic growth has been widely studied. Sachs & Warner (1995) demonstrated that countries with abundant natural resources tend to grow more slowly than countries with scarce natural resources, a phenomenon known as the "natural resource curse." There have also been numerous studies on the effect of natural resources on FDI. Poelhekke & Ploeg (2012) found that abundant natural resource assets positively impact natural resource FDI but negatively impact non-natural resource FDI. Asiedu (2013) also found that natural resources harm FDI and that the resource curse of FDI persists even after controlling for institutional quality and other important determinants of FDI. Bakari & Mabrouki (2017) examined the impact of agricultural exports on economic growth in Southeast Europe and found that agricultural exports are strongly correlated and positively impact economic growth. Zagozina (2014) found similar results in former Soviet Union member countries. According to Barbier (2019), many low- and middle-income countries today rely heavily on exploiting their natural resources for export-oriented commercial and economic activities, particularly exports of primary products such as agricultural raw materials, food, ores, and metal commodities.

There have been many studies on the impact of foreign direct investment (FDI) on economic growth. This study aims to fill in some gaps left by previous research by exploring the effect of FDI on economic growth while considering the factor of natural resource abundance in the host country, which is often overlooked. The strength and novelty of this study lie in its use of a larger data set and a longer period. Additionally, the analysis simulates the effect of total FDI on economic growth under four different conditions of natural resource abundance: 1) no increase in natural resource abundance, 2) natural resource abundance increases by 1%, 3) natural resource abundance increases by its average value, and 4) natural resource abundance doubles or increases by 100%. This condition allows the researchers to analyze how the effect of FDI on economic growth changes with changes in natural resource abundance in the host country.

Given the limited literature on the topic and the background and formulation of the problem, this study aims to examine the effect of foreign direct investment (FDI) on economic growth by considering the factor of natural resource abundance in the host country. The study will analyze the growth of FDI inflows based on the group of countries per capita income levels worldwide. It will also explore the effect of FDI on economic growth while considering the host country's natural resource abundance and several other control variables.

The results of this study are expected to provide useful information for governments of both developed and developing countries as they consider policies related to FDI and natural resources that can increase economic growth. This research is also expected to be a valuable reference for future studies, particularly those focused on the relationship between FDI, natural resource abundance, and economic growth at the global level.

METHODS

The data for this study were obtained from secondary sources, including the World Development Index (WDI) World Bank Database and the Worldwide Governance Indicators (WGI). The data is panel data, comprising time series data from 1996-2020 and a cross-section of 124 countries worldwide. The data used in the study are shown in the table below:

Table 1. Variables, Descriptions, and Data Sources in Research

Variables	Description and Source
Gross Domestic Product (GDP)	The growth rate of real GDP per capita (Economic Growth) (WDI)
Foreign Direct Investment (FDI)	Share of FDI inflows to GDP (WDI)
Natural resource (NR)	Share of natural resource exports to total exports of goods and services (WDI)
Inflation (INF)	Annual CPI growth rate (WDI)
Trade openness (TRADE)	The ratio of exports and imports to GDP (WDI)
Government expenditure (GE)	The ratio of government consumption expenditure to GDP (WDI)
Population growth (POP)	Annual population growth rate (WDI)
Domestic investment (DS)	The ratio of gross domestic savings to GDP (WDI)
Institutional quality (IQUAL)	Level of institutional quality, an average of six different indicators of institutional quality and governance: political stability and absence of violence, voice and accountability, control of corruption, government effectiveness, the rule of law, and regulatory quality (WGI)

The descriptive analysis method was used to answer the first objective of analyzing FDI inflow growth in groups of countries based on their per capita income level. The quantitative methods, including panel data regression analysis, were used to address the second objective of analyzing the effect of FDI on economic growth while considering the host country's natural resource abundance, and several other control variables.

The model used to examine the effect of foreign direct investment (FDI) on economic growth while considering the natural resource abundance factor was based on the research model used by Hayat (2018):

$$GDP_{it} = \alpha + \beta FDI_{it} + \delta NR_{it} + \theta(FDI_{it} * NR_{it}) + \gamma X_{it} + v_{it} \qquad (1)$$

Description:

GDP_{it}: Economic growth; FDI_{it}: Share of FDI inflows to GDP; NR_{it}: Share of natural resource exports to total exports of goods and services; X_{it}: Other exogenous variables as control variables include data on inflation, trade openness, government consumption expenditure, population growth rate, gross domestic savings, and institutional quality; v_{it}: Error term; α: Constant; β, δ, θ: Coefficient; i: Country; t: Year.

RESULTS AND DISCUSSION

The development of FDI and GDP per capita by income group can be seen in Figures 1 and 2. Both FDI inflows and per capita income in each income group have generally trended upwards. While it cannot be directly concluded that higher FDI inflows in a country lead to higher per capita income for its population, there is a significant gap in FDI inflows between groups of countries based on their per capita income levels. Figure 1 shows that FDI inflows have been dominated by high-income countries (HICs) over the past 25 years, with an average of $1,204.21 billion per year. The highest total realization was in 2007 at $2,599.07 billion, and the lowest was in 2018 at $319.95 billion. Meanwhile, FDI inflows in upper-middle-income countries (UMICs) have been relatively stagnant, with an average of $324.59 billion. FDI flows appeared to have gained significant momentum due to the thriving M&A market and rapid growth in international project finance, likely caused by favorable financing conditions and large infrastructure stimulus packages.

Figure 1. FDI Inflows and per Capita Income in the High-Income and Upper-Middle-Income Country Groups, 1996-2020
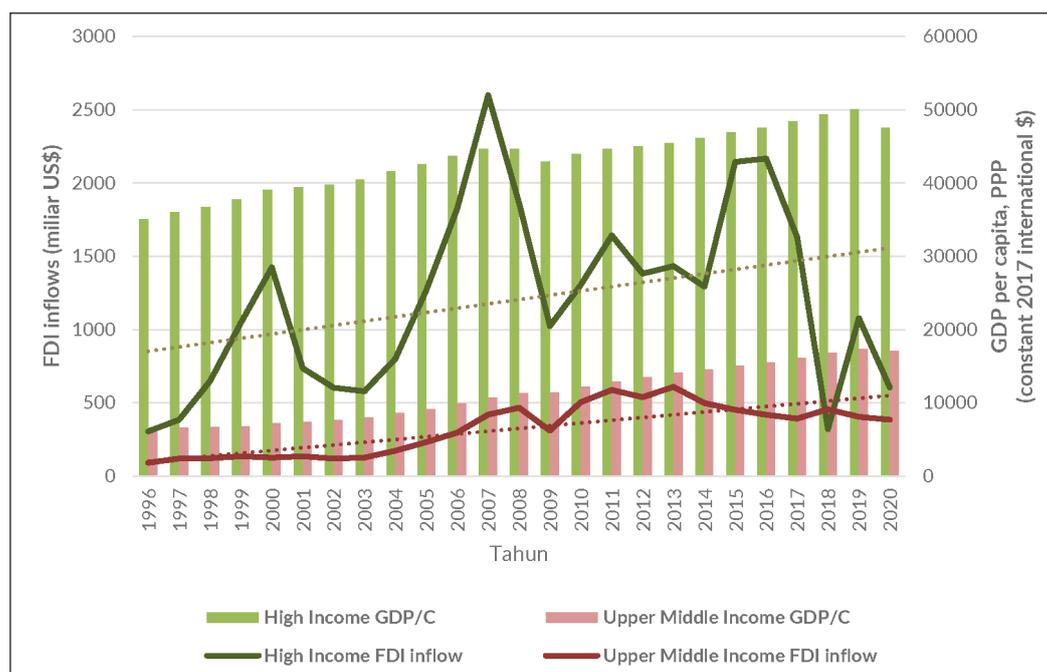
Source: World Development Indicators (WDI) 2022, processed

As shown by GDP per capita, Figure 1 illustrates a significant gap in average per capita income levels between HICs and UMICs. In terms of data patterns, it can be seen that per capita income in both HICs and UMICs has generally trended upwards during the 1996-2020 period. Hlaváček & Bal-Domańska (2016) found that foreign direct investment in Central and Eastern European countries has become an essential indicator of economic development and a measure of external confidence in the stability and growth of their economies.

As shown in Figure 2, FDI inflows to lower-middle-income countries (LMICs) have experienced a significant upward trend over the past 25 years, as indicated by the trendline. On average, LMICs have received approximately US$82.11 billion in FDI, with the highest total amount being realized in 2019 at US$147.23 billion and the lowest in 2000 at US$12.53 billion. In contrast, FDI inflows to low-income countries (LICs) have remained relatively stagnant, with an average of US$9.47 billion. Developing economies could withstand the pandemic's adverse effects better than developed economies. However, in developing regions and economies in transition, foreign direct investment (FDI) inflows were more significantly impacted by the pandemic's effect on investment in activities that are intensive in global value chains, tourism, and resources. Additionally, the unequal availability of fiscal space for implementing economic support measures also contributed to the regional differences observed.

Figure 2. FDI Inflows and per Capita Income in the Lower Middle-Income and Low-Income Country Groups, 1996-2020
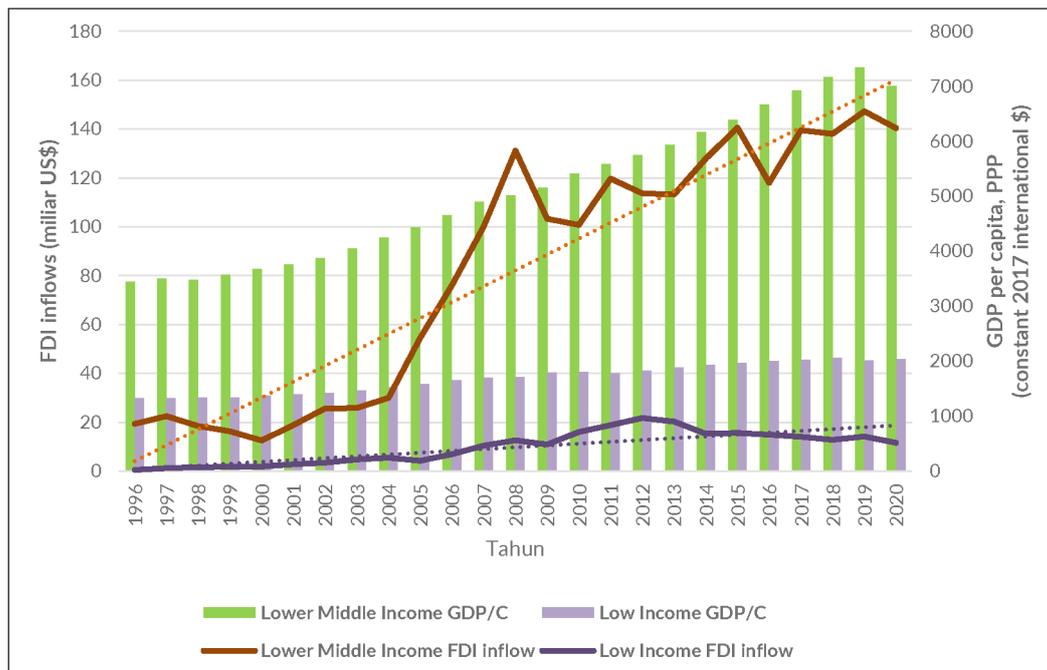
Source: World Development Indicators (WDI) 2022, processed

Regarding the level of per capita income as measured by GDP per capita, Figure 2 illustrates a considerable gap in the average value of per capita income levels between lower-middle-income countries (LMIC) and low-income countries (LIC) when compared to the two higher-income groups. Of course, it is expected that there will be a significant difference between income groups. The data pattern shows that in both LMIC and LIC, the average level of per capita income during the 1996-2020 period tends to increase annually. Similar to the FDI inflows, the average value of per capita income level in LMIC has experienced a significant upward trend over the last 25 years compared to the other three income groups.

The effects of FDI on economic growth in a sample of 124 countries worldwide were analyzed, taking into account the host country's natural resource abundance and several other control variables. The first step in model selection is to conduct a Chow test to determine whether the best model is the common effect model (CEM) or fixed effect model (FEM). The test results showed that the fixed effect model (FEM) was selected. Furthermore, the Hausman test was conducted to choose the best model between the fixed effect model (FEM) and the random effect model (REM). The test results showed that the fixed effect model (FEM) was selected. Thus, from the results of the Hausman test that has been carried out, the fixed effect model (FEM) is more appropriate among the other two models, namely the common effect model (CEM) and the random effect model (REM). Therefore, the econometric output results with the FEM model will be analyzed and interpreted.

Table 2. Regression Results

Variables	Common Effect Model (CEM)	Fixed Effect Model (FEM)	Random Effect Model (REM)
FDI	0.000183 (0.000858)	0.000632** (0.000303)	0.000642** (0.000302)
NR	0.004251* (0.000561)	0.002177* (0.000454)	0.002130* (0.000445)
FDI*NR	-0.000288* (4.75E-05)	-4.39E-05** (1.80E-05)	-4.60E-05** (1.80E-05)
INF	-0.000191 (0.000476)	-0.001010* (0.000163)	-0.000980* (0.000162)
TRADE	0.002203* (0.000234)	0.002104* (0.000220)	0.002281* (0.000215)
GE	0.027370* (0.002456)	0.012571* (0.001875)	0.014454* (0.001849)
POP	-0.099827* (0.007893)	0.007194 (0.004504)	0.004309 (0.004474)
DS	0.026540* (0.001001)	0.012191* (0.000730)	0.012959* (0.000720)
IQUAL	1.490324* (0.037318)	0.445932* (0.035665)	0.541608* (0.034551)
R-squared	0.716927	0.971570	0.238227
Adjusted R-squared	0.716102	0.970304	0.236006
Prob(F-statistic)	0.000000	0.000000	0.000000
Chow Test Statistic (p-value)		215.835704 (0.0000)	
Hausman Test Statistic (p-value)		156.149087 (0.0000)	

Source: Author Computation, 2022
Description:
FDI=Foreign Direct Investment, NR=Natural Resources, INF=Inflation,
TRADE=Trade Openness, GE= Government Expenditure, POP=Population,
DS=Domestic Saving, IQUAL= Institutional Quality
Note: *, ** and ***: significant at 1%, 5% and 10% respectively

The Glejser test is conducted to check for the presence of heteroscedasticity in the fixed effect model (FEM). From the results of the Glejser test, it can be seen that there is a violation of heteroscedasticity, namely in the NR variable (prob. 0.0000), INF (prob. 0.0000), TRADE (prob. 0.0000), GE (prob. 0.0000), and IQUAL (prob. 0.0011). A residual cross-section dependence test is conducted to check whether or not there is a serial correlation between cross-sections. The test results show that in all tests, the value of prob. < 0.05, there is a cross-section serial correlation. So, to overcome these two problems, a fixed effect regression model and weighted white/robust standard error regression were re-run to overcome the heteroscedasticity and autocorrelation problems. According to Baltagi (2021), the application of white/robust standard errors can overcome the problem of heteroscedasticity or serial correlation. The output of these regression results will then be used for analysis and interpretation.

Next, from the multicollinearity test results, it can be seen that there is no correlation between variables worth more than 0.8 (Spearman's Rho Correlation). It can be concluded that the independent variables in the model do not have a linear relationship with other independent variables. Furthermore, the regression results show that the adjusted R-squared is 0.9703, indicating that the diversity of the independent variables can explain 97.03% of the variety of the dependent variable in the sample of 124 countries. The prob(F-statistic) value is significant (p<0.05), indicating that at least one of the independent variables has a significant effect on the dependent variable (economic growth) at a significance level of 5%.

The previous analysis determined that the fixed effect model (FEM) with white/robust standard error regression weighting was the best model to analyze the effect of FDI and several other variables on economic growth. The results show that FDI has a positive and significant effect on economic growth, as indicated by the coefficient value of 0.000632 at the 1% significance level (see Table 2). This result means that a 1% increase in FDI inflow is associated with a 0.000632% increase in economic growth, all else equal. A country with a favorable environment for investments makes it simple for businesses to operate and provides resources, and good safety and security will become increasingly attractive to investors. This aspect will make the country more competitive in attracting foreign investment. The inflow of capital can serve as a powerful stimulus for a country's economy. It can also lead to the transfer of new technologies, which can help increase productivity, thus, leading to the economy's overall growth.

Previous research has shown that FDI can bring new technology and knowledge to the host country, improve productivity, and provide access to global markets (de Gregorio, 2003; Eudelle & Shrestha, 2017). Asghari et al. (2014) argue that FDI can contribute to economic growth in several ways. One is adding to domestic savings, which can help overcome capital accumulation limitations. Another is facilitating technology transfer, which can lead to more efficient use of resources and increased productivity. In addition, FDI can help boost exports by expanding the capacity and competitiveness of domestic production. This result is consistent with the findings of multiple studies (Mehic et al., 2013; Alvarado et al., 2017; Hayat, 2017; Sultanuzzaman et al., 2018; Dinh et al., 2019;

Shittu et al., 2020; Zeeshan et al., 2020; Mohamed et al., 2021; Nasir et al., 2021; Orji et al., 2021; Ahmad et al., 2022), which have found that an increase in FDI inflows can stimulate economic growth. In addition, Raza et al. (2021) discovered that countries with high institutional quality tend to have stronger economic growth and more foreign direct investment (FDI) inflows.

The abundance of natural resources, as measured by the share of natural resource exports, has a positive and significant effect on economic growth, as indicated by the coefficient value of 0.002177. This result means that a 1% increase in the abundance of natural resources is associated with a 0.002177% increase in economic growth, all else being equal. De Gregorio (2003) found that countries with high levels of human capital and extensive natural resource bases, such as Scandinavian countries, can leverage their natural resources for economic growth without negative consequences. Industrialized countries have also been able to protect their natural resources and reduce their reliance on raw materials through technological advancement (Redmond & Nasir, 2020; Haseeb et al., 2021; Adika, 2022). Natural resource abundance tends to increase per capita incomes in countries with less government intervention, more sound money, better property rights protection, less openness to international markets, or less government corruption (Kim & Lin, 2017). Furthermore, Erum & Hussain (2019) claim that appropriate management and governance of natural resources can promote economic growth.

The influence of the natural resource abundance factor on the effect of FDI on economic growth can be analyzed by comparing the impact of FDI on economic growth before and after taking the natural resource abundance factor into account using an interaction variable between FDI inflow and the share of natural resource exports (FDI*NR). The total effect of FDI on economic growth can be calculated by deriving equation (1) on FDI to obtain equation (2) as follows Hayat (2018):

$$Y_{it} = \alpha + \beta FDI_{it} + \delta NR_{it} + \theta(FDI_{it} * NR_{it}) + \gamma X_{it} + \varphi_{it} \qquad (1)$$

$$\frac{dY_{it}}{dFDI_{it}} = \beta + \theta NR_{it} \qquad (2)$$

The interaction variable between FDI inflow and the share of natural resources exports (FDI*NR) is negative and significant at the 10% significance level (see Table 2). This indicates that changes in the value of the NR variable are expected to lead to an adverse change in the effect of FDI on economic growth. This aspect can be demonstrated by substituting different values for NR into equation (2), using the known values of $\beta = 0.000632$ and $\theta = -4.39E-05$. If the NR variable is ignored or there is no growth in natural resource abundance (NR=0), the effect of FDI on economic growth is 0.000632, as shown by the first condition. If the abundance of natural resources increases by 1%, the value of NR = 1 is inserted into equation (2), resulting in a total effect of FDI on economic growth of 0.000588%.

Further testing with the average value of NR (25.598530), which represents an increase in the abundance of natural resources by its average, shows that the total effect of FDI on economic growth changes to -0.000492%. The impact of FDI on economic

growth continues to decline and becomes negative as the abundance of natural resources increases. When NR is set at 100, meaning that the abundance of natural resources doubles, the total effect of FDI on economic growth becomes increasingly negative at -0.003758%. This result is consistent with the research findings of (Hayat, 2014, 2018), which suggest that FDI has a positive and significant effect on the host country's economic growth. However, the positive effect of FDI on economic growth can change and become negative as the abundance of natural resources increases. A summary of the changes in the effect of FDI on economic growth resulting from the simulation of different values of natural resource abundance is shown in Table 8 for reference.

Table 3. The Effect of FDI on Economic Growth by Simulating Several Values of Natural Resource Abundance

Observations	The total effect of FDI on economic growth
FDI when NR = 0	0.000632 (Positive)
FDI when NR = 1	0.000588 (Positive)
FDI when NR = 25.59 (average NR)	-0.000492 (Negative)
FDI when NR = 100	-0.003758 (Negative)

Source: Author Computation, 2022

According to Hayat (2018), the role of the natural resource abundance factor in changing the effect of FDI on economic growth is through capital accumulation in the natural resource sector. A country's natural resource abundance can attract FDI, leading to more significant capital accumulation in the natural resource sector and lower accumulation in the non-natural resource sector (Kekic, 2005). Increased activity in the resource sector due to increased FDI can make firms operating in the non-resource sector less competitive, potentially negating the positive impact of FDI on economic growth. Asghari et al. (2014) suggest that abundant natural resources may decrease the motivation for individuals and governments to invest in human capital, as non-wage income, such as dividends and social spending, may be high and taxes low. However, they also note that a boom in the extraction and export of natural resources can cause the value of a country's currency to appreciate, which may negatively impact the exports of manufactured and service-based industries.

Willebald et al. (2015) argue in their book "Natural Resources and Economic Growth: Learning from History" that economic development is not solely dependent on the accumulation of physical and human capital. There is a third form of "capital" or "economic asset" that is essential for the performance of production, consumption, investment, saving, and welfare systems, which is referred to as "natural capital". This term refers to the natural and environmental resource endowment available to an economy. Natural capital is crucial for sustainable economic development, but an economy's increasing reliance on natural resource exploitation can hinder growth and development, particularly for low- and middle-income countries (Barbier, 2019). These countries often

depend on their natural resource endowments for economic growth and development, as natural capital may be their only source of capital. According to the Hecksher-Ohlin (H-O) modern trade theory, countries tend to export commodities that have abundant and relatively cheap and import factors of production that are scarce or expensive in their own country. Furthermore, other control variables, namely the inflation rate, the level of trade openness, government spending, domestic investment, and institutional quality, were found to affect economic growth significantly.

CONCLUSION

The results of the descriptive analysis show that the development of FDI inflows to various countries has increased significantly over the past 25 years, with significant inequality between countries based on their per capita income. FDI inflows are higher in countries with larger economies, as measured by their high per capita income. Therefore, governments in low-income countries should strive to attract more FDI to catch up with high-income countries in terms of economic development, consistent with the eighth goal of the Sustainable Development Goals (SDGs) to promote sustainable economic growth through increased productivity and technological innovation. The results of the panel data regression analysis show that FDI inflows and the abundance of natural resources have a significant positive effect on the host country's economic growth. However, as the abundance of natural resources increases, the total effect of FDI on economic growth is estimated to decrease and may even turn negative.

Countries worldwide should pay more attention to several essential factors impacting economic growth. Both high-income countries (HICs) and middle-income countries (MICs) should focus on increasing foreign direct investment (FDI) inflows, particularly in the non-natural resource sector. This condition will help increase economic growth and maintain natural resource management and institutional quality. For low-income countries (LICs), governments should study FDI and natural resource management policies more intensively. They should also implement strict legal regulations on FDI entry requirements and international investment cooperation. In addition, they should enforce policies that improve institutional quality, such as good governance, the rule of law, and low levels of corruption. These conditions can accelerate the process of technology spillover from FDI firms to domestic firms. LICs can emulate the policies implemented in HICs and MICs, which have a high institutional quality. FDI and abundant natural resources will positively benefit these countries economic growth. In addition, host countries should consider lowering entry barriers for institutional investors while protecting the public interest. To improve the risk-return profile of investment projects related to the Sustainable Development Goals (SDGs) and make them more appealing to institutional investors, these countries can use risk-sharing tools such as public-private partnerships, investment insurance, and blended financing. Measures should also be taken to maximize the developmental benefits of these projects.

Further research is recommended to use more cross-sectional (country-level) data to investigate further the effect of FDI, natural resource abundance, and other variables

on economic growth. This research should also categorize countries based on their per capita income levels and use graphical analysis to examine the relationship between FDI, natural resource abundance, and economic growth. Additionally, the influence of economic shocks such as the 2008 global economic crisis and the Covid-19 pandemic should be considered, along with variables that have not been included in this study.

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Urban Size and Labor Market Premium:
Evidence from Indonesia

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Abstract

The study of economic agglomeration is again a concern in the urban economic literature, especially in describing urban areas and better econometric approaches. This study improves the size of cities to become urban and suburban, reflecting the flow of commuting, using the 2010 and 2015 Landscan data to measure economic density better and reduce bias due to measurement errors. Empirically, using this density and using the 2SLS estimation technique with instrument variables in the form of earthquake risk and ruggedness measures, the result of a city twice as large can increase wages by 61 percent. This result is higher than most other literature because the sample only covers urban areas. This study also shows that workers with characteristics such as higher education, the formal sector, the service sector, and white-collar jobs get more enormous benefits in urban areas.

Keywords:

agglomeration economies; economic density; urbanization

INTRODUCTION

In 2018, more than half of the world's population lives in cities, 55.27 percent of the total 4.19 billion-world population. This figure will continue to increase, estimated to reach 68 percent in 2050 (United Nations, 2018). The benefits of living in cities may partly drive this imbalance in the concentration of rural and urban populations. For workers, higher wages and urban amenities can beat all the congestion costs that arise in cities, such as high prices for land, housing, environmental problems, especially pollution, transportation costs, and longer commute times. Likewise, for companies, higher wages may cause the cost of production input to be more expensive. However, these companies still choose to operate in urban areas, not moving to lower fees.

The foremost contribution of this study is in being one of the first in the literature to causally estimate the impact of urban size on the individual's labor market outcomes in developing countries by determining the urban size with a clustering algorithm so that it can reflect economic density. Economic density classified as urban and suburban, to reduce measurement error. In doing so, this paper adds to an existing body of work on benefit from the urban size on the individual's labor market outcomes. Outside of this work, much of the existing research on urban labor market premium has focused on developed countries such as United States (Glaeser & Mare, 2001; Glaeser & Resseger, 2010; Baum-Snow & Pavan, 2012; Fu & Ross, 2007; Yankow, 2006), France (Combes, 2008; Combes et al., 2012), United Kingdom (D'Costa & Overman, 2014), Spain (Puga, 2017), Europe (Ciccone, 2002), and several other works of literature and urban size data based on administrative boundaries, which cannot yet describe economic density and is currently considered inappropriate in determining city size. As for developing countries, the study is still limited. The constraints are the limitation of longitudinal data and urban size data, which cannot yet describe economic density.

The labor market in developing countries is quite different from developed countries. Large informal sector and labor with low skills characterize this labor market. The benefit of a higher population and business concentration in urban areas is higher for formal industry and highly skilled workers. Therefore, the impact of urban size on labor market outcomes in developing countries may differ from that of developed countries, so it is interesting to study. Recently, there has been more work on developing countries with, for example, papers on Columbia (Duranton, 2016), China, Brazil, and India (Chauvin, 2017), and Sub-Saharan Africa (Henderson, 2019).

In developed countries, urban size reflects the economic density determined by commuting flows (Duranton, 2015). However, this cannot be used in developing countries because of the limitations of the data. City size based on administrative boundaries has not been able to capture de facto economic density (Widya et al., 2019; Khairunurrofik, 2017). Due to pre-determined administrative units, cities, or villages, based on qualitative aspects of land use, which can include areas that don't have populations or rural areas and cities usually grow beyond their administrative boundaries. However, this cannot be done in developing countries due to limited data.

This study evaluates the impact of city size on the individual labor market premium using the Indonesian case, due to 3 reasons. First, Indonesia is one of the developing countries with the characteristics of a labor market dominated by the informal sector and low-skilled labor. Second, Indonesia is the fourth most populous country in the world, experiencing a relatively fast rate of urbanization. Third, Indonesia will also experience a window of opportunity, with an enormous population growth of productive age. It is hoped that this study can provide useful results for policymakers to face this big opportunity. This study also conducts a more in-depth heterogeneity analysis of several characteristics of workers because the benefits of city size are not the same for every worker (Duranton, 2015). Estimating the impact of city size on labor market outcomes is quite challenging due to endogeneity problems that cause the estimation results using the Ordinary Least Square (OLS) method to be biased. Endogeneity problems at the city level occur due to the non-random process of city size, in the form of population density, because of the unobserved attributes of the city, both in the form of natural amenities and urban public infrastructure encourages urban development and also boosts productivity. Besides, the problem of reverse causality is that the average wage in urban areas increases the number of workers, and density increases, and the measurement error of urban size. Therefore, to reduce this bias, we use the Two-Stage Least Square (TSLS) method. Besides, this study improve the city's size to become urban and suburban that reflects the commuting flow so that they can better measure economic density and reduce bias due to measurement error. At the same time, the endogeneity problem at the individual level occurs due to select sorting driven by unobserved individual characteristics. Individuals with high abilities can live in larger cities and, at the same time, affect the wages received. So this study controls education and age as proxies of experience, other observed individual characteristics, job control, and the fixed effect industry are carried out to factor abilities by conditioning education.

At present, the study of economic agglomeration is again a concern in the urban economic literature, especially in describing urban areas and better econometric approaches, resulting in a more precise estimate of the impact of city size on the labor market premium. It is because advancing data has made it possible to do this. Data on a better spatial scale makes it possible to obtain an urban size that matches the commuting flow. By utilizing geospatial data that is increasingly developing today, several economists and geographers have conducted studies on urban sizes that are in line with commuting's flow. As far as the researchers know, there are several approaches proposed, including agglomeration index (Uchida & Nelson, 2009), urban clustering (Henderson, 2019), night-time lights (Dingel, 2019), and finally using building information with an algorithm machine learning (Arribas-Bel & Lopez, 2019; Bellefon et al., 2019). This study uses an urban cluster approach such as that conducted by Henderson, 2019, for Sub-Saharan Africa. Using Landscan 2012 data to determine the threshold that matches the commuting flow, Henderson defines the city and town. Henderson concluded that this measure was perfect in estimating economic density measures.

This research contribution includes two things. First, determine the city's size with

a clustering algorithm, based on the population density and total population threshold consistent with commuting flow so that it can reflect economic density, classified as urban and suburban, to reduce measurement error. Second, this study examines causal impact of city size on the individual labor market premium.

METHODS
Data

Wage and worker's characteristics - Our main data source for for worker's wage and individual characteristics is 2010 and 2015 National Labor Force Survey (Sakernas) from Central Bureau of Statistics. The sample is restricted to working-age residents of 15-64 years, with wages not equal to zero. This research is limited to the net income of workers with self-employed status, casual workers in agriculture, casual workers in non-agriculture, and net wages, either in cash or in-kind, for workers with labor/employee/employee status. Workers working in the agriculture, forestry sectors, and mining and quarrying sectors were excluded from the sample.

Urban density - We construct urban density from 2010 and 2015 Landscan data sourced from Oak Ridge National Laboratory. As the urban definition is likely to be beyond the administrative boundaries, we follow Djikstra & Poelman's method (2014) in harmonizing the definition of urban and rural areas. They applied a cluster algorithm using population grid data with a resolution of 1 km^2. Adjacent population grids are categorized as urban areas if each population grid meets a certain population density threshold and population threshold. We follow Henderson's strategy (2019) in determining the status of urban areas using different threshold. A settlement area may fall into one of four categories, i.e. (a) Core, with a population density of more than 4000 people per km^2 and a total population of more than 400,000 people, (b) fringe, with a population density of more than 2000 people per km^2, (c) suburban, a standing area alone, a population density of more than 2000 people per km^2 and a total population of more than 200,000 people, and rural if otherwise. An urban area is then defined as those who have cores and fringes. Figure 1 illustrates the urban areas in Java Island, the most populous island in Indonesia.

Figure 1. Urbanized areas in Java Island, Indonesia
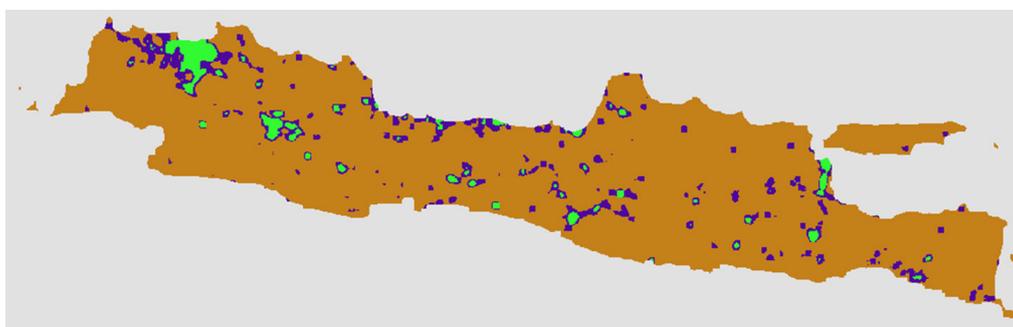
Note: Green area represents core, an area with a population density of more than 4000 people per km^2 and a total population of more than 400.000 people. Purple area represents suburban area, an area with a population density of more than 2000 people per km^2 and a total population 200.000 people. Brown area represents rural area, an area with a population density of less than 2000 people per km^2 or total population of less than 200.000 people

Instrumental variables - To construct the instrument variables, we rely on district/city-level earthquake risk index from the Indonesian Disaster Risk Index by the Indonesian Disaster Management Agency. The index is published in 2014 and represents information of the level of vulnerability of the area at the territory of the State of Indonesia. Disaster Risk Index compiled based on hazard components, loss, and capacity. Component hazards arranged by intensity and probability parameters incident. The loss components are compiled based on socio-cultural parameters, economic, physical, and environmental. Capacity components are arranged based on capacity parameters regulations, institutions, systems early warning, education, training, skills, mitigation, and systems preparedness. At last ruggedness measure is constructed from Shuttle Radar Topography Mission by the United States Geological Survey. We follow Riley (1999) to construct the index.

Additional variables – We also rely on other source of data for our robustness test on model specification. We rely on the 2010 Population Census (SP) and the 2015 Intercensal Population Survey (SUPAS) for constructing the population density at district level.

Identification Strategy

The empirical model in this study uses individual data (i) in the city $c(i)$ in the year (t) period. Mathematically, the empirical model can be written with

$$y_{ic(i)t} = \alpha_0 + \alpha_1 \log Density_{c(i)t} + \alpha_2 X_{ic(i)t} + \alpha_3 A_{c(i)t} + \delta_t + \varepsilon_{ic(i)t} \qquad (1)$$

The dependent variable ($y_{ic(i)t}$) represents a set of urban individual labor market outcomes, including employment opportunities in urban areas, the wage premium for those working, and the absorption of formal workers in urban areas. The wage used is the amount nominal wages or income per month received in the form of money and goods. Differences in nominal wages reflect differences in productivity more than differences in real wages that better reflect differences in living standards. The variable of interest is urban size. The measure used is population density, the total population divided by area, both obtained from 2010 and 2015 Landscan data using cluster algorithms or with administrative boundary approaches. It is important to note that $c(i)$ shows the city where the individual works, not the city of residence.

The variable of interest is urban size. The measure used is population density, the total population divided by area, both obtained from 2010 and 2015 Landscan data using cluster algorithms or with administrative boundary approaches. The area used is also derived from Landscan data processing. The use of these two variables in equation (3.1) reduces bias because the area is often not well measured (Duranton, 2020). According to Duranton (2015), the use of density measures is more robust against zoning to provide more reliable results. It is important to note that $c(i)$ shows the city where the individual works, not the city of residence.

X_{it} is a vector of individual characteristics in year t, including age, age squared, duration of work in current jobs, and it's square as a rough proxy of experience. Variables reflect skills, namely years of schooling. Besides, other individual characteristic variables

used are dummy gender, hours of work and its square, employment field (Classification of Standard Indonesian Business Field 2005 (KBLI 2005) 2 digits, and position classified according to Indonesian Classification Classification (KJI 2002) 1 digits. $A_{c(i)t}$ is a vector of city characteristics in year t, including human capital city and island dummy. Clustered standard clustered errors based on KBLI are used to accommodate the correlation between individuals in the same KBLI.

An empirical strategy in estimating the effect of urban size on individual labor market premiums needs to consider the endogeneity problem, both at the individual level and at urban area level. The endogeneity problem at the individual level occurs because unobserved individual characteristics drive individual sorting. Individuals with high ability tend to choose to live in a larger city, so this study controls education and age as proxies of experience, other observed individual characteristics, and the occupation and industry fixed effect. The use of occupation and industry fixed effect as a way of factoring abilities by conditioning occupation because specific jobs or sectors correspond to particular skills. Capturing work done by workers, which is also an effect of past careers, can be considered a more correlated measure with current skills than education (Combes, 2015). Besides, job control and industry fixed effects can eliminate the benefits of a wider choice of jobs and industries when moving to a larger city (Henderson, 2019).

The issue of endogeneity at the urban area level occurs due to the non-random process of city size, in the form of population density, due to the city's unobserved attributes, both in the form of natural amenities and city public infrastructure that encourage city development and also boost productivity. Besides, there is also the problem of reverse causality, where a larger average wage in urban areas attracts workers to the city so that the density increases. To reduce this bias, the Two-Stage Least Square (TSLS) method. Instrument variables (IV) used in this study are the interaction between district/city earthquake risk index and the district/city ruggedness. Earthquake risk and ruggedness measures are exogenous events, which are important determinants of population settlement patterns (Combes, 2010; Duranton & Turner, 2018), and both variables do not directly determine the individual's wage level. When the terrain is rough, then construction on an inclined side is more expensive than a flat area, so the rough terrain naturally encourages diffuse development. It can also mean a spread population. In contrast, flat areas or high mountains tend to make development more densely populated to become denser (Burchfield, 2006). As for earthquake risk, areas with a higher earthquake risk have a lower population density than areas with low earthquake risk. Our first-stage equation is then as follows:

$$\log Density_{c(i)t} = \beta_0 + \beta_1 Earthquake_{c(i)t} * ruggedness_{c(i)t} + \beta_2 X_{ic(i)t} +$$
$$\beta_3 A_{c(i)t} + \mu_t + u_{ic(i)t} \tag{2}$$

Where $earthquake_{c(i)t}$ and $ruggedness_{c(i)t}$ are earthquake risk score and ruggedness index, respectively.

RESULT AND DISCUSSION
First stage: Geological characteristics and population density

Table 1 provides the first-stage result of the earthquake risk score and ruggedness index on the population density. A one-point increase in an interaction between earthquake risk score and ruggedness index corresponds to 2.9 percent decrease in the district's population density.

Table 1. *First Stage Result*: Earthquake Risk Index and Ruggedness on Population Density

Variable	(1)	(2)	(3)	(4)
Earthquake score x ruggedness index	-0.0283 (0.0023)	-0.0287 (0.0023)	-0,0286*** (0.0024)	-0.0290*** (0.0024)
Individual characteristics	N	N	Y	Y
Urban characteristics	N	Y	N	Y
Province-year fixed effect	Y	Y	Y	Y
Occupation and industry fixed effect	Y	Y	Y	Y
Mean of population density				
R-sq	0.326	0.330	0.326	0.329
Observations	108,831	108,831	103,984	103,984

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors in parentheses are clustered at industry classification level. Samples are limited to those working in urban and suburban area. Individual characteristics includes age, age squared, years of schooling, experience, experience squared, working hours, working hours squared, and gender dummy. Urban characteristics include average human capital.

Second stage: Effects of urban density on individual wages

We now move to our main result. Table 2 shows the OLS and TSLS estimation results from equation (1). The results obtained are that urban size has a positive and significant impact at the 1 percent level, both on the OLS and 2SLS estimates. The bigger the size of a city, the bigger the wages will be. The city's size in this study is population density because city density is a robust measure of zoning. However, the use of the total population size will still be carried out in the robustness test.

Due to endogeneity problems, this study uses the TSLS method. The OLS estimation results in column 1 and column 2 are only for descriptive purposes. In Table 2, there are the results of the first stage F statistics for the instrument. The results passed the test for weak instruments Stock and Yogo (2005) shown from the first stage-F-statistic value exceeding the relative bias critical value measure Stock-Yogo. To overcome the endogeneity problem due to individual sorting, which is driven by unobserved individual characteristics, the study controls variables of education (school duration) and experience (age and length of work in current work). Also, control occupation and industry fixed effect because a particular job or sector corresponds to a particular ability. Also, occupation and industry fixed effects can eliminate the benefits of a more extensive choice of occupations and industries when moving to a larger city (Henderson, 2019).

The 2SLS estimation results using control occupations and industries fixed effect (column 4) show that an increase in population density by 1 percent increases urban wages by 61 percent. Compared to column (2), the OLS estimate underestimates because of the omitted bias variable. Compared with column (3), the estimation results without controlling the occupation and the industry fixed effect are overestimated because of the omitted bias variable (ability).

Table 2. Estimation result: Impact of Urban Size on Wages

Variable dependent: : ln (wage)	(1)	(2)	(3)	(4)
	OLS	OLS	2SLS	2SLS
Ln (population density)	0.041*** (0.019)	0.040*** (0.019)	0.830*** (0.136)	0.615*** (0.104)
Individual characteristics	Y	Y	Y	Y
Urban characteristics	Y	Y	Y	Y
Province-year fixed effect	Y	Y	Y	Y
Occupation and industry fixed effect	N	Y	N	Y
Mean of population density	6.741,007	6.741,007	6.741,007	6.741,007
First stage F-stat	-	-	136.9	147.2
Observations	103,984	103,984	103,984	103,984

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors in parentheses are clustered at industry classification level. Samples are limited to those working in urban and suburban area. Individual characteristics includes age, age squared, years of schooling, experience, experience squared, working hours, working hours squared, and gender dummy. Urban characteristics include average human capital. 2SLS estimation method uses the interaction between earthquake risk score and ruggedness index as the instrument.

This result is much higher than the results obtained from the economic agglomeration literature for developed countries such as Combes (2010) for France of 0.027, Puga (2017) for Spain, the resulting short-term urban wage elasticity of 0.024 and 0.051 for the medium term, Glaeser (2001) for the United States, using longitudinal data, the wage premium is 0.039. This result is also higher than other developing countries, such as Duranton (2016) for Columbia; the results obtained are 0.054. However, Duranton does include urban areas and rural areas so that these results cannot be compared directly. Chauvin (2017) found wage premium results for China of 0.323 and India of 0.208. Meanwhile, for Indonesia, Bosker (2019) found that the urban wage premium produced varies depending on the approach to defining the metropolitan area used. With the cluster algorithm approach, the resulting wage impact is 0.49, while the nights time light approach results in an impact of 0.796. Henderson (2019) for Sub-Saharan Africa, with a similar approach to the one this study uses to define urban areas, finds results for urban wage premium of 0.169 and urban household income premium of 0.523. According to Henderson, the magnitude of the estimation results obtained is due to the size of the city used, namely density is the right size produced based on a particular area, in contrast to the area based on administrative boundaries, which is very likely to

cause measurement errors. Henderson proves this by entering the total population size together with the area because the area is correlated with the total population so that there is no omitted bias variable. The result is that the resulting coefficient is very close in absolute value, only has a contradicting sign. Besides, this higher result may indicate that there is still some bias because the sorting problem in the time-invariant unobserved individual characteristics has not been appropriately resolved.

An interesting policy related to the current density of urban areas in Indonesia is the plan to relocate the Indonesian capital, which is currently in DKI Jakarta Province, to East Kalimantan Province. If the plan is carried out, the population that usually does activities in Jakarta will certainly decrease, for example, by around 10 percent. Reducing the density of DKI Jakarta by 10 percent certainly changes not only the economic activities that occur in Jakarta but also its productivity, which is shown by wages, because the benefits of externalities created will certainly decrease. Based on the main results of this study, the wage elasticity of population density is 0.615, so a 10 percent reduction in Jakarta's density has the potential to eliminate Jakarta's wage premium by 6.1 percent. Meanwhile, East Kalimantan Province, especially Kutai Kartanegara Regency and North Penajam Paser Regency, as the location centers for the new capital plan, may not necessarily be able to create premium benefits that are comparable to the potential loss of premium that has occurred in Jakarta.

Heterogeneity Analysis

Heterogeneity analysis needs to be done because city size benefits are not the same for every worker (Duranton, 2015). Equation (1) estimates the average effect of the urban density on the individual's wage. This section will evaluate the potential for heterogeneity between sample groups based on gender, age group, education, formal-informal jobs, type of work, and work sector. First, differentiation between men and women is carried out because the labor market for men and women is often different. The gap between gender wages occurs in almost all countries in the world, including Indonesia. Second, differentiation by age group is due to the possibility of differences in urban benefits received by different age groups. There is quite a lot of literature that proves that wages grow with the city's length of life, or that there are learning benefits that workers receive overtime. This theory predicts more significant benefits for workers who stay longer, arguing that older workers receive more. Therefore, the learning mechanism can be proven indirectly by differentiating these age groups (Duranton, 2005). Third, differentiation based on education, the theory predicts cities to be more profitable for individuals who have high education and skills (Duranton, 2015). Fourth, the distinction is also made based on formal-informal jobs. The theory predicts that formal sector workers, especially those with high skills, feel more significant urban benefits. Meanwhile, informal workers dominate labor market conditions in Indonesia. Fifth, differentiation based on type of work, white-collar that reflects professional jobs with high skills and blue collar that reflects manual workers with low skills. Sixth, the impact of city size can also be heterogeneous between industries depending on the industry's characteristics. In a meta-

analysis, Melo (2009) concluded that city size's average impact tends to be stronger for the manufacturing sector than for the services sector.

From Table 3, Panel A, differentiation based on sex, the estimation results show that men get wage premium working in urban areas, which is much higher than women. These results are found in the literature on wage disparity studies between genders. A study conducted by Nordman et al. (2011) for West Africa found that wage disparities that occur are due to education gaps and differences in sector allocations, which can explain one-third of this gender gap. This result is also consistent with a study conducted by Sohn (2015) for Indonesia, where women earn 30 percent less than men, both for paid workers and self-employed workers. The gender gap explained by individual and occupational characteristics is only a quarter gap for paid workers and half the gap for self-employed workers. Although the sizeable unexplained gap cannot be discriminatory, the researchers speculate that this gap is driven by culture, religion, and social norms in Indonesia that restrict women from remaining in the domestic sphere.

Table 3. Estimation Result: Sample groups

	Ln (population density)		Obs	First stage F- stat
	Coef	Std. error		
Panel A: Gender				
Men	0,858 ***	0,101	66124	118,1
Women	0,302***	0,121	37860	120,2
Panel B: Age group				
Age 20-30	0,598***	0,145	27081	109
Age 40-50	0,617***	0,106	29148	202
Panel C : Education				
Less than high school	0,497***	0,099	87365	118,8
More than high school	0,907***	0,209	16619	125,1
Panel D : Formal Informal				
Formal	0,717***	0,139	70322	91,6
Informal	0,383***	0,102	33662	136,7
Panel E : Type of work				
White_collar	0,890***	0,236	25890	107
Blue_collar	0,378***	0,125	53044	60,5
Panel F : Work sector				
Industrial	0,476***	0,173	33512	24,8
Services	0,756***	0,116	70472	829

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. Standard errors in parentheses are clustered at industry classification level. Samples are limited to those working in urban and suburban area. Individual characteristics includes age, age squared, years of schooling, experience, experience squared, working hours, working hours squared, and gender dummy. Urban characteristics include average human capital. 2SLS estimation method uses the interaction between earthquake risk score and ruggedness index as the instrument.

In panel C, the distinction is made based on individual education. The results show that individuals with higher education benefit from a more significant urban wage premium. These results are consistent and support the theory that economic agglomeration has more impact on workers with high education and skills (Glaeser & Resseger, 2010; Bacolod, 2009). Different results were found by Duranton (2005) for Columbia, a smaller wage premium for highly educated workers in large cities due to the informal sector's high premium in urban areas, which is dominated by young workers and with low education.

In panel D, differentiation is based on employment in the formal or informal sector. The estimation results show that the benefits of urban wage premium are more significant for workers in the formal sector. However, workers in the informal sector also benefit from a large urban wage premium. This result is consistent with the results found in developed countries, but contradicts the results found by Duranton (2005).

In panel E, the distinction is made based on the type of work, and the results show that a white-collar that reflects professional work gets the most significant wage premium. Workers with high education and skills dominate professional workers. These workers benefit significantly in the form of learning from interactions with their fellow environment. In contrast to white collars, blue collars, which are synonymous with manual labor, benefit from a lower wage, such as in informal work, this type of work also benefits from a large urban wage premium. Bacolod et al. (2009) concluded that cognitive skills were more valuable in cities, while motor skills and physical strength were less valued. Gould (2007) also found that the benefit of city size exists for white collars but not for blue collars.

In panel F, the differentiation is made based on the industrial sector and the service sector. The service sector has more significant urban benefits than the industrial sector, contrary to the conclusion of Melo (2009). It may be due to the city's increasing size, which reflects the diversity in the city. The benefits of industrial diversity in this city are more profitable for the service sector than in the industrial sector. The activities carried out by this sector are closely related to the locations of other sectors, such as in the trade, hotels and restaurants sector, and the transportation and communication services sector. This result is consistent with the results found by Brulhart & Mathys (2008) for Europe, and the financial services sector gets more urban benefits than the manufacturing sector, this also occurs in Indonesia when disaggregated into smaller subsectors.

CONCLUSION

This study estimates the magnitude of city size's impact on wages by evaluating different approaches to defining urban areas. This study selects Indonesia, a developing country with a large population and a fast rate of urbanization. By selecting the right threshold, the resulting urban area is quite good at capturing economic density, reflecting commuting flows. Besides, the city's size is based on population density obtained from the 2010 and 2015 Landscan data. This density measure is more precise than the population density obtained based on administrative boundaries because the area generated from the

Landscan data is more accurate. The results obtained from estimating the impact of city size on wage premium give an extraordinary effect, higher than most of the rest of the literature, because the sample only includes urban areas and uses a more precise measure of density than based on administrative boundaries.

Hence, the problem of measurement error is very likely to be adequately resolved. Besides, this higher result may indicate that there is still some bias because the sorting issue in the time-invariant unobserved individual characteristics has not been appropriately resolved. Heterogeneity analysis shows that the benefits of urban wage premiums received by men are more significant than those received by women, *workers with characteristics such as higher education, the formal sector, the service sector, and white collar jobs* get more enormous benefits in urban areas. This result also suggests that cognitive skills are more valuable in cities, while motor skills and physical strength are less valued. The policy implications of this research are to increase the cognitive skills of workers and strengthen the service sector.

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Appendix 1. Variable Definition

No	Variable	Definition	Operational variable	Data category	Sources
(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables					
1	Wage per hour (wage_hr)	Wages per hour received by individuals		continuous data	Sakernas 2010 and 2015
2	Work	Individual during the last week working or not		1 work 0 tidak	Sakernas 2010 and 2015
3	Formal	Individuals work in the formal or informal sector	The formal informal sector is determined by status and type of work	1 formal 0 informal	Sakernas 2010 and 2015
4	city diversity (diver_city)	A measure of industrial diversity in a city		continuous data	Sakernas 2010 and 2015
Independent Variables					
5	Population density (density)	Total population per km2 of the district where the individual works		continuous data	SP 2010, Supas 2015, BPS
Individual Characteristics					
6	Age	Individual age at enumeration survey		continuous data	Sakernas 2010 and 2015
7	Squared age (age_sq)	The age of the individual at the time of enumeration is squared		continuous data	Sakernas 2010 and 2015
8	(experience)	The length of work on the job now		continuous data	Sakernas 2010 and 2015
9	Lama kerja kuadrat (exper_sq)	The length of work on the job now is squared		continuous data	Sakernas 2010 and 2015
10	Years of schooling (yos)		Years of schooling based on education completed Elementary school/ equivalent = 6 Middle school/ equivalent = 9 High School/ Equivalent = 12 Diploma I = 13 Diploma III = 15 Undergraduate = 16 postgraduate = 18	continuous data	Sakernas 2010 and 2015
11	Gender	Individual gender		1 male 0 female	Sakernas 2010 and 2015

No	Variable	Definition	Operational variable	Data category	Sources
(1)	(2)	(3)	(4)	(5)	(6)
12	total working hours (workinghours)	total working hours for one week		continuous data	Sakernas 2010 and 2015
13	total working hours squared (workinghours_sq)	total working hours for one week is squared		continuous data	Sakernas 2010 and 2015
14	KBLI	individual business classification at current job (KBLI 2005)		Kode KBLI 2 digit	Sakernas 2010 and 2015
15	KJI	Type of job/ individual position at work (KJI 2002)		Based on Indonesian Job Classification (KJI)	Sakernas 2010 and 2015
Urban characteristics					
16	Human capital city (hc_city)	Share residents with high school education and above	Hc_city = the number of residents with high school education and above / the number of residents of the city/ district	continuous data	Sakernas 2010 and 2015
17	Island dummy (dpulau)	Individual work island code		1. Sumatera 2. Jawa 3. Bali 4. Nusa Tenggara 5. Kalimantan 6. Sulawesi 7. Maluku 8. Papua	Sakernas 2010 and 2015
Instrumental Variable					
18	Earthquake Disaster Risk Index (IRBI)	The level of disaster risk for each district/city in Indonesia is by the hazard it has		continuous data	Publication of Indonesia's Disaster Risk Index 2013
19	ruggedness	The average value of the terrain ruggedness at each center point in the Indonesian district. Terrain ruggedness is the absolute difference in the height of the center point with respect to 8 other adjacent points	ruggednes on the central cell grid i is the elevation on the grid of central cells i is the elevation on the grid of neighboring cells j Then a raster of index values is generated, which is then carried out by zonal statistics (means) with a map of Indonesian districts	continuous data	Geospatial Information Agency

Appendix 2. Constructing urban density variable

It was defining urban areas using ArcMap 10.5 software. The initial step taken is to determine the built cover threshold that matches the current commuting in Indonesia. After that, a smoothing algorithm is performed, the value of each reference cell is the average density of 7x7 cells around it, with the reference cell as its center. This step is done to overcome holes in urban areas, such as terrain, airports, or massive open public places. Population grids that meet the population density threshold per kilometer are grouped for adjacent grids. They are based on four rook neighbors (which do not include neighbors on the diagonal side), not based on eight queen neighbors (which have neighbors on the diagonal side).

Furthermore, it is classified into core, fringe, town, and rural. The threshold used in defining urban and suburban is: (a) core, with a population density of more than 4000 people per km^2 and a total population of more than 400,000 people, (b) fringe, with a population density of more than 2000 people per km^2, (c) suburban, a standing area alone, a population density of more than 2000 people per km^2 and a total population of more than 200,000 people. The area is said to be urban if it consists of cores and fringes.

The size of cities formed, urban and suburban is based on a population grid of 1 km^2. While other available data, such as wages and individual characteristics, are only available at the district/city level, there is no personal location point. Therefore, the size of the resulting city needs to be mapped to Indonesia's districts/cities. The way to do this is that a district belongs to an urban or suburban area, if at least 50 percent of the district's population is included in that urban area.
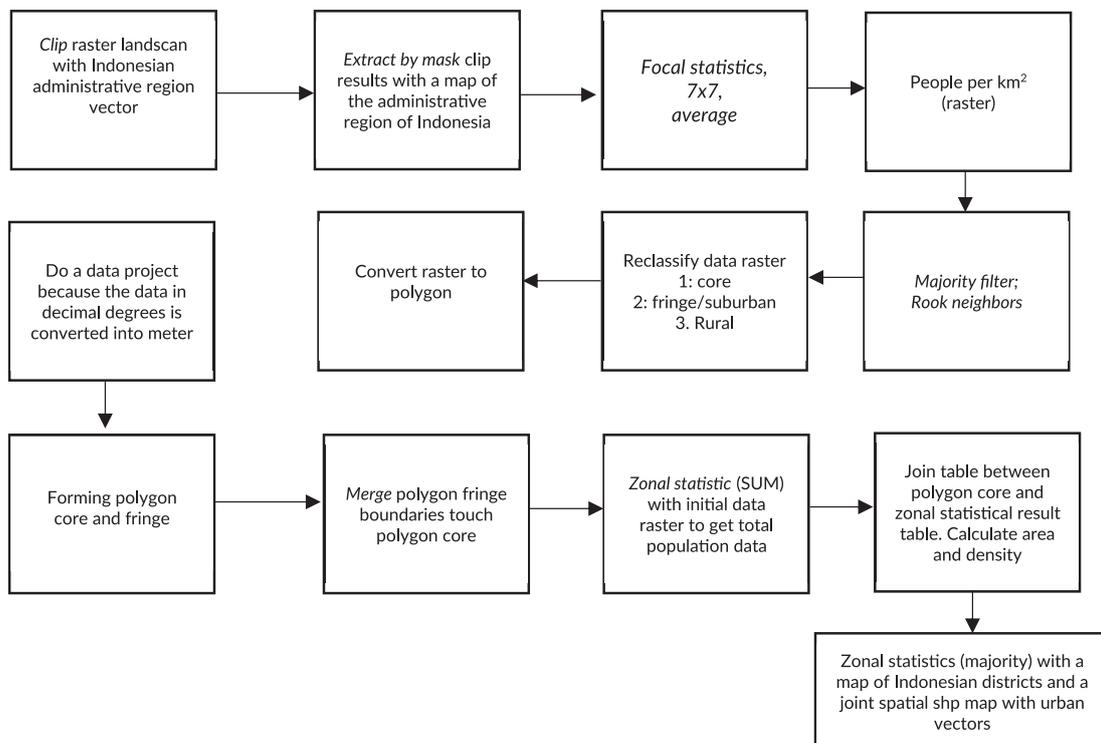
Indonesian Tourism Demand by ASEAN Tourists:
A Panel Data Analysis

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Abstract

Indonesia recorded the lowest average foreign tourist arrivals compared to ASEAN central countries, thus proving that Indonesia has yet to be thoroughly used as the primary destination for foreign tourists. Market forces influence the low number of foreign tourist arrivals in Indonesia. This study analyzes the impact of determining factors of ASEAN tourism demand in Indonesia. Panel data analysis with the Fixed Effect Model selection model explored Indonesia's tourism demand from five ASEAN countries from 2001 to 2020. The results showed that tourist expenditure, CPI, terrorism, and COVID-19 significantly negatively affect the number of Indonesian tourist visits. In contrast, the exchange rate and GDP per capita significantly positively impact the number of Indonesian tourist visits. Indonesia needs to improve the quality of tourism products and services to increase foreign tourist arrivals and implement international cooperation to create promotions for domestic tourism.

Keywords:

Indonesia tourism; ASEAN; panel data; tourism demand

INTRODUCTION

Tourism is a sector that contributes to supporting the Indonesian economy, including as a foreign exchange earner, developing business opportunities, employment, and regional development (Aisah & Deky, 2021). Quality and competitive tourism development need to be oriented toward aspects of tourism demand (Mukaffi, 2022). The development of national tourism, when accompanied by the purchasing power of tourists, can trigger an increase in the number of tourist visits, including foreign residents who will travel to countries outside their residences. Two factors influence global tourism growth, according to Pratomo (2009). First, external factors, namely factors that are not directly related to the tourism industry but affect tourism demand. Second, market power factors, namely factors that influence economic conditions, including demand, supply, and distribution of tourism products and services. From the demand side, economic conditions can be analyzed through two influences or effects. First, the effect of substitution (substitution effect), namely the occurrence of price changes with income, is considered unchanged. Second, the income effect, namely the difference in the number of goods demanded if there is a change in real income with prices thought unchanged.

The determinants of tourism demand can be seen from the price approach. Price is an essential factor in determining tourism demand. The price of tourism activities tourists need to spend can be described through tourist spending. Pratomo (2009) said cheaper tourism expenses would follow a decrease in tourism prices. More reasonable travel costs increase tourist visits. Research conducted by Kadir & Karim (2009) found that the tourism prices that tourists need to pay significantly have a negative effect on the number of tourist arrivals. The higher the price, the lower the intention of foreign tourists to visit, so a country must be able to maintain price competition. These results are inconsistent with the findings of Choyakh (2009), which states that prices cannot increase tourist arrivals. This study suggests that destinations or competing countries influence the arrival of foreign tourists.

The price of tourism activities can also be measured through the cost of foreign currency against the domestic currency, or called the exchange rate. The exchange rate indicator is an essential factor for foreign tourists to pay attention to because the exchange rate can be used for transactions between countries and is used to see foreign exchange conditions. Demand for foreign exchange more significant than the supply will be followed by an increase in the price of the foreign currency itself so that foreign currency becomes more expensive and a country's exchange rate weakens. There is a negative and significant effect between the exchange rate and the number of tourist visits shown in the research of Abbas & Ibrahim (2011); Hanafiah & Harun (2010). An increase in foreign currency against the destination country's currency will indicate a weakening of the destination country's currency so that more tourists will want to travel because the required cost of living tends to be cheaper. Different findings are explained in the research by Vanegas & Croes (2000), which states that the exchange rate has a positive and insignificant relationship to the number of tourist visits. The

study explains that most tourists need to adjust their travel plans, or in other words, tourism demand is inelastic to exchange rates.

Tourism prices refer to the costs of goods and services consumed by tourists at their destination, where the calculation can be based on the Consumer Price Index (CPI). The CPI is also used to measure the inflation rate's effect on the tourism industry. More minor price changes indicate that the purchasing power of consumers from the country of origin is greater than that of consumers from the destination country, followed by an increase in tourist visits. The influence between the CPI and the number of tourist visits is shown through research conducted by Abbas & Ibrahim (2011); Hanafiah & Harun (2010) stated that relative prices proxies through the CPI significantly negatively affect the number of tourist arrivals. An increase in tourism prices, in general, can reduce tourist visits. These findings contradict the research of Leitão (2015), which states that the CPI positively affects tourism demand. This study assumes that a higher price of tourism indicates a quality tourism product so that tourist demand increases.

Tourism demand is not only influenced by the price factor but also by income levels. Classical economic theory explains that the determinants influencing tourism demand are based on per capita income indicators (Hermawan & Wardhana, 2016). An increase in per capita income will accompany an increase in tourist visits because tourism is considered a non-luxury good (Habibi & Abbasinejad, 2011). Other findings suggest different results where an increase in per capita income causes a decrease in the number of tourist visits in the short term. These conditions indicate that tourist income is not only allocated for tourism interests but is used to meet other needs (Fahmi & Lafani, 2021).

Indonesia, as a developing country, has the opportunity to attract more tourists from the tourism market segment because Indonesia has a variety of natural and cultural wealth. For this reason, studies related to tourism demand are needed to analyze the factors that influence the number of tourist visits and input material in determining policies to improve the quality of domestic tourism. Several previous studies have analyzed tourism demand through the approach of external factors such as the occurrence of terrorism or war, as well as market power factors from the demand side, both through price effects and income effects that occur in several countries in the world with different influences (Abbas & Ibrahim, 2011; Choyakh, 2009; Habibi & Abbasinejad, 2011; Hanafiah & Harun, 2010; Kadir & Karim, 2009). However, this study added the COVID-19 variable to see the effect of the latest disease outbreaks that have spread to almost all corners of the world on Indonesian tourism. Therefore, this research is considered important as a complement and renewal of research that has been done before, especially after the spread of the COVID-19 outbreak globally.

It is observed many studies in the world analyze the factors that influence tourism demand. Most previous studies only examined the impact of market power or external factors. This study adds the COVID-19 factor to see the significant impact of the

recent outbreak on the tourism industry, which is also a novelty for this research. As a contribution, the results of this research are expected to be the basis or material for consideration in formulating policies to increase tourist visits to Indonesia, such as establishing international cooperation and tourism promotion. This study aims to analyze whether tourist expenditure, exchange rates, GDP per capita, CPI, terrorism, and COVID-19 can significantly affect the number of tourist visits from five ASEAN countries, namely Malaysia, Singapore, Thailand, Philippines, and Brunei Darussalam to Indonesia.

METHODS

The type of data used in this study is secondary data, namely research data sources obtained indirectly by intermediaries or other parties. This study uses panel data (pooled data) covering five ASEAN countries, Malaysia, Singapore, Thailand, Philippines, and Brunei Darussalam to Indonesia from 2001 to 2020. The data in this study were obtained through the ASEAN Statistics and UNCTAD Statistics websites. Secondary data collection techniques in this study used document materials, namely research that utilized data generated by other parties and did not directly collect their data in the field.

The analysis technique used in this study was panel data regression analysis. Panel data is a combination of cross-sectional data and time series data. There are three approaches to the estimation analysis of panel data regression models, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The econometric model in this study is systematically derived in Equation (1).

$$Y_{it} = \alpha + \beta_1 X_{1_{it}} + \beta_2 X_{2_{it}} + \beta_3 X_{3_{it}} + \beta_4 X_{4_{it}} + \beta_5 D_{1_{it}} + \beta_6 D_{2_{it}} + \varepsilon \qquad (1)$$

$$LnY_{it} = \alpha + \beta_1 LnX_{1_{it}} + \beta_2 LnX_{2_{it}} + \beta_3 LnX_{3_{it}} + \beta_4 X_{4_{it}} + \beta_5 D_{1_{it}} + \beta_6 D_{2_{it}} + \varepsilon \qquad (2)$$

Where:

Ln = natural logarithm

Y = number of tourist visits

X_1 = expenditure of tourists from ASEAN countries

X_2 = ASEAN countries' currency exchange rates against the rupiah

X_3 = GDP per capita of ASEAN countries

X_4 = CPI of ASEAN countries

D_1 = dummy terrorism

D_2 = dummy COVID-19

i = country in ASEAN

t = year

ε = error term

The independent variables and the dependent variable used in this study have different units, so efforts are needed to change the scale of measurement of the original data into other forms in order to be able to fulfill the underlying assumptions through data transformation. The form of data transformation used in this study is the natural logarithmic transformation according to Equation (2) previously. The CPI variable is not put in logarithmic form because the CPI contains a percent element (%) which, if entered into the logarithm will cause a loss of meaning. The terrorism dummy and COVID-19 dummy variables are also not included in the logarithm because the dummy contains a nominal value of zero (0) where the numerical basis cannot be logarithmic (the numeric must be greater than zero).

RESULT AND DISCUSSION

Estimating the panel data regression in this study was carried out using two approaches, namely the Common Effect Model (CEM) and the Fixed Effect Model (FEM). This study did not test using the Random Effect Model (REM) approach because the number of coefficients between the estimators is greater than the number of cross-sections used. Based on the results of the Chow test calculations, the probability value of 0.0000 is lower than the 5% significance level. The Fixed Effect Model is better than the Common Effect Model.

Table 1. Regression Result

No.	Variable	CEM	FEM
1.	Constant	30.07013	11.73039
		(0.0000)	(0.0000)
2.	LNTE	-1.663383	-0.464358
		(0.0000)	(0.0006)
3.	LNER	-0.563464	0.339842
		(0.0057)	(0.0013)
4.	LNGDP	0.323201	0.303266
		(0.1281)	(0.0122)
5.	CPI	0.006536	-0.063643
		(0.9353)	(0.0259)
6.	D1	-0.494247	-0.326508
		(0.1098)	(0.0021)
7.	D2	-0.173523	-1501514
		(0.7769)	(0.0000)

The model in this study uses an Ordinary Least Square (OLS) basis, so it is necessary to test the classical assumptions. Based on the normality test, the probability value of Jarque-Bera is 0.368242, which is greater than the 5% significance level (0.368242 > 0.05), so the residual values are normally distributed. Utilizing the multicollinearity test carries out tests carried out to determine whether or not there is a relationship between the independent variables used in the study. The following table presents the output of the multicollinearity test.

Table 2. Multicollinearity Test Results

	LNTE	LNER	LNGDP	CPI	D1	D2
LNTE	1.0000	0.1023	-0.3570	0.0359	0.1014	-0.0299
LNER	0.1023	1.0000	-0.0313	0.0900	0.1944	-0.1754
LNGDP	-0.3570	-0.0313	1.0000	-0.4612	0.0188	-0.0323
CPI	0.0359	0.0900	-0.4612	1.0000	-0.1741	-0.1790
D1	-0.0299	-0.1754	-0.0323	-0.1790	-0.1409	1.0000
D2	0.1014	0.1944	0.0189	-0.1741	1.0000	-0.1409

Based on Table 2, the correlation of each independent variable is less than 0.85, so it can be concluded that there is no multicollinearity between the independent variables in the regression model. The circumstances of the emergence of variable variant inequalities in the residual variable regression model from one observation to another require heteroscedasticity testing. The following describes the results of the heteroscedasticity test that has been obtained.

Table 3. Heteroscedasticity Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.088032	1.774198	0.049618	0.9605
LNTE	0.095073	0.176407	0.538943	0.5914
LNER	0.009705	0.114142	0.085024	0.9324
LNGDP	0.206949	0.125354	1.650915	0.1025
CPI	-0.004799	0.036537	-0.131348	0.8958
D1	-0.149595	0.135158	-1.106815	0.2715
D2	0.266467	0.276943	0.962173	0.3387

Based on the results of the heteroscedasticity test in Table 3, the overall probability value generated by each independent variable is greater than the significance level of 0.05, so it can be concluded that there is no heteroscedasticity problem in panel data regression. Based on the R^2 results from the regression model, an Adjusted R-squared value of 0.945323. The study results show that the percentage contribution to the influence of the independent variables, namely tourist expenditure, exchange rates, GDP per capita, CPI, terrorism, and COVID-19 on the dependent variable, namely the number of tourist visits is 94.53%. In the same condition, the remaining 5.47% is explained by other variables not included in the model.

Table 4. Hypothesis Test Results

Variable	Notation	t-Statistic	Prob.	Description
Tourist expenditure	LNTE	-3.550450	0.0006	Significant
Exchange rate	LNER	3.327849	0.0013	Significant
GDP per capita	LNGDP	2.557796	0.0122	Significant
CPI	CPI	-2.265785	0.0259	Significant
Terrorism	D1	-3.176194	0.0021	Significant
COVID-19	D2	-7.224738	0.0000	Significant

Based on Table 4, can explain that all independent variables have a significant effect on the number of visits by Indonesian tourists from 2001-2020. Meanwhile, the education variable has no significant impact on the number of poor people. Tourist expenditure from five ASEAN countries significantly negatively affects the number of visits by Indonesian tourists. Suppose there is a 1 percent increase in ASEAN tourist expenditure. In that case, it will be followed by a decrease in Indonesian tourist visits by 0.464358 percent, assuming other variables are constant. This study's estimation results align with the theory stated by Sinclair & Stabler (2002), where there is a negative effect between the prices represented by tourist expenditure from the five ASEAN countries and the number of visits by Indonesian tourists from 2001 to 2020. This finding is supported by research by Martins et al. (2017), which states that the relative decline in domestic prices helps increase world tourism demand because consumers pay close attention to price comparisons when they choose a destination and buy goods or services at that destination. Sianipar et al. (2016) also supported this finding, stating that Australian tourism prices negatively affect the amount of Australian tourism demand in the short-term relationship.

One of the ways ASEAN tourists respond to changes in tourism prices is by changing the amount they spend on their trips. Tourist expenditure shows that most of the five ASEAN countries visiting Indonesia have a downward trend from 2001 to 2020. This

indicates a decline in tourism prices and decreased spending per visit. An increase will follow the decline in tourism prices in demand for ASEAN tourists because the prices offered are relatively lower.

The exchange rates of the five ASEAN countries significantly positively affect the number of visits by Indonesian tourists. Suppose there is an increase of 1 percent in the ASEAN exchange rate. In that case, it will be followed by the rise in the number of visits by Indonesian tourists by 0.339842 percent, assuming other variables are constant. The positive relationship between price and tourism demand indicates that price elasticity is inelastic. The number of goods demanded is less sensitive to price changes, so a price increase will only slightly reduce tourism demand. This finding is supported by the results of Agesti (2017), which argues that the exchange rates of six Asia Pacific countries have a significant positive relationship with the demand for tourism in Indonesia. Tung (2019) also supported this finding, which stated that the exchange rate positively impacted the demand of foreign tourists. It indicated that the domestic currency devaluation also positively affected the number of foreign tourists to Vietnam.

The strengthening of the five ASEAN countries' exchange rates against the rupiah shows an increase in the number of tourists visiting Indonesia. Strengthening the currencies of the five ASEAN countries will be followed by a decrease in costs to be spent so that tourist visits to Indonesia will increase. ASEAN tourists will benefit because travel and accommodation costs are relatively cheap, so tourists will sell their currency to get the rupiah. This can also help Indonesia achieve the target of foreign tourist arrivals yearly.

The GDP per capita of the five ASEAN countries has a significantly positive effect on the number of visits by Indonesian tourists. Suppose there is an increase of 1 percent of ASEAN GDP per capita. In that case, it will be followed by the rise in the number of visits by Indonesian tourists by 0.303266 percent, assuming other variables are constant. The estimation results in this study align with the theory stated by Sinclair & Stabler (2002), where there is a positive influence between income represented through GDP per capita of ASEAN and the number of visits by Indonesian tourists from 2001 to 2020. These results are supported by findings from Akter et al. (2017), which argue that there is a positive relationship between the increase in GDP per capita in the origin country and arrivals in the destination land. Martins et al. (2017) also supported this finding, which stated that an increase in the World GDP per capita does help to boost the number of arrivals because the wealth and size of the economy might influence the tourism demand functions.

The five ASEAN countries that visited Indonesia generally had income levels that had increased over the last 20 years. This shows that Malaysia, Singapore, Thailand, the Philippines, and Brunei Darussalam have high purchasing power, so an increase can follow an increase in tourist income in demand for tourism in Indonesia. Or it can be interpreted that with increasing revenue, the purchasing power of tourists for tourism

prices also increases because tourists can set aside their money for tourism needs. An increase in revenue followed by the rise in tourism consumption shows that tourism in Indonesia is a normal good.

The CPI of the five ASEAN countries significantly negatively affects the number of visits by Indonesian tourists. If there is an increase of 1 percent in the ASEAN CPI, it will be followed by a decrease in the number of visits by Indonesian tourists by 0.063643 percent, assuming other variables are constant. This study's estimation results align with the theory stated by Sinclair & Stabler (2002), where there is a negative effect between prices represented through the CPI of the five ASEAN countries and the number of visits by Indonesian tourists from 2001 to 2020. These results are supported by findings from Abbas & Ibrahim (2011), which stated that the CPI of the country of origin of tourists had a significantly negatively affected on the number of Egyptian tourist arrivals. Akter et al. (2017) also supported this finding, which argue that there is a negative relationship between the CPI of Bangladesh and tourist arrival.

The CPI proves that the five ASEAN countries visiting Indonesia from 2001 to 2020 generally experienced a downward trend. This means that the price of goods and services to the tourism industry has fallen, which has led to a decrease in the CPI. The decline in the CPI will be accompanied by a reduction in prices relative to ASEAN, which will reduce the number of ASEAN tourist visits to Indonesia.

Terrorism that occurred in Indonesia significantly negatively affects the number of tourists visiting. The coefficient value of -0.326508 indicates a negative direction between terrorism that occurs in Indonesia and the number of Indonesian tourist visits, which means that the number of tourist visits when terrorism occurs decreases by 0.326508 percent. These results are consistent with the theory of tourism demand, where war or terrorism can affect tourism demand (Fletcher et al., 2018). This finding is in line with the research from Samitas et al. (2018), which stated that terrorism has a decisive negative impact on tourism demand in Greece. Buigut et al. (2022) also supported this finding, which said that terrorism events within Malaysia consistently show a negative and significant impact on international arrivals. The possibility of terrorist attacks in tourist destination countries can cause discomfort for tourists because tourism security factors can be threatened it can reduce the number of tourists nationally (Karjaya et al., 2018).

COVID-19 has significantly negatively affected the number of visits by Indonesian tourists. A coefficient value of -1.501514 indicates a negative direction between COVID-19 and the number of Indonesian tourist visits, which means that the number of tourist visits after COVID-19 has decreased by 1.501514 percent. These results are consistent with the theory of tourism demand, where the emergence of epidemics and outbreaks can affect tourism demand (Fletcher et al., 2018). This finding is in line with research by Tran et al. (2020), which stated that COVID-19 had a significant negative effect on the number of tourist visits from APEC countries. This study explains that the health status of the destination country strongly influences tourism. The emergence of COVID-19

can cause fear and anxiety (fear of travel) for potential tourists who will travel and leave their residence because there is a possibility of being infected with the virus when visiting a country with a high number of active cases (Zenker et al., 2021). Schmude et al. (2021) also supported this finding, which argue that COVID-19 has been able to trigger changes in tourism demand, such as reduced tourist areas and major events due to reduced foreign tourists.

CONCLUSION

The results of the study show that tourist expenditure, CPI, terrorism, and COVID-19 have a significant negative effect on the number of visits by Indonesian tourists. In contrast, the exchange rate and GDP per capita significantly positively affect the number of visits by Indonesian tourists. Based on these six significant variables, the occurrence of terrorism had the greatest influence on the number of tourist visits to Indonesia from 2001-2020. Indonesia needs to improve the quality of tourism products and services to boost spending by foreign tourists. Accelerating the development of aspects of tourism products in priority destinations in Indonesia and improving market strategies through tourism promotion to several countries with high per capita GDP levels so that they have the potential to make visits to Indonesia can do this. Publicizing domestic tourism travel can also increase cooperation with foreign policymakers to attract tourists. In addition, Indonesia needs to keep tourism prices competitive by maintaining currency exchange rate stability.

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Forecasting Export Volume of Indonesian and Colombian Coffee in the World Market using ARIMA Model

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Abstract

Colombian coffee exports influence Indonesian coffee exports in the short term, so this study aims to forecast the export volume of Indonesian and Colombian coffee in the future. The study used time-series data from 2001 to 2021, further analyzed using the ARIMA model. Based on the projection, Indonesian coffee export is projected to increase with an average value of 1.14 percent and a potential increase of 1.79 percent. However, this result still needed to reach the desired value since the projected coffee export of Indonesia in 2025 only reached 429 172 tons, or lower than the export quantity of Colombian coffee in 2011. This finding indicated that Indonesian coffee export tended to increase stagnantly and was considered low compared to the increasing export of Colombian coffee.

Keywords:

ARIMA; coffee; export volume; forecasting

INTRODUCTION

Coffee is a commodity that is consumed in almost every country. It has a bitter but unique taste and is usually served either cold or hot, increasing public interest in consuming coffee daily. Therefore, there was surplus demand in 2016 caused by a coffee supply of 147.94 million bags which was lower than its demand of 151.30 million bags (Rosiana et al., 2017). Currently, world coffee is supplied by several major coffee exporting countries, including Indonesia and Colombia, where coffee has become the leading export commodity (Lizano, 2017; Torok et al., 2018). In 2019, the export volume of Indonesian coffee amounted to 359 053 tons, while Colombia successfully exported a value of 769 050 tons. According to the data, the export difference between Indonesian and Colombian coffee reached 409 997 tons, indicating quite a large gap where the export value of Colombian coffee was twice that of Indonesian coffee export.

The trade potential of the coffee commodity is still widely open since coffee producing countries do not yet fulfill coffee demand. Indonesia and Colombia should maximize the situation to increase their coffee export volume globally. However, Indonesia experienced a fluctuating coffee export volume over the last five years. In 2014, the export of Indonesian coffee was 384 827 tons and further increased in 2015 to reach 502 020 tons, but drastically decreased in 2018 to a value of 279 960 tons. On the other hand, Colombia has had a stable coffee export for the last five years. In 2014, the export volume of Colombian coffee was 623 367 tons, which later increased to 717 944 tons in 2015, and 722 540 tons in 2018.

Despite the fluctuating export volume, it is predicted that the Indonesian coffee export value will increase (Erlina & Azhar, 2020). The export volume of Robusta coffee, one of the types of coffee exported by Indonesia, is also forecast to experience an annual 1.6 percent increase, even though Robusta is considered the second-class coffee with quality that is less able to compete in the international market (Chandra et al., 2013; Sahat et al., 2018). An increase in export volume might occur in trade among importing countries in the ASEAN region, showing an increasing coffee export in Malaysia, Thailand, and Vietnam (Ginting & Kartiasih, 2019). Research conducted by Deina et al. (2021) predicted the price of Brazilian coffee using several analytical methods, including ARIMA but the resulting model was only significant for Arabica coffee. Gopinath et al. (2019) predicted that coffee production in India would continue to decline.

Previous research only forecast Indonesian coffee exports in the international market (Chandra et al., 2013; Erlina & Azhar, 2020; Hamzah et al., 2020). Their research shows that Indonesia's coffee exports are predicted to increase. However, research that compares Indonesia's coffee export forecast with other coffee-producing countries has not been widely studied. So, this study was conducted to compare the forecasted volume of Indonesian coffee exports and Colombian coffee exports with a long data range, from 2001 to 2021 using ARIMA model. This is done because it is based on (Zuhdi et al., 2021), Indonesian coffee exports in the short term are influenced by Colombian coffee exports. Therefore, Colombian export forecasting will be needed to determine Colombia's potential in the international coffee trade, which

disrupts Indonesia's export volume. This information can be used by the government to determine the policy for developing the Indonesian coffee industry to face coffee marketing competition in the international market taking into account domestic coffee production. Thus, this study aims to determine the potential changes in the export volume of Indonesian and Colombian coffee for the next five years.

METHODS

This study used *time series* data of 21 years (2001-2021) collected from the COMTRADE. The data were further analyzed using the *Autoregressive Integrated Moving Average* (ARIMA) model to obtain the short-term forecast related to coffee export in Indonesia and Colombia with the help of Minitab 19. The ARIMA method is the development of the Autoregressive Moving Average (ARMA) model, which consists of Autoregressive (AR) and Moving Average (MA) models (Jia et al., 2015; Siami-Namini et al., 2019). Zhang et al. (2017) reported a difference between ARIMA and ARMA models concerning the differencing process in ARIMA. The primary data obtained were replaced by the difference between the current and previous data; thus, the ARIMA model could minimize the non-stationarity of time series data that often leads to inaccurate forecasts.

ARIMA is a model frequently used in forecasting based on the behavior of variables and completely ignores the independent variable in the model (Qonita et al., 2017). Mathematically, the ARIMA model is written as follows:

$$(1 - \emptyset_1 \beta)X_t = \mu' + (1 - \theta_1 \beta)\varepsilon_t \qquad (1)$$

Where X_t is data in period-t, $\emptyset_1$ is the autoregressive parameter-1, and ε_t is an error in time-t.

There are three stages in ARIMA modeling, namely: identification of model structure, estimation of parameter, also calibration, testing, and validation of model (Sena & Nagwani, 2015). According to Riyanto & Mulyono (2019), the stages for forecasting using the ARIMA model are as follows:

Identification of Model Structure

Identification of the structure of the model is the stage to test the stationarity. Data are considered stationary if the data statistically show a constant pattern over time, either the *mean* or *variance*. However, differencing is required if data are not yet stationary. If Xt is stationary at level, which means d = 0, the model specification is ARIMA (p,0, q). If Xt is not stationary at level but is stationary after first order *differencing*, the model specification is ARIMA (p,1,q). If the process is not yet stationary after first-order differencing but is finally stationary after second-order *differencing*, the model specification is ARIMA (p,2,q). The following identification stage is determining the order of AR (p) and MA (q). In this stage, the autocorrelation function and partial autocorrelation function will determine the value of p and q. The *Autocorrelation Function* (ACF) and *Partial Autocorrelations Function* (PACF) are explained as follows:

- For AR (1), all partial autocorrelation coefficients are equal to zero for k > 1, where k is lag-k. For AR (p), general conditions apply where all coefficients of partial autocorrelation are equal to zero for k > p

- For MA (q), the autocorrelation coefficient will be zero for k > q.

The specified ARIMA (p,d,q) model is selected through the identification stage.

Estimation of Parameter

Estimating parameter in an ARIMA model is necessary to obtain the model's parameter. The Moving Average (MA) model is one of the time series models possibly selected. Moreover, if the order q from the Moving Average process is known, there are three methods possibly applied in estimating the parameter: the Moment method, the Ordinary Least Square (OLS) method, and the Maximum Likelihood method (Nirwana et al., 2018). Due to the complexity of MA (q) parameter estimation, estimating ARIMA (p,d,q) parameter becomes very complex; hence estimation of the ARIMA parameter is done using the Maximum Likelihood method.

Calibration, Testing, and Validation of Model

There are two essential things to consider in the testing stage. First, ARIMA (p,d,q) model adopts the principle of *parsimony* (simple); thus, only significant lags should be included in the model. To say, if the process of model identification and specification results in ARIMA (1,1,2) as the suggested model, but after estimation and testing, it turns out the coefficient of MA (2) is not significant, the model to be used is ARIMA (1,1,1). Second, the ARIMA (p,d,q) model is considered to meet the criteria of *goodness of fit* if an error or residual is *random*. In other words, the model estimated can capture the data pattern, resulting in non-patterned *error*. Moreover, random *error* is determined by testing the autocorrelation coefficient and partial autocorrelation of *error*. *Error* or residual is considered *random* if all coefficients of autocorrelation and partial autocorrelation of *error* are equal to zero.

RESULT AND DISCUSSION
Overview of Indonesian and Colombian Coffee Export in the Global Market

Indonesia and Colombia are included in the world's five largest coffee exporting countries. In 2018, Indonesia placed fourth, and Colombia ranked third. The export volume of Indonesian coffee during 2001 – 2019 fluctuated highly; the highest export volume of 534 025 tons was observed in 2013, while the lowest was found in 2001 at around 250 817 tons. Several reasons were responsible for the fluctuated export volume of Indonesian coffee, such as the coffee production land was still traditionally cultivated; of a total of 1,615 million hectares of coffee plantations in Indonesia in 2018, about 1,194 million hectares were smallholder (community) plantations, and the private sector or the government managed the rest, coffee plants were no longer in productive age, farmers were not yet using high-quality beans, and poor processing of coffee bean (Martauli,

2018). The export value of Colombian coffee produced from a total area of 940 thousand Ha also found to be similarly fluctuated to Indonesia but caused by different reasons. The main factor responsible for the fluctuated export volume of Colombian coffee was the relocation of coffee production areas from Caldas, Quindío, and Risaralda to Huila, Antioquia, and Tolima due to cheaper labor costs and climate change (Gomez, 2018). The export volume of Colombian coffee in 2019 was the largest, amounting to 769 050 tons, while the lowest occurred in 2012 at approximately 400 650 tons (Table 1).

Table 1. The export volume of Indonesia and Colombia in 2001 - 2021

Year	Indonesia (ton)	Colombia (ton)
2001	250 817	560 246
2002	325 009	579 081
2003	323 903	579 223
2004	344 076	575 669
2005	445 929	617 316
2006	414 105	603 378
2007	321 404	638 304
2008	468 749	604 628
2009	510 898	460 865
2010	433 594	413 444
2011	346 492	437 140
2012	448 590	400 650
2013	534 025	547 569
2014	384 827	623 367
2015	502 020	717 944
2016	414 651	739 529
2017	467 797	720 911
2018	279 960	722 540
2019	359 053	769 050
2020	379 353	706 241
2021	382 930	700 641

Source: Secondary data processed (2022)

Analysis of *Autoregressive Integrated Moving Average* (ARIMA)
Identification of the model structure

Identification of the model is applied to test the stationarity of data since data stationarity is highly required in ARIMA analysis (Fattah et al., 2018). The time-series data will be tested for stationarity using plot analysis, and the differencing process is carried out if the data is not stationary until the data is stationary. The stationary data are then used for ACF and PACF testing (Harris, 2012). The two test results estimate the best ARIMA model for forecasting Indonesian and Colombian coffee exports.

Results of ACF and PACF tests for Indonesian coffee export data showed that the data obtained were likely in the moving average model, indicating that ARIMA (0,1,1) or ARIMA (0,1,2) was the best model to choose. Furthermore, the results of ACF and PACF tests on Colombian coffee export indicated that the data obtained were likely in the moving average model; hence the ARIMA model possibly built were ARIMA (0,2,1) and ARIMA (0,2,2).

Parameter estimation and model calibration

The next stage was the estimation of parameters and calibration of the model. This stage was applied to verify which ARIMA model is most suitable for the analysis. Estimation and calibration of the model is by comparing the p-value of each parameter coefficient with the tolerance level of 5 percent. Based on the test result of each ARIMA model, it was concluded that the best ARIMA models to forecast Indonesian is (0,1,1) because the p-value is smaller than 0.05, which is 0.001 (see Table 2). It was due to a better significant value obtained by the model than by other models.

Table 2. Estimation forecasting on Indonesian coffee export

Model/Parameter	Variable	Coef	SE Coef	t-Value	p-Value	MS
ARIMA (0,1,1)	MA (1)	0.682	0.180	3.79	0.001	6214.88
	Constant	3.71	5.96	0.62	0.542	
ARIMA (0,1,2)	MA (1)	0.724	0.238	3.04	0.007	
	MA (2)	-0.080	0.253	-0.32	0.755	6617.53
	Constant	3.83	6.68	0.57	0.574	

Source: Secondary data processed (2022)

Then, Colombian coffee export to the Global Market was ARIMA (0,2,1) because the p-value is smaller than 0.05, which is 0.000 (see Table 3). Although the p-value of ARIMA (0,2,2) is smaller than 0.05, that is 0.018, the value is greater than 0.000 in the ARIMA model (0,2,1).

Table 3. Estimation forecasting on Colombian coffee export

Model/Parameter	Variable	Coef	SE Coef	t-Value	p-Value	MS
ARIMA (0,2,1)	MA (1)	0.913	0.168	5.43	0.000	4514.13
	Constant	0.50	2.57	0.19	0.849	
ARIMA (0,2,2)	MA (1)	0.713	0.271	2.63	0.018	
	MA (2)	0.230	0.272	0.84	0.411	4491.46
	Constant	1.20	2.48	0.49	0.634	

Source: Secondary data processed (2022)

Model Testing and Validation

The ARIMA (0,1,1) and ARIMA (0,2,1) models were determined as the best ARIMA model used in this study to forecast the Indonesian and Colombian coffee export in the global market. The next stage required to verify the ARIMA model was performing a test for normality and independence in residuals (white noise). The Kolmogorov-Smirnov test for normality was done by comparing the test result with a known tolerance (0.05). If the p-value is greater than 0.05, the residual is normally ditributed and vice versa. Furthermore, the Ljung-Box test for independence was also performed by comparing the p-value with the tolerance level of 5 percent (0.05). If the p-value is greater than 0.05, there is no correlation between lags in the residuals.

Figure 1. The *Kolmogorov-Smirnov* test for Indonesian and Colombian coffee export

(a) Indonesian coffee export

(b) Colombian coffee export
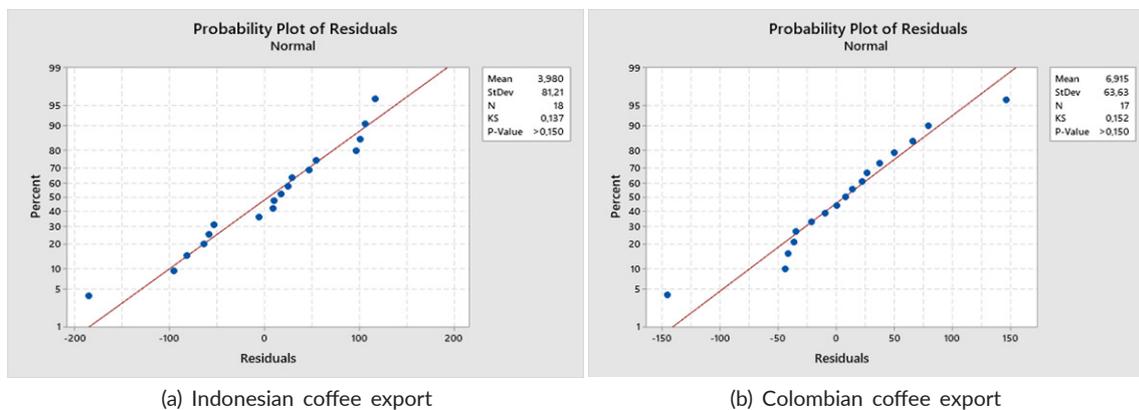
Based on the Kolmogorov-Smirnov test, it was concluded that the residual of the ARIMA (0,1,1) model for Indonesian coffee export data and the residual of the ARIMA (0,2,1) model for Colombian coffee export data were normally distributed since the *p-value* was greater than 0,05 and lay along the normal distribution line (Figure 10). A similar method was also used by Deina et al. (2021), Harris (2012), and Yashavanth et al. (2017). They argue that the model testing and validation stages are essential stages in determining the best model.

Table 4. The *Ljung-Box* test of Indonesian and Colombian coffee export

Residual	Lag	*Chi-Square*	*P-Value*	Description
Indonesian Coffee Export	12	11.57	0.315	White Noise
Colombian Coffee Export	12	16.45	0.087	White Noise

Source: Secondary data processed (2022)

Moreover, residual independence was examined through the Ljung-Box test. The result of the Ljung-Box test showed that the data processed were already homogenous or did not have a correlation between lags in the residuals. It was reflected by the result of the Ljung-Box test showing a p-value greater than 0.05; thus, H_0 was accepted (Table 4).

Projection of Indonesian and Colombian coffee export in the Global Market

Export value of Indonesian and Colombian coffee to the Global Market was further projected using ARIMA (0,1,1) and ARIMA (0,2,1) models to obtain the optimum, lower limit, and upper limit values of Indonesian and Colombian coffee export to the Global Market for the next five years (2021-2025). Mathematically, ARIMA (0,1,1) model was for Indonesian coffee export, and ARIMA (0,2,1) model was for Colombian coffee export, written in the following equation:

$$Zt = 4.74 + Z_{t-1} + 0.716a_{t-1} + a_t$$
$$Zt = 2.10 + Z_{t-1} + 0.951a_{t-1} + a_t$$

Based on the projection, it was found that Indonesian coffee export to the global market would experience an average increase of 0.93 percent with increased potential of 1.92 percent (Table 5). This value was still lower than a previous study which mentioned that Indonesian coffee exports, particularly the Robusta type, will have an average growth of 1.6 percent per year (Chandra et al., 2013). This increase was still considered below the expectation since projections in 2026 showed that Indonesian coffee export will only reach 409 339 tons or 4 106 tons lower than the export quantity of Colombian coffee in 2010. In contrast, Indonesian coffee export potential to the Global Market will possibly reach 592 414 tons or 44 845 tons higher than the export quantity of Colombian coffee in 2013.

This finding implied that Indonesian coffee export tended to increase stagnantly and was considered low compared to the increasing export of Colombian coffee. This result was confirmed by the projection showing that Colombian coffee export to the Global Market will experience an increase of 1.53 percent with a potential increase of approximately 6.97 percent (Table 6). Many factors caused the low export volume of Indonesian coffee, but the main reason was the low coffee production affected plantation management, harvest and post-harvest handling that was still inadequate; also, coffee plantation ownership was still dominated by smallholder plantations which resulted in low coffee production (Manalu et al., 2019). On the other hand, Colombia continued to improve the quality of the coffee product since players in the coffee industry focused on increasing coffee quality despite the declining coffee production quantity that occurred at the same time (Stringer & Roldán-Pérez, 2013).

Table 5. The forecasting value of Indonesian coffee export with the ARIMA (0,1,1) model

Year	Forecasting (ton)	Growth (%)	Lower Limit (ton)	Upper Limit (ton)	Growth Potential (%)
2022	394 511		239 965	549 058	
2023	398 218	0.94	236 068	560 369	2.06
2024	401 925	0.93	232 512	571 338	1.96
2025	405 632	0.92	229 255	582 008	1.87
2026	409 339	0.91	226 263	592 414	1.79
Average	401 925	0.93	232 813	571 037	1.92

Source: Secondary data processed (2022)

Table 6. The forecasting value of Colombian coffee export with the ARIMA (0,2,1) model

Year	Forecasting (ton)	Growth (%)	Lower Limit (ton)	Upper Limit (ton)	Growth Potential (%)
2022	710 501		578 787	842 210	
2023	720 856	1.46	526 321	915 390	8.69
2024	731 708	1.51	483 216	980 200	7.08
2025	743 057	1.55	444 185	1 041 930	6.30
2026	754 902	1.59	407 291	1 102 510	5.81
Average	732 205	1.53	487 960	976 450	6.97

Source: Secondary data processed (2022)

The forecast results also show that Indonesia's coffee export growth will decreased every year from 0.94% in 2023 to 0.91% in 2026 (Table 5). On the other side, the Colombia's coffee export forecast shows an increase in growth every year from 1.46% in 2023 to 1.59% in 2026 (Table 6). This condition can be interpreted that if Indonesia does not make significant changes in the development of the coffee industry and continues to rely on farming that has been carried out by farmers so far, it is estimated that Indonesia will lose its competitiveness in international market. Research conducted by Narulita et al. (2014) shows that Indonesian coffee still has competitiveness in international market. However, the potential loss of competitiveness according to the forecast results could cause Indonesia's coffee market share in the international market to shrink and be taken over by other coffee producers such as Colombia.

Results of the analysis above also showed that the export volume potential of Indonesian coffee is still far behind that of Colombia. It confirms that Indonesia still faces intense competition from Colombia regarding the coffee trade in the international market (Purnamasari et al., 2014). To face this competition, Indonesia have to improve the competitiveness of its coffee by increasing the quantity and quality coffee and strengthening government coordination with the private sector (Yulia Putri & Salam, 2019). In the context of international competition, Indonesia must also be able to produce coffee that meets international standard by adapting good farming practices to qualify the sustainability certification (Wahyudi et al., 2020). In addition, efforts to increase exports can also be done with a better trade relations and entering into trade agreements (Atif et al., 2019).

If the government is serious about making coffee a leading export commodity of Indonesia, the upstream sector, particularly the on-farm aspect of the coffee plantation, should be taken into concern; as mentioned by Malaisamy et al. (2020), Indian coffee was able to be optimally produced due to the use of shade trees that was suitable to the land condition of coffee plantation. Later, Bhattarai et al. (2020) suggested that factors influencing coffee production in Nepal included the adoption of plants to intercrop with coffee and shade trees, planting distance, access to irrigation facilities, farmer experience in coffee cultivation, ownership of the vehicle, and participation in program training related to coffee production and marketing. The government of Indonesia can adopt the coffee cultivation method in both countries to increase the productivity of coffee plants; thus, the forecast will not occur.

CONCLUSION

The ARIMA (0,1,1) dan ARIMA (0,2,1) models were considered the best ARIMA model for forecasting Indonesian and Colombian coffee export in the Global Market. Based on the projection, it was found that Indonesian coffee export to the Global Market will averagely increase by 0.93 percent with a potential increase of 1.92 percent. This increase was still considered lower than the desired value since the projected result showed that Indonesian coffee export in 2026 will only reach 409 339 tons or 4 106 tons lower than the export quantity of Colombian coffee in 2010. Moreover, Indonesian coffee export potential to the Global Market will possibly reach 592 414 tons or 44 845 tons higher than the export quantity of Colombian coffee in 2013. This finding implied that Indonesian coffee export tended to increase stagnantly and was considered low compared to the increasing export of Colombian coffee. This result was confirmed by the projection showing that Colombian coffee export to the Global Market will experience an increase of 1.53 percent with a potential increase of approximately 6.97 percent.

The forecast results also show that Indonesia has the potential to lose coffee competitiveness so that the government have to improve the quantity and quality of its coffee. Indonesia must be able to produce coffee that meets international standard by adapting good farming practices to qualify the sustainability criteria. This is because the sustainability issue has become a concern for international consumers in choosing agricultural products. To fulfill this, the government must pay attention to improving the coffee cultivation process by disseminating the latest cultivation technology to farmers.

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Unemployment in Indonesia:
An Analysis of Economic Determinants from 2012-2021

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Abstract

The economic problem is one of the things that the Indonesian government must consider. One of them is unemployment because it impacts the socioeconomic conditions of society. This condition is necessary to suppress or reduce the unemployment rate. This research was conducted to determine the conditions and variables affecting Indonesia's unemployment rate. The data analysis used is an econometric model on dynamic panel data using the Generalized Method of Moments (GMM) developed by Arellano Bond. The study results show that the Human Development Index, inflation, minimum wages, and worker numbers significantly influence Indonesia's unemployment. In addition, the unemployment lag also has a significantly positive effect on unemployment. The findings of this study provide information on strategies for increasing the demand and supply of labor, wage regulation, search, match effectiveness in the labor market, and realistic short- and long-term policies.

Keywords:

unemployment rate; dynamic panel data regression; generalized method of moments (GMM)

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INTRODUCTION

Indonesia has a very dense population, so it experiences significant and speedy population growth. Therefore, economic growth is needed in order to keep pace with population growth. However, the dense population can handle problems (Johan et al., 2016). The economic problem is one of the things that the Indonesian government must consider. One of them is unemployment because it impacts the socioeconomic conditions of society (Nguyen & Le, 2022).

Unemployment is when a person or individual searching for a job focuses on obtaining information about job vacancies and the intensity of the job search but still needs to get the job they want (Hooft & Wanberg, 2012). The cases causing the unemployment rate could be the high population, limited employment opportunities disproportionate to the number of job seekers, low per capita income, and the current impact of information and communication technology (Shabbir & Alam, 2019). Indirectly, the unemployment rate becomes a macroeconomic problem that dramatically influences all aspects of social welfare (Hasan & Sun'an, 2020). Some factors affect the unemployment rate in developing countries such as Indonesia.

Figure 1. Open Unemployment Rate in Indonesia 2011-2021
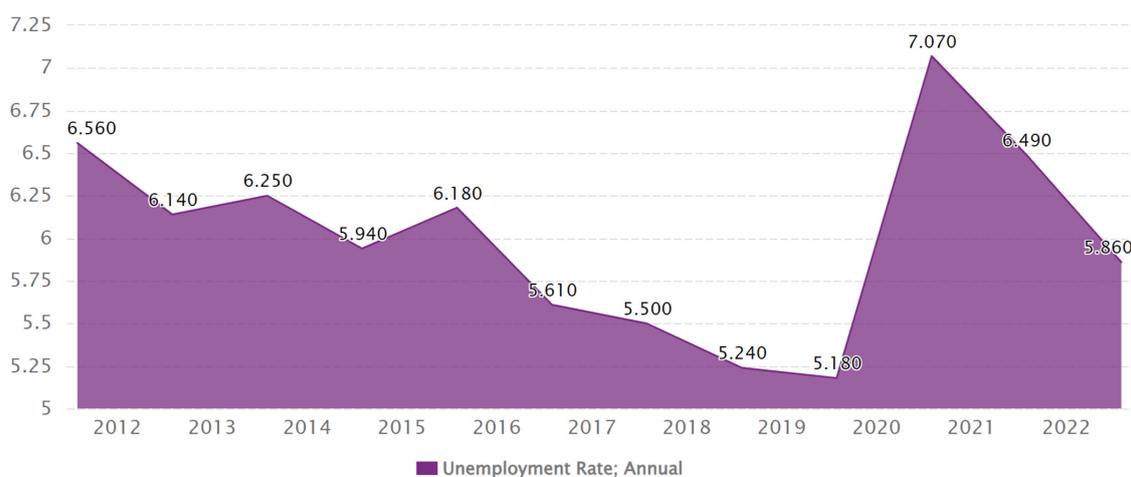
Source: Central Bureau of Statistic

Empirically, the highest unemployment rate was 7.07% when the COVID-19 pandemic first appeared in 2020. In comparison to 2019, this increased by 1.84% to its peak. Based on data, the open unemployment rate in Indonesia has fluctuated and has tended to decrease from 2015 to 2019. Unemployment in Figure 1 from 2011 to 2019 tends to be flat or does not experience an excessive increase in numbers, but in 2020 and 2021, there is a very high increase in unemployment; this is due to the COVID-19 pandemic.

The urgency of alleviating unemployment is based on considerations and trends concerning people's welfare (Abomaye-Nimenibo, 2022). Therefore, many jobs are needed to produce goods and services so that the number of unemployed people decreases and

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people's welfare increases. Minimizing the unemployment rate is very important (Shi & Wang, 2022). Indirectly, people have jobs and income to meet their needs so that welfare can be felt. One of the efforts that can be made is to increase human resources based on the role of the community, which is considered necessary so that the problem of unemployment can be minimized and overcome.

The continuously increasing rate of economic growth will positively impact various aspects of economic development, including increasing development opportunities for companies to encourage job creation and improve people's welfare (Segun & Samson, 2015). The Human Development Index, or human capital, must be prioritized and strategically positioned to increase current and future economic growth and development. Increased economic growth caused by GRDP in a region is expected to be able to absorb labor, and an increase in the gross regional domestic product (GRDP) can increase production capacity (Valeriani., 2019). It can be indicated that the decline in the level of GRDP can affect the high number of unemployed people (Potocky-Tripodi, 2013). The unemployment rate in Indonesia often changes. Changes in the unemployment rate in Indonesia occur due to the increasing number of labor force members but are not accompanied by an increase in investment (Astrid & Soekapdjo, 2020).

Studies on dynamic panel data conducted by Soylu et al. (2018) about the issue of unemployment and economic growth using the unit root panel, pooled OLSP panel, and Johansen co-integration test panel for Eastern European countries for the period 1992–2014 found that unemployment was positively affected by economic growth. In other words, a 1% increase in GDP will reduce the unemployment rate by 0.08% because of Okun's coefficient for Eastern European countries and because there is co-integration between macroeconomics.

Investment has a vital role in a country's economy, and domestic investment (PMDN) is a source of investment (Cahyaningtyas, 2022). A country with a PMDN level will generate numerous new industries. As a result, PMDN can create jobs to absorb labor and reduce unemployment (Islamiah, 2020). Investment also causes an increase in the production of goods, affecting labor demand. This condition has an impact on reducing unemployment. In Indonesia, investment has a positive impact on the economy. Some policies need to be taken by the government to help increase investment by holding various collaborations with other countries, one of which is with foreign investment. Some studies conducted by Raifu (2017) in Nigeria show that inflation and FDI negatively and significantly affect unemployment.

Government outcome is also a factor that triggers the unemployment rate (Afonso, 2018). The greater the government's spending, the more taxes will be issued. Tax increases result in a more significant transfer of resources from the private sector to the public sector. One of the economic activities that can lead to people's well-being is government spending (Van & Sudhipongpracha, 2015). Therefore, increasing government outcomes, especially on development programs to expand employment opportunities, will reduce the unemployment rate. Abouelfarag & Qutb (2020) observed that government spending significantly affects the unemployment rate in Egypt.

The inside-out theory states that long-time workers in the labor market, insiders, always enjoy better job opportunities than outsiders. The insider-outsider theory examines the behavior of economic agents in markets where some participants have a more privileged position than others. Those with special privileges can keep their jobs, while outsiders will have difficulty breaking into the labor market. In addition, the imbalance between labor demand and supply causes problems in the labor market (Guszalina, 2022).

Several empirical studies on unemployment in Indonesia have been carried out on an ongoing basis to determine the extent to which macroeconomic variables can affect the unemployment rate. No empirical studies have analyzed it, and only a few studies have analyzed the short-term and long-term effects of the unemployment rate in Indonesia. This condition raises the question of whether there are short-term and long-term impacts and whether the macroeconomic variables that affect the unemployment rate are only affected in the current year. One of the empirical foundations still needs to be improved in previous studies, so ongoing research on macroeconomic aspects is required.

Most studies on the factors influencing the unemployment rate are still being conducted to obtain empirical results and a form of updating the research to be conducted. Some of the results of previous research found that the Human Development Index, inflation, minimum wage, and the number of workers had affected unemployment through a multiple linear regression approach with panel data so that only static models could be obtained. Meanwhile, many economic variables are empirically dynamic, meaning the relationship between variables. Economic variables are dynamic; they are influenced not only by variables at the same time but also by variables at a previous time.

Figure 2. Bibliometric mapping of research developments on poverty levels in Indonesia on Google Scholar using Vosviewer
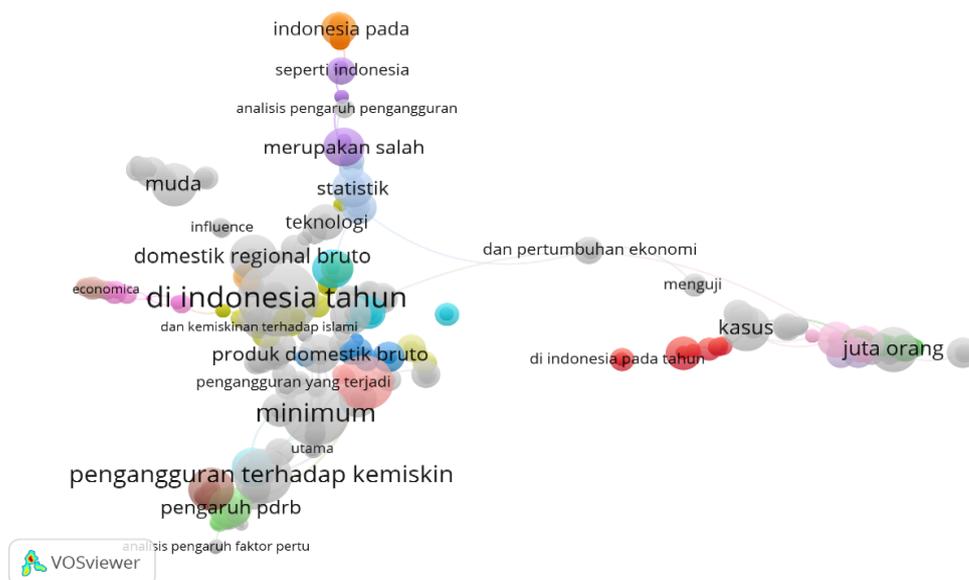
Source: Processed Data (2023)

Based on these problems, this research was conducted using dynamic panel data regression through the Arellano-Bond General Method Moment Approach (GMM). In the dynamic panel data model, there is a lag of the dependent variable, which is located as an explanatory variable, to analyze short-term and long-term impacts to form an appropriate unemployment alleviation model in Indonesia as well as the influence of independent variables on the previous year of an economic policy and producing an estimator that is not biased, consistent, and efficient.

Based on the above explanation, this study aims to analyze the relationship between these variables and the unemployment rate. As a contribution, this research can be used as empirical research investigating the factors influencing the unemployment rate. The results of this study are expected to be a reference for the government's consideration in taking corrective steps because job creation is a fundamental goal of its fiscal policy. Furthermore, this study's results will help expand the available literature to generalize the existence of variable relationships and address the unemployment problem.

This research is unique in its investigation. Researchers to identify similarities and gaps in previous studies use VOSViewer software. Vosviewer is used to analyze bibliometrics, find the most widely used references in specific disciplines, look for research topics that have the opportunity to be researched, and much more. Vosviewer can present and represent specific information about graphical bibliometric maps. Vosviewer also offers text mining functionality that can be used to build and visualize co-occurrence networks of critical terms drawn from a body of scientific literature.

Simply put, Vosviewer can be used to display large bibliometric maps in an easy way to interpret a relationship. According to VOS viewer data that researchers have processed, research related to unemployment rates in Indonesia shows that the most frequently conducted research is qualitative research related to poverty in Indonesia. Meanwhile, there are several statistical studies, but only a few. Researchers fill the gap in poverty research based on statistics and economic models. Therefore, with the results from the processed VOSViewer above, researchers can prove that research related to applying the generalized moment Arellano-Bond method to the unemployment rate in Indonesia is novel and worthy of further development.

METHOD

The data source used is secondary data from BPS Indonesia from 2012 to 2021, covering 34 provinces. Data processing was carried out using econometric applications, namely Stata software. The dynamic panel model is described in equation (1) below:

$$y_{i,t} = \delta y_{i,t-1} + x_{i,t}\beta + u_{i,t} \tag{1}$$

The specifications for the unemployment model are as follows:

$$lnEM_{i,t} = a_1 lnHDI_{i,t} + a_2 lnIHK_{i,t} + a_3 lEG_{i,t} + a_4 lnTP_{i,t} + a_5 lnW_{i,t} +$$
$$a_6 lnEM_{i,t-1} + u_{i,t} \tag{2}$$

Where δ is a scalar $x_{i,t}$ represents a matrix with size $1 \times k$ and β is a matrix with size $k \times 1$ it is assumed that $u_{i,t}$ is a one-way error component. It is assumed that $\mu_i \sim IIDN(0, \sigma_v^2)$ and $v_{i,t}, \sim IIDN(0, \sigma_v^2)$. In the dynamic panel regression model, the coefficient is the short-term effect of changes in x_{it}. β is called a short run multiplier. Meanwhile, the long run multiplier ($\frac{\beta}{(1-\delta)}$) is the long-term effect of changes in x_{it} or long run multiplier. The following is a simple dynamic panel regression model, which is a dynamic data model with the lag of the dependent variable as the only independent variable in the model, as follows:

$$y_{i,t} = \delta Y_{i,t-1} + u_{i,t} \tag{3}$$

The approaches used in estimating the dynamic panel data regression model are first-difference GMM (FD-GMM) and system GMM (Sys-GMM). Arellano and Bond developed FD-GMM. This approach is used to determine that the dynamic panel data model with the most perfect GMM estimation is used, which meets the criteria of being an unbiased. This approach is used to determine that the dynamic panel data model with the most perfect GMM estimation is used, which meets the criteria of being an unbiased, valid, and consistent instrument. According to (Baltagi, 2021) a first difference was made to eliminate individual effects with the following equation:

$$y_{i,t} - y_{i,t-1} = \delta(y_{i,t} - y_{i,t-2}) + (x_{i,t} - x_{i,t-1})$$

Parameter estimation by Arellano and Bond uses the GMM principle to obtain consistent estimates. The GMM estimator for δ is obtained by minimizing the quadratic function so that,

$$\hat{\delta} = \left[\left(N^{-1} \sum_{i=1}^{N} Z_i \Delta y'_{i,t-1} \right) \widehat{W} \left(N^{-1} \sum_{i=1}^{N} Z_i \Delta y'_{i,t-1} \right) \right]^{-1}$$
$$\left[\left(N^{-1} \sum_{i=1}^{N} Z_i \Delta y'_{i,t-1} \right) \widehat{W} \left(N^{-1} \sum_{i=1}^{N} (Z'_i \Delta y_i) \right) \right]$$

So as to get a consistent estimate for δ (two step efficient estimatoris by substituting the weight $\widehat{W}$ for $\hat{\lambda}^{-1}$, so the GMM Arellano-Bond estimation results are as follows:

$$\hat{\delta} = \left[\left(N^{-1} \sum_{i=1}^{N} (\Delta y_{i,t-1} Z_{\text{diff}}) \right) \hat{\lambda}^{-1} \left(N^{-1} \sum_{i=1}^{N} (\Delta y_{i,t-1} Z_{\text{diff}}) \right) \right]^{-1}$$
$$\left[\left(N^{-1} \sum_{i=1}^{N} (\Delta y_{i,t-1} Z_{\text{diff}}) \right) \hat{\lambda}^{-1} \left(N^{-1} \sum_{i=1}^{N} (Z'_{\text{diff}} \Delta y_i) \right) \right] \tag{4}$$

The above equation is an estimate of the Arellano-Bond GMM, which is unbiased, consistent, and efficient. The System Generalized Method of Moment (Sys-GMM) is used to estimate a system of equations by combining the moment of the first difference condition and the moment of the level condition. The following is a one-step consistent estimator for the system:

$$\hat{\delta} = \left[\left(N^{-1} \sum_{i=1}^{N} \varphi_{i,-1} Z_{sys} \right) \widehat{W} \left(N^{-1} \sum_{i=1}^{N} Z'_{sys} \varphi_i \right) \right]^{-1} \left[\left(N^{-1} \sum_{i=1}^{N} \varphi_{i,-1} Z_{sys} \right) \widehat{W} \left(N^{-1} \sum_{i=1}^{N} Z'_{sys} \varphi_i \right) \right]$$

Estimator $\hat{\delta}$ is a consistent estimator and does not depend on how the weights are selected $\widehat{W}$. In one-step consistent estimator, election $\widehat{W}$ will have no effect on the

consistency of estimates, but by selecting $\widehat{W}$ optimally will produce an efficient estimate. Blundell and Bond adapted $\hat{\delta}$ which is obtained in the one-step consistent estimator, namely by replacing $\widehat{W} = \widehat{\Psi}^{-1}$ to:

$$\widehat{\Psi}^{-1} = N^{-1} \sum_{i=1}^{N} Z'_{sys} \hat{q}_i \hat{q}'_i Z_{sys}$$

The resulting efficient two-step Blundell and Bond GMM System estimator is

$$\delta = \left[\left(N^{-1} \sum_{i=1}^{N} \varphi'_{i,-1} Z_{sys} \right) \widehat{\Psi}^{-1} \left(N^{-1} \sum_{i=1}^{N} Z'_{sys} \varphi_{i,-1} \right) \right]^{-1}$$
$$\left[\left(N^{-1} \sum_{i=1}^{N} \varphi'_{i,-1} Z_{sys} \right) \widehat{\Psi}^{-1} \left(N^{-1} \sum_{i=1}^{N} Z'_{sys} q_i \right) \right]$$

The estimation results of the two-step efficient Blundell and Bond GMM System Estimator above are more efficient than the two-steps efficient Arrelano and Bond Estimator.

RESULT AND DISCUSSION

At this stage of the study, estimates were made in the dynamic panel data regression model with the GMM two-step estimator system approach. Each dynamic panel model in the system of equations is estimated using the SYS-GMM method because it meets the criteria of the best GMM estimator, namely unbiased, valid, and consistent instruments when compared with the FD-GMM estimation results. The next step is to analyze the moment using the Arellano Bond generalized method to find out the endogenous variables of unemployment that are affected by the values of other variables and the values of relevant variables in the previous period.

Table 1. Results of Panel Data Regression Analysis With SYS-GMM

Variable	Coefficients	Standard Error	Z	P-Value
EM L1.	0,332	0,215	15,42	0,000
lnHDI	0,278	0,232	11,98	0,000
lnIHK	0,443	0,110	4,00	0,000
lnEG	-0,456	0,345	-1,32	0,186
lnTP	0,257	0,687	0,37	0,708
lnW	-1,227	0,220	-5,55	0,000
lnL	-0,670	0,275	-2,43	0,015

Source: Processed Data (2022)

According to (Arellano & Bond, 1991), the model specification test used is the Arellano and Bond test (consistency test) and the Sargan test (instrument validity test). From the results of the Sargan test in the table above, it is known that the dynamic model perfection criteria in the Sys-Gmm 31.28129 model Sargan test is not significant with a probability value of 0.907, which is more than the significance level *of* α = 5%. This shows that H_0 is not rejected, which means no correlation between errors and the conditions for a valid instrument are fulfilled.

Table 2. Sargan Test Results

Sargan Test	
Chi2 (43)	Prob > Chi2
31,281	0,907

Source: Processed Data (2022)

According to (Arellano & Bond, 1991), this test was conducted to test the consistency of the estimates obtained from the Sys-GMM process. The estimation is stated to be consistent if, in the second-order first difference, there is no autocorrelation between the residuals and the endogenous variables. Based on the results of the Arellano bond test in the table above, it shows that the use of the dynamic panel data method with the generalized Arellano bond method and the moment analysis approach meet the criteria for the best model statistically. Arellano-Bond (AB) results with a statistical value of m2 are not significant at a five percent significant level with a p-value of 0.70635 and a probability value of 0.4800. Therefore, the test meets the criteria for the consistency of the estimator.

Table 3. Arellano Bond Test Results

Arellano Bond	
Z	P-Value
0,70635	0,4800

Source: Processed Data (2022)

The test results of the pooled least squares estimator are biased upward, and the fixed-effects estimator is biased downward. The estimator from Sys-GMM falls somewhere in between. As a result, the unbiased criteria met the criteria.

Table 4. Unfamiliarity Test Result

Variable	Fem	Sys-Gmm	Pls
Unemployment L1.	0,33764	0,33396	0,80547

Source: Processed Data (2022)

In the dynamic panel regression model, the coefficient β is the short-term effect of changes in xi. β is called the shor- run multiplier. Meanwhile, $(1-\delta)$ is the long run multiplier, which is the long-term effect of changing xi. The partial test results obtained using the SYS-GMM method on the unemployment indicator equation show five exogenous variables that influence the unemployment rate according to the significant level at the 5 percents significant level. The influential variables include the lag of the unemployment variable itself (HDI), inflation, the minimum wage, and the number of workers. While the exogenous variables of economic growth and population show no significant effect on unemployment at the 5 percent significance level.

The next stage is the interpretation of the variables that have a significant effect on the indicators of unemployment in Indonesia's provinces. Based on Table 6 above, it can be seen that the lag coefficient of the unemployment indicator has a positive and statistically significant effect. Thus, it can be interpreted that the unemployment rate in the previous period had an influence on the unemployment rate in the current period in this study.

This model tries to reveal that the research results show that the Human Development Index has a positive effect on unemployment, which is partially indicated by a coefficient of 0.278 and a p-value of 0.000, which is smaller at a significance of 0.05. This positive relationship shows that if there is an increase in HDI of 1%, in the short term, it will increase unemployment by 0.278 and in the long term by 0.422, it can be concluded that the increasing in HDI of unemployment in the long term is greater than the short-term effect.

Table 5. Estimating Equation of Unemployment Indicator With SYS-GMM

Unemployment	Estimated Coefficients	Standard Error	Z	P-Value	Short-run Multiplier	Long-run Multiplier
EM L1.	0,332	0,215	15,42	0,000	-	-
lnHDI	0,278	0,232	11,98	0,000	0,278	0,422
lnIHK	0,443	0,110	4,00	0,000	0,443	0,797
lnEG	-0,456	0,345	-1,32	0,186	-0,456	-0,121
lnTP	0,257	0,687	0,37	0,708	0,257	0,686
lnW	-1,227	0,220	-5,55	0,000	-1,227	-1,68
lnL	-0,670	0,275	-2,43	0,015	-0,670	-0,108

Source: Processed Data (2022)

Furthermore, the factor that triggers an increase in the human development index but has an impact on increasing the number of unemployed in every province in Indonesia is because the standard human development index is still in the moderate category. The moderate category in the human development index shows that the role of the government has yet to be maximized in achieving an optimal human development index. The education level factor also has a positive influence on the unemployment rate. It is known that having a higher education does not guarantee that someone gets a job. Therefore, the higher the level of education, the higher the open unemployment rate in Indonesia. This condition is undoubtedly in line with previous research by Sisnita (2017) that HDI has statistically significantly affected open unemployment in Lampung Province.

This study's results follow the Keynesian theory that the Human Development Index influences unemployment by increasing people's purchasing power. The Human Development Index indicates that a country is prosperous if it has a decent standard of living (Hasan, 2022). An increase in aggregate demand can affect employment opportunities. If the aggregate demand in a company is low, it will reduce the amount of production and result in less labor supply so that the demand and supply of labor are

not balanced. This study backs up previous research by Maulana & Kyswantoro (2022), which found that the Human Development Index positively affects unemployment. The industry must maximize its ability to absorb labor, and the government must be able to guarantee the availability of job vacancies to reduce the current unemployment rate to balance the Human Development Index, which is already good.

Inflation has a significant effect on the unemployment rate in Indonesia. These results follow the Phillips curve theory establishing the relationship between inflation and unemployment. Okun's law provides a relationship between output and employment, with unemployment as output and inflation as price changes. Conditions indicate that high inflation will be followed by high unemployment. The inflation that occurred in Indonesia was high and long-term. Inflation has a short-term effect elasticity of 0.443 and a long-term effect elasticity of 0.797. This condition shows that for every 1% increase in inflation, long-term unemployment will increase by 0.797 percent.

These results also align with the research findings conducted by Gyang & Eze (2015) and Elliot (2015). These results indicate that the relatively low inflation environment associated with the inflation-targeting regime is conducive to job creation in the region (Vermeulen, 2015). It also supports the notion that low and stable inflation is required for long-term sustainable economic growth, which leads to job creation. Therefore, the respective monetary authorities should adopt a robust anti-inflationary stance through inflation-targeting policies to reduce unemployment in the region. However, these monetary policymakers must be holistic and characterized by a lack of fiscal dominance, operational transparency, credibility, and explicit quantitative objectives involving monetary authorities in the main objective of price stability.

Economic growth does not affect the open unemployment rate in Indonesia. However, in Indonesia itself, the effect of output growth (GDP) on employment is relatively negligible and weak. While the Indonesian economy is still growing, its ability to create jobs remains weak and below average. This condition still points to growing unemployment in a region where employment is not growing as the economy grows (Ziberi & Avdiu, 2020). This result is in line with the results of research (Levine, 2014), which states that GDP growth is insufficient to exceed the combined growth rate in the labor force and productivity so that a reduction in unemployment can be guaranteed in the long term. This condition shows the need to pursue sustainable long-term economic growth that can create jobs so that the unemployment rate in a region can be suppressed.

High population growth threatens the economy's ability to perform. This condition demonstrates that a broad area's relatively high population density provides an opportunity for positive population development and utilization in developing economic potential. However, the total population has no significant effect on open unemployment in Indonesia. The negative relationship is consistent with the findings population variable with a coefficient of 0.477383 and a probability of 0.6251, so it does not affect unemployment (Brahma et al., 2019).

This result is in contrast to previous studies by Gideon (2017), which found that population has a positive effect on unemployment; this is indicated by the increase in

Nigeria's population in 2014. In addition, rapid population growth can increase the dependency burden on those with a weak economy. A larger population leads to growth in the labor force, which shifts the labor supply curve upward. As noted by Folawewo & Adeboje (2014), rapid population growth leads to an expansion of the labor force, exacerbating the unemployment situation in developing countries.

The minimum wage has a negative effect on open unemployment in Indonesia. This fact shows that the high level of unemployment in Indonesia arises due to the high minimum wage but is not proportional to productivity. This condition is consistent with a competitive labor market model in which a worker's wage equals his marginal product; setting wages above this level reduces the demand for labor until the marginal product rises to higher wages. As a result, the minimum wage removes the minor productive workers from employment, leading to a concomitant reduction in employment and an increase in unemployment.

According to the research findings of Sordyl (2019), the minimum wage changes the job structure because companies choose workers who are considered the most productive, reduce employment opportunities for inefficient workers and increase unemployment. Some models assume that the influence of the employer causes wages to be set below the worker's marginal productivity and equal to the value of the worker's external choices (Engbom & Moser, 2021). Under these circumstances, the introduction of the minimum wage does not lead to a decrease in employment but a change in the division of rent between producers, with company profits decreasing and the share of labor in national income increasing (Riley & Bondibene, 2015).

The variable number of workers has a significant negative effect on the open unemployment rate in Indonesia. This condition shows that the high unemployment rate in Indonesia arises due to economic growth that is far smaller than the growth of the labor force and demographic pressures with a large labor force. This result is in line with the results of research conducted by Bakare (2011), which means that the variable number of workers significantly negatively affects the open unemployment rate in Indonesia.

This fact shows that the high unemployment rate in Indonesia arises due to economic growth that is far smaller than the growth of the labor force as well as demographic pressures with a large labor force. This result is by the results of research conducted by Bakare (2011), which shows that the high unemployment rate in Nigeria arises as a result of an increase in the supply side of labor above the demand side. The results state that when the labor supply is greater than the demand for labor, there is an excess of labor. This fact shows that the net effect of excess labor supply determines the high unemployment rate because the number of workers and the unemployment rate has a negative relationship. If there is a high number of a worker, the unemployment rate is also high. Therefore, economic growth is needed along with a decrease in the unemployment rate.

The Arellano bonding moment analysis method was carried out because, empirically, many economic variables are dynamic, meaning that the value of a variable can be influenced by the value of other variables and is influenced by the value of relevant variables in the past or previous periods. The analysis results show that the variables that affect it and the previous period's unemployment rate influence Indonesia's unemployment

rate, with an increase shown through short-term and long-term influences. This study found that the influential variables and the previous year's unemployment rate influenced this year's unemployment rate. The increase in unemployment in Indonesia is largely determined by the role of other variables and the unemployment rate in previous years.

CONCLUSION

Based on the findings of this study's data analysis and discussion, it is possible to conclude that the variable unemployment in Indonesia is influenced by five independent variable coefficients at the same time, namely the Human Development Index, inflation, population, the minimum wage, and the number of workers. In addition, the unemployment lag also has massively contributed to unemployment. Thus, unemployment this year is dominated by unemployment in the previous year. This research can enhance our understanding of unemployment and the factors that cause unemployment. The policy implies that the government or relevant institutions can take appropriate and practical steps to address the issue of unemployment. Unemployment in Indonesia has wide-ranging impacts and can affect various aspects of social and economic life. Therefore, there is a need for several implicit policies that can be taken to address the issue of unemployment in Indonesia by increasing job opportunities. Developing new economic sectors, attracting foreign investment, and providing training and education to improve the workforce's skills, making it easier for them to obtain jobs, can carry out this policy.

Increasing the quality of the Human Development Index and motivating people to continue opening their business opportunities pursue alleviation of unemployment. Nevertheless, this can also be done in other ways: by increasing the demand for and supply of labor, setting wages, and the effectiveness of search and match in the labor market and policies. Sensible short-term and long-term policies are necessary to reduce open unemployment from year to year.

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The Determinant of Human Development in the Eastern Part of Indonesia

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Abstract

Improving human resource quality in Eastern Indonesia has become a primary concern in many development programs enacted in Indonesia. The KTI regions needed to catch up and often experienced development problems. Several challenges, such as the significant disparity in education and health facilities compared to the western part of Indonesia, have hindered the development process of KTI. This research aims to find the determinants of human development in KTI. We analyze the regional fiscal dependency ratio, employment level, allocation of DAU (general allocation fund) by the central government, and poverty gap level as determinants of the Human Development Index in KTI. Using the Fixed Effect panel data analysis, we found that the general allocation fund, employment, and fiscal dependency ratio are positively associated with HDI in KTI regions. In contrast, the poverty gap is negatively associated with HDI in KTI regions. Our empirical finding implies that central government transfers play an essential role in the human development process, while the poverty problem is one of the main obstacles to improving the human resources quality in KTI regions.

Keywords:

employment; fiscal dependency ratio; general allocation fund; human development; poverty

INTRODUCTION

Every country continues to pursue development in its area to seek prosperity and continuous improvement, not only for the nation and the regions but also for the community. The growth process in a region is determined not only by how much income the region can generate. Human resources also play a significant role in the region's growth. Human resources are total capital that can support the region's development process. Human capital is seen as a determining factor in a nation's development process and economic growth (Arisman, 2018; Ogundari & Awokuse, 2018; Raharti et al., 2020). A higher level of human resources quality will improve the regional development process and, hence, it will bring a society's welfare.

Government expenditure in supporting human development progress is determining factor in improving economic growth (Rizal & Fitrianto, 2021; Imandojemu & Babatunde, 2020; Butar & Rahmanta, 2021). United Nations Development Program (2019) also emphasized that human development is important to the region's development. The UNDP has introduced the Human Development Index (HDI), or the IPM in Indonesia, which includes health, education, and economic aspects as a precautionary measure of the society's quality of life that will determine the society's welfare. According to Ahmad et al. (2019), and Akay & Van (2017), the HDI was created to emphasize that people and their skills should be the primary criteria for assessing a country's overall development.

The eastern part of Indonesia (KTI) has become a focus of Indonesia's human development process. KTI needs to catch up in its three HDI sectors, and it needs more improvement to develop the quality of its human resources. Another problem that hinders the human development process in KTI is the apparent poverty incidents within KTI territory. Farida et al. (2021) show that poverty and development inequality are still apparent in eastern Indonesia. They also noted that lagging development and poverty leads to poor human resources quality in these regions. This problem subsequently hinders the human development progress of the KTI regions. For that reason, we want to explore the determinants of human resource development in eastern Indonesia.

Figure 1 shows how human development in the eastern part of Indonesia (KTI) lags behind the western part of Indonesia (KBI). From the national figure from 2015 to 2020, the lack of human quality in KTI was more concerning compared to the western part of Indonesia (KBI). The HDI gap between KTI and KBI showed that the quality of human resources in KTI needs to catch up to KBI and national figures. The average HDI in KBI was above national and KTI scores. On the other hand, The HDI score of KTI was under both KBI and national figures with an index value of 66.41(2015); 66.98(2016); 67.63(2017); 68.32(2018); 69.03(2019); and 69.06 (2020). The pandemic-led recession in the year 2020 has impacted the development in all sectors, including human resources. As the national economy dropped significantly during 2020, government programs in human development were

diverted to the economic recovery program. This condition is a drawback for human resources development in KTI.

Furthermore, the lag of human development conditions in KTI was caused by welfare and income distribution disparity. KBI has been the center for business and government activities; hence the national income is generated mainly from economic activities in KBI. This condition leads to a development gap between KBI and KTI. From 2015 to 2020, only two provinces in KTI have a human development index above the national HDI average: East Kalimantan and North Sulawesi. Based on Statistics Indonesia (BPS) data, the highest HDI in Eastern Indonesia was in East Kalimantan, with a score of 76.24 in 2020, while Papua has the lowest index, with a score of 60.44. East Kalimantan was the highest HDI score in KTI and even the 3rd highest in Indonesia. These differences in the development progress in both provinces are due to more extended life opportunities, better access to health and education facilities, and the economy that tends to improve. This condition was in contrast to human development in Papua, where the development process needed to support the advancement of education, access to health facilities, and improving living standards. This fact shows that within the KTI region, there is also a disparity in development progress.

Figure 1. The Comparison of the Human Development Index

	2015	2016	2017	2018	2019	2020
KBI	70,73	71,33	71,87	72,45	73,04	73,09
KTI	66,41	66,98	67,63	68,32	69,03	69,06
National	69,55	70,18	70,81	71,39	71,92	71,94
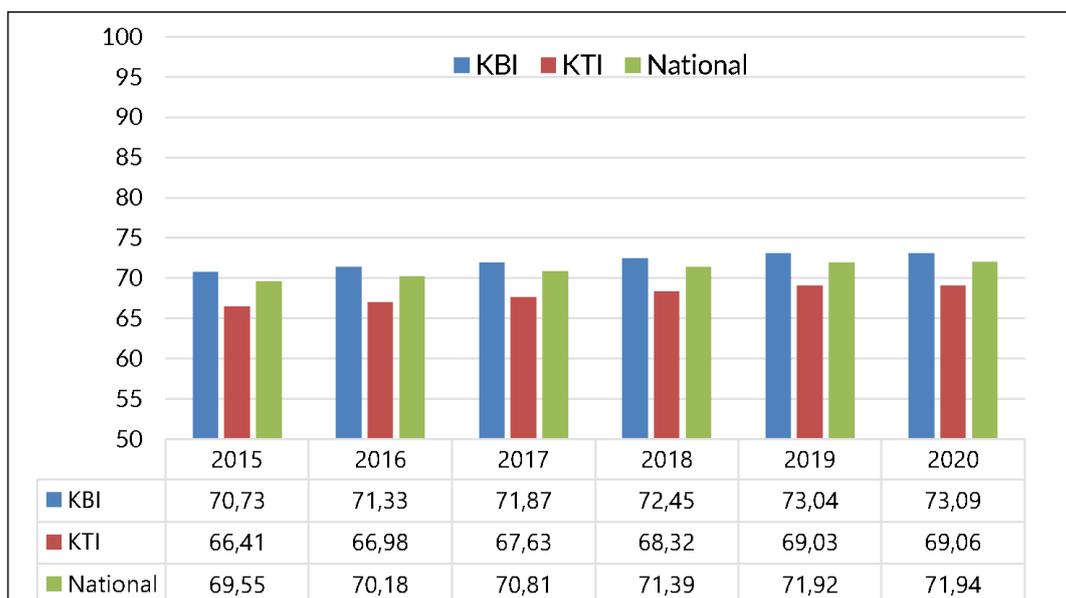
Source: Statistics Indonesia 2021, processed

Bappenas has mapped the strategic development issue of human quality progress in Indonesia, especially in KTI and KBI. Through the Medium-Term National Development Plan, Bappenas (2015; 2019) has made a development direction to encourage the transformation and acceleration of regional development in KTI by supporting and improving its human resources. The leading indicators that can direct the advancement

of human quality are life expectancy (health sector), the average length of schooling (education sector), and per capita expenditure (economic sector). However, those indicators have hindered the growth of HDI in KTI. These conditions were caused by several factors, such as the inadequate supply of clean water, the low average length of schooling (up to 8 years), and the poor purchasing power of the people in KTI. So they were unable to meet their needs of life adequately.

Human development is critical for local governments in their efforts to implement decentralization. Local governments are responsible for funding public services for their community's welfare. Finance is the primary source of regional development funding to execute development programs. Therefore, regional finance is much needed to facilitate better services for people's welfare. In the regional funds' budgeting process, local governments are very dependent on regional revenues. The ability of regional funds to support the needs of regions independently reflects better regional independence, especially in financial performance (Canare & Fransisco, 2019). In the Eastern part of Indonesia, the fiscal independency of provinces tended to fluctuate. A low level of provincial fiscal independence, with an average of 39 percent, dominated almost all provinces.

Compared to 2015, regional financial independence in KTI decreased yearly from 51% to 35% in 2020. This condition represents local governments' inability to control their regional wealth. If the governments did not manage local resources very well, the regions would not earn local income to improve investment in capital expenditures to provide better public services. Low locally generated revenue will make regional finances depend on the central government. Thus, regional financial independence, which was still low in KTI, is the main reason for the lagging development of KTI. Previous research has shown mixed evidence of the relationship between fiscal dependency and the human development index. Local government fiscal independency can positively impact the quality of HDI (Mauludin & Dewi, 2020; Suhyanto et al., 2020; Hung & Thanh, 2022). While Digdowiseiso & Satrio (2022) concluded a contradictive result in which the level of regional fiscal independence has a negative impact on human development. It is then interesting to find more empirical evidence to know the relationship between fiscal dependence and human development progress in KTI regions.

Another aspect that may influence the human development index is the employment level. The number of active workers in KTI is important in boosting regional development (Izzah & Hendarti, 2021; Feriyanto, 2016). The more significant number of working people will subsequently generate more output, causing the gross domestic product to rise nationally and regionally. If GDP is increasing in regions, the per-capita income of society will also be higher since a GDP increase impacts the enhancement of the economy. However, data from the Statistic bureau of Indonesia shows that within 2015-2020, the total number of workers in KTI is still lower than in KBI. The proportion of KTI workers is about 20% of Indonesia's overall workers. However, Eastern Indonesia has low-quality workers, indicated by lower educational backgrounds. Most of the workers are junior school graduates or even lower. Other than that, at the beginning of 2020,

the number of employees decreased as the impact of the Covid-19 pandemic limited any economic activity, including workers. The total wages declined, and unemployment grew. The low number of active workers in KTI may affect the development progress of the region. Previous research has shown mixed evidence of the relationship between labor and HDI. Izzah & Hendarti (2021) and Feriyanto (2016) show a positive impact of labor on HDI, while Masiku et al. (2017) found an insignificant impact of labor on HDI.

In addition, the general allocation fund also plays an essential role in regional development. The regional government sees it as capital needed to undertake human development programs. As mandated in the decentralization regulation, the development program can be executed using the general allocation of funds from the central government to the regional government. As the Ministry of Finance Indonesia released, the general allocation fund (DAU) given to the provinces in KTI and KBI had a pretty different budget allocation, where the distribution was more significant in KBI than in KTI. Hence, the level of development quality would also certainly be different. As stated in Regional Transfer Funds Policy, the basic allocation of the general allocation fund is formed by civil servant salary. Referring to the SIMREG data by Bappenas, the number of civil servants in KBI was more extensive than in KTI. The difference in total civil servants between these two parts of Indonesia was 30.88% in KTI and 69.12% in KBI, which means the basic allocation of DAU in KBI was higher than in KTI. For that reason, that is the cause of the DAU proportion of KTI is lower than KBI, with the differences ranging from thousands of billions of rupiah.

The KTI area should be prioritized, considering its lagging development. Further, since the Covid-19 pandemic began in 2020, the government has had to shift the DAU allocation due to decreased state income. Thus, the allocation must be reallocated for handling COVID-19 in all regions in Indonesia. This DAU reduction increased each region's financial burden by refocusing the budget on coronavirus cases, influencing the quality of development progress. Looking at the conditions in each region should carry out the distribution of the DAU allocation. If the region's development is lagging, it should receive a higher amount of DAU when compared to regions with better development progress. Previous research has shown mixed evidence on the relationship between DAU and the human development index. Lestari et al. (2019) and Regina et al. (2020) concluded that the allocation of DAU positively impacts human development. While studies by Sembiring (2020) and Williantara & Budiasih (2016) found that the allocation of DAU did not significantly affect human development because the allocation from the central government was intended for personnel than capital expenditures. Pursuing further evidence of the relationship between DAU and human development in KTI regions is interesting.

Another obstacle to the region's development in Eastern Indonesia is the high poverty rate. The poverty depth index is closely related to the quality of human development (Ahmaddien, 2019; Kurniawan, 2017; Khikmah et al., 2020; Wahyuni et al., 2021). The findings of these studies have found that the implications of poverty

depth index reduction would improve the degree of human development because it can reflect the community's ability to access the development outcomes of the three HDI sectors in the regions. The data shows that the poverty gap index tends to fluctuate and be high in Eastern Indonesia. When the covid-19 pandemic spread widely in 2020, this situation increased the poverty gap in most provinces in KTI due to declining incomes and people's purchasing power. It certainly needs to be considered by the government to minimize the gap between people with low incomes. Provinces of KTI dominated the poverty incidence in Indonesia. This condition was in line with the problem of inequality between people experiencing poverty, which was still high in the KTI.

The HDI was developed to convey that human capabilities should be the ultimate indicator for evaluating a country's development. Al-Nasser & al Hallaq (2019) concluded that poverty in human life has a negative effect on the country's human development. Feriyanto (2016) observed that the number of workers positively impacts the human development index. Then, Sandjaja et al. (2020) found that the general allocation fund positively impacts human development in regencies and cities. Khairudin et al. (2020) also discovered that the ratio of regional financial independence significantly affects HDI.

With financial assistance and a large amount of labor, it should be possible to boost human development in KTI to levels comparable to KBI and national figures to diminish the disparity. However, in reality, the HDI in KTI remained the lowest and lagged with an average of 68 in 2020. A low fiscal independency ratio with an average of up to 39%, insufficient employment quantity in KTI by only 20.1% of Indonesia's workers, general allocation fund that was not evenly distributed to KTI despite the region's need for more financial support for its development, and poverty problems that have not been addressed so that development problems in KTI have not been fully resolved. Based on the problems stated above, this study aims to explore the relationship between the impact of the fiscal dependency ratio, employment, general allocation fund, and poverty gap level on the quality of human development in Eastern Indonesia.

This study will add empirical evidence to the broad literature on human development in emerging countries. The study's novelty lies in the effort to provide recent empirical evidence of HDI determinants in the eastern part of Indonesia, which still needs to be improved. Previous studies have elaborated on the association between central government transfer, poverty, and employment to economic growth (Martinez-Vazquez & McNab, 2003; Swasono, 2007; Gemmell et al., 2013; Anantika & Sasana, 2021). This study analyzes whether these factors also determine human development in Indonesia.

METHOD

This study investigated human development issues in 17 Eastern Indonesia provinces comprising East, South, West, and Central Kalimantan, Papua and West Papua, East, and West Nusa Tenggara, Central, West, South-East, North and South Sulawesi, Maluku,

and North Maluku. We use the human development index as the dependent variable (Y) and fiscal dependency ratio (X1), employment (X2), general allocation fund (X3), and poverty gap level (X4) as the independent variables. The fiscal dependency ratio is measured by dividing the total transfer from the central government by the total regional income. The higher ratio of fiscal dependency shows a higher dependence of locals on the central government. The total transfer from the central government to the local government measures the General allocation fund. The number of citizens with age 15 years old and above who participate in productive activities to generate income or profit measures the employment variable. The poverty gap level is obtained from Indonesia's Statistical bureau data. This study used quantitative research with secondary data obtained from the Indonesia Statistical Bureau and DJPK Ministry of Finance. We use the data of the Human development index, fiscal dependency ratio, employment, and poverty gap index from 2015 to 2020.

We use panel regression analysis as the empirical strategy to explore the determinant of the Human Development Index in KTI regions. The panel regression is estimated by using the following model:

$$HDIit = \alpha + \beta_1 \, FISCAL_{it} + \beta_2 \, EMP_{it} + \beta_3 \, GAU_{it} + \beta_4 \, P1_{it} + \varepsilon_{it}$$

Where:

$HDIit$: Human development index in the i-province at the t-period

$FISCAL_{it}$: Fiscal Dependency ratio in the i-province at the t-period

EMP_{it} : Employment in the i-province at the t-period

GAU_{it} : General allocation fund in the i-province at the t-period

$P1_{it}$: Poverty gap level in the i-province at the t-period

RESULT AND DISCUSSION

Table 1 depicts the descriptive statistic estimate of dependent and independent variables. The total number of observations is 102, comprised of 17 provinces of eastern regions of Indonesia from 2015 to 2020.

Table 1. Descriptive Statistic of Determinant of HDI in Eastern Indonesia

	General Allocation Fund (in billions Rp)	Employment (in million)	Fiscal Dependency Ratio	Poverty Gap	HDI
Mean	1.401345	1.438040	60.78078	2.523431	67.91000
Median	1.338722	1.295798	64.29000	1.875000	68.43500
Maximum	2.625303	4.058595	84.50000	9.370000	76.61000
Minimum	0.057313	0.267023	24.80000	0.690000	57.25000
Std. Dev.	0.496285	0.921638	16.48812	1.976693	3.761716
Observations	102	102	102	102	102

The empirical result from panel OLS regression is presented in table 2. Column 2 to 4 shows the result of the fixed effect, common effect, and random effect approach, respectively. The result of R-Squares varies among the three approaches, with the highest R-Square resulting from the fixed effect model, 0.980. We obtain significant results from the FEM's regression results in column 2 for all independent variables.

Table 2. Estimation Result of Determinant of Human Development Index in Eastern Part of Indonesia Regions

Variable	Fixed Effect	Common Effect	Random Effect
General Allocation Fund	1.6941*** (0.2602)	-0,6509* (0.3921)	1.6923*** (0.4251)
Employment	2.4627** (1.2174)	0.2746* (0.1566)	0.9329* (0.5562)
Fiscal Dependency	0.0183** (0.0088)	-00003 (0.0125)	0.0262*** (0.0099)
Poverty Gap	-0.888*** (0.1124)	-1.3847*** (0.1234)	-1.0988*** (0.1443)
Region fixed effect	Yes	No	No
Constant	63.119***	71.943***	65.3755***
Observations	102	102	102
R^2	0.980	0.599	0.674
Prob (F-test/ Chi^2)	0.0000	0.0000	0.0000

*, **, *** Indicates significance at the 10%, 5%, and 1% levels, standard error in parentheses

The variable General Allocation Fund is significant at a 1% level and has a coefficient of 1.6941, which means that a one-unit increase in general allocation fund transfer from the central government will increase the HDI by about 1.6941 points. The findings of this study are in line with the research by Soejoto & Suyanto (2015), Regina et al. (2020), and Agus (2020), who concluded that the general allocation fund has a positive and significant impact on the Human Development Index. This result means that the general allocation fund has helped each province execute a better policy to improve the quality of human resources. The financial infusion is intended to improve development quality by accelerating essential public services and creating priority programs to catch up with the -more developed- western part regions. General allocation funds also play an essential role in promoting equitable development.

The employment variable has an impact on the human development index. The findings above are consistent with previous research by Eren et al. (2014), Maulida (2016), Lubis (2014), and Izzah & Hendarti (2021) that states an increase in workers (employment) will be able to improve the quality of the HDI because a higher labor participation rate will increase productivity and generate more output. These

workers will receive income for their hard work that is subsequently used to improve their living standards. Growth in the number of workers must be accompanied by an increase in the workforce quality so that human development in KTI can grow much more rapidly and contribute to the reduction of development inequality. In addition, this finding also supports the premise mentioned above stated by Amate-Fortes et al. (2016) and Wijaya et al. (2021), suggesting that higher employment will increase regional savings, that in turn will positively affect the region's development progress. Worker productivity will contribute to regional output and savings positively associated with regional growth. Subsequently, higher regional growth will help improve human development quality through better access to education and health facilities.

The variable of the fiscal dependency ratio shows a significant impact on HDI. Higher fiscal dependence means higher dependency of KTI provinces on the central government. However, it also means the central government is more concerned about KTI's development progress. Allocation of Funds from the central government has helped KTI develop more development programs and increase HDI. This result aligns with previous findings by Sofilda et al. (2015) and Agus (2020), showing that central government transfer has a positive and significant association with human development. This result confirms our hypothesis that the eastern part region of Indonesia still profoundly depends on central government transfer to finance their development program.

Central government transfers enable local governments to improve regional human development continuously. The positive association of the fiscal dependence ratio and human development index in KTI regions shows that the local government uses central government transfer to compensate for the region's inability to finance its development. Local government should maximize their effort to generate more local income and gain fiscal independence. Further, this also means that fiscal decentralization in eastern regions of Indonesia needs to be optimally executed (Farida et al., 2021).

The poverty gap level variable has a negative impact on human development in Eastern Indonesia. The research results are consistent with the finding of Wahyuni et al. (2021) and Al-Nasser & Hallaq (2019), who concluded that human development would decrease as the poverty gap increase. Poverty is a significant barrier to a region's development process. People living in poverty usually have limited access to education, health facilities, and other resources needed to maintain a decent living standard. The region's higher poverty gap index means more of its citizens live in poverty. A higher poverty problem will hamper the development progress of a region and eventually will also obstruct the improvement of human resources quality.

Further, the poverty problem may worsen if there is an inequality of income distribution within the region. Suppose the income distribution in the local community is carried out unevenly. In that case, the poverty level will spread, resulting in a lack of people's purchasing capacity to meet their basic needs. The Covid-19 pandemic has also

increased the gap in poverty due to a sudden drop in people's income, subsequently; it affects people's overall purchasing power to afford necessities. This problem will lead to the people's inability to access resources needed to maintain a decent living standard, such as job training, education, better nutrition, and health facilities. According to Joko et al. (2020) and Syofya (2018), high poverty will worsen human development since people experiencing poverty cannot access education and health care to improve their quality of life. This condition will result in the HDI's decline in Eastern Indonesia.

Apart from the fixed effect estimations explained in the above paragraph, column 2 and 3 in table 1 shows the estimation result of the common and random effect approach. In the common effect estimates, the fiscal dependency variable shows an insignificant result, while in random effect estimates, all variables are statistically significant. The variable's coefficients have the same signs and similar values for both fixed and random effect estimates. From the consistent result of both fixed and random effect estimates, the general allocation fund, employment, fiscal dependency ratio, and poverty gap are determinant factors of human development indicators in eastern regions of Indonesia.

CONCLUSION

Based on previous analysis and research, the fiscal dependency ratio, employment, and general allocation of funds positively and significantly impact human development. This result means that the greater fiscal dependency, employment, and general allocation fund are associated with a high human development index. While the poverty gap has a negative and significant effect on human development, meaning that the higher poverty gap value is associated with a lower human development index in Eastern Indonesia from 2015 to 2020.

There are several research implications in this study. Firstly, the distribution of general allocation funds by the central government should be more evenly distributed following the region's basic needs. Secondly, the regional government maximizes and optimizes the budget, particularly during the Covid-19 pandemic. At the same time, transfers from the central government to the regions should also be allocated more significantly, anticipating the Covid 19 outbreak as a priority in Eastern Indonesia. Thirdly, optimizing regional wealth in Eastern Indonesia so that financial dependence on the government and the ability of regions to finance their development can be more balanced. Fourth, there is a need to provide programs for human resources to keep up with constantly updating knowledge and skills to respond to the increasing competitiveness of employment opportunities. Fifth, future research should elaborate more factors to explain human development in Indonesia to make future research findings more comprehensive.

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Public Debt and Budget Deficit Threshold Levels on New Fiscal Sustainability Indicator

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Abstract

Fiscal sustainability can be determined and assessed using financial technology (FinTech). Consequently, a new indicator of fiscal sustainability can be constructed. This study also estimates threshold levels of public debt and budget deficit by considering institutions for 88 developing and 35 developed countries in 2014 and 2017. The principal component analysis (PCA) and the cross-section threshold regression are employed. The main findings revealed that the threshold levels of public debt-to-GDP ratio for developed and developing countries in 2014 were 100.37% and 63.04%, while that in 2017 were 90.09% and 84.28%, respectively. Moreover, the threshold levels of budget deficit-to-GDP ratio for developed and developing countries in 2014 were -3.04% and -1.24%, while those in 2017 were -0.97% and -5.75%, respectively. Therefore, policymakers should emphasize a certain public debt and budget deficit level to warrant a fiscally sustainable level.

Keywords:

new fiscal sustainability indicator; FinTech; public debt; budget deficit; institutions

INTRODUCTION

The scholars and policymakers in many countries pay more attention in rising level of public debt and government expenditure during recent decades especially since 2008 financial crisis (Berrittella & Zhang, 2015; Baharumshah et al., 2017; Lau & Syn-Yee, 2018; Akram & Rath, 2019; and Caselli & Wingender, 2021). The higher level of public debt produces the significant debate in the literature on fiscal sustainability. Specifically, there is no a unique definition and indicator of fiscal sustainability. Fiscal sustainability can be defined as "a sufficient yearly adjustment in the primary balance towards a target ratio consistent with a country-specific target debt ratio" (Croce & Juan-Ramon, 2003). Therefore, this study proposes new fiscal sustainability indicator by incorporating financial technology (FinTech) and estimates the threshold levels of public debt and budget deficit by considering institutions. Besides, institutions can determine fiscal sustainability level following some previous empirical studies such as Bergman et al. (2016), Ali & Ahmed (2017), and Cooray et al. (2017). The higher quality of institutions promotes sustainable public finance in the long-run.

The higher level of public debt-to-GDP ratio in some countries has been announced by the International Monetary Fund (IMF) that in 2019 the level of general government gross debt-to-GDP ratio is more than 100%. Those countries were Angola (109%), Bahrain (103%), Barbados (122%), Belize (105%), Bhutan (104%), Cabo Verde (125%), Eritrea (189%), Greece (181%), Italy (135%), Japan (238%), Lebanon (174%), Mozambique (104%), Portugal (118%), Singapore (130%), Sudan (201%), United States (108%), and Venezuela (233%). It motivates to examine the threshold level of public debt-to-GDP ratio in maintaining fiscally sustainable level.

Moreover, FinTech leads government revenue and expenditure in an efficient and transparent outcomes. Previous empirical studies found that digitalization of government budget and tax were accelerated by employing FinTech in fiscal policy (Otieno, et al, 2013; El Gohary, 2019; and Cangiano et al., 2019). FinTech delivers some benefits for fiscal policy such as support better transaction for government, business, and individual. The government utilizes e-budgeting to manage government revenue and expenditure. Meanwhile, the business and individual use e-taxation to pay their tax. Technically, FinTech can be proxied using some indicators following Thakor (2019) such as lending platforms, payment platforms, and bitcoin. The indicator of FinTech can also use Global Findex Database in 2014 and 2017 (Nizam, et al, 2020).

Literature reported that fiscal sustainability can be assessed using some indicators such as primary gap (Sulaiman et al., 2015; Uryszek, 2016; and Nxumalo & Hlophe, 2018) and recursive algorithm (Cruz-rodriguez, 2014; Sulaiman et al., 2015; Asava-vallobh et al., 2018; and Lau & Lee, 2021). They argued that these indicators were derived from the concept of intertemporal budget constraint (IBC). Conceptually, primary gap and recursive algorithm were determined by public debt-to-GDP ratio, primary surplus-to-GDP ratio, economic growth, and real interest rate. Nonetheless, there is no fiscal sustainability indicator constructed under a better framework and multiple dimension. Besides, this study formulates new fiscal sustainability indicator by incorporating FinTech

using principal component analysis (PCA). The new indicator will provide new evidence and contribute significantly on the existing literature.

This study examines the threshold levels of public debt and budget deficit on new fiscal sustainability indicators by incorporating FinTech using cross-section threshold regression for 88 developing and 35 developed countries in 2014 and 2017. These years are set following the publication of the Global Findex Database. In particular, this empirical model follows previous studies published by Tran (2018) and Bajo-Rubio et al. (2006). The sample comprises 88 developing and 35 developed countries in 2014 and 2017. The threshold regression also considers institutional indicators on new fiscal sustainability following Ali & Ahmed (2017).

This study fills empirical gaps in several ways. First, it provides a new fiscal sustainability indicator by incorporating FinTech using principal component analysis. The new indicator contributes significantly to the existing literature on fiscal sustainability by providing a better framework and multiple dimensions. The literature had previously ignored the indicator. Second, this study reveals threshold levels of public debt and budget on new fiscal sustainability indicators using cross-section threshold regression. This study also considers institutional indicators of new fiscal sustainability following Ali & Ahmed (2017), such as regulatory quality and the rule of law. Finally, policymakers in developed countries should control certain levels of public debt-to-GDP ratio and budget deficit to maintain a fiscally sustainable level. Besides, policymakers in developing countries should trim the threshold levels of public debt-to-GDP ratio and budget deficit to guarantee a fiscally sustainable level.

Previous empirical study emphasizes the threshold level of public debt for 14 emerging economies from 1999-2016 using Hansen's panel threshold regression published by Tran (2018). The findings show that non-Latin American economies can maintain the sustainable public finance by conducting below the threshold bounds public debt-to-GDP ratio at 40-55% of GDP. Conversely, the Latin-American economies faced the threshold level of public debt of roughly 35% of GDP. Moreover, the threshold level of budget deficit-to-GDP ratio has been depicted by Bajo-Rubio et al. (2006) for Spanish fiscal policy using non-linear threshold cointegration. They found that the threshold level of budget deficit-to-GDP ratio is about 5.30% of GDP using annual data and at 7% of GDP using quarterly data. Nonetheless, these previous findings did not emphasize the contribution of institutions. Therefore, Ali & Ahmed (2017) estimate the impact of institutional quality on public debt sustainability for 17 countries in MENA region during 1996-2015. They argued that poor governance stimulates to higher public debt accumulation. Interestingly, three institutional indicators contribute significantly on public debt sustainability cover political stability and absence of violence, regulatory quality, and rule of law. Thus, this study provides a better analysis of threshold levels of public debt and budget deficit by considering quality of institutions on new fiscal sustainability indicator by incorporating FinTech.

The main findings reveal that developed countries can suppress the level of public debt-to-GDP ratio and budget deficit in 2014 and 2017. For example, at that time

the public debt-to-GDP ratio threshold was about 100.37% to 90.09%, while budget deficit-to-GDP ratio threshold was about -3.04% to -0.97%. In contrast, developing countries face a risk of higher levels of public debt-to-GDP ratio and budget deficit. In 2014 and 2017 the threshold levels of public debt-to-GDP ratio were 63.04% to 84.28%, while the threshold levels of budget deficit-to-GDP ratio were -1.24% to -5.75%, respectively. Furthermore, the findings also revealed that two institutional indicators contribute significantly on new fiscal sustainability indicator by incorporating FinTech such as regulatory quality and rule of law.

This study will be organized following some sections. The first section describes introduction which elaborates study issues, empirical gaps, study objectives, and contributions. The next section is method consists of data, principal component analysis (PCA), and cross-section threshold regression. The third section explores result and discussion of current findings compared to previous empirical studies. The fourth section expresses conclusion and policy implication.

METHOD
Data

This study employs fiscal, macroeconomic, financial technology and institutional indicators published by the World Bank, International Monetary Fund, Global Findex Database, and Worldwide Governance Indicators. Table 1 shows research variables were set to estimate the threshold levels of public debt and budget deficit on new fiscal sustainability indicator by incorporating FinTech using cross-section threshold regression. There are three dimensions to construct new fiscal sustainability indicator consist of primary gap, recursive algorithm, and financial technology. The collected data were from 2014 and 2017. These years demonstrate FinTech's contribution to the development of new fiscal sustainability indicators. In addition, the data from the two years were published by the Global Findex Database. Moreover, the threshold variables are depicted by public debt-to-GDP ratio and budget deficit. Besides, institutional indicators are illustrated by regulatory quality and rule of law following Ali & Ahmed (2017). This study also selects corruption perception index following Cooray, Dzhumashev & Schneider (2017). Several macroeconomic data are employed following the literature cover economic growth, inflation rate, and unemployment rate.

Table 2 explains descriptive statistics of research variables. Developed and developed countries take a beneficial impact from new fiscal sustainability indicator by incorporating FinTech such as lower value of the new indicator which reflects achieving fiscally sustainable level in 2014 and 2017. The level of public debt-to-GDP ratio for developed countries is higher than developing countries. Particularly, the level of budget deficit-to-GDP ratio for developed countries is lower than developing countries. The data indicate that developed countries faced a risk of public debt accumulation and lead to control the level of budget deficit. However, developing countries can manage the level of public debt accumulation and suffer a higher level of budget deficit.

Table 1. Research Variables

Variables	Description	Unit	Source
Primary gap indicator (pg)	Fiscal sustainability indicator is assessed using Intertemporal Budget Constraint following Sulaiman, Karim, & Khalid (2015); Uryszek (2016); and Nxumalo & Hlophe (2018).	Negative (-) equals fiscally sustainable level, positive (+) equals fiscally unsustainable level.	Literature and the Author's calculation
Recursive algorithm (ra)	Fiscal sustainability indicator is assessed using Intertemporal Budget Constraint following Cruz-rodriguez (2014); Sulaiman, Karim & Khalid (2015); Asava-vallobh, Aroonvisoot & Yangwiwat (2018); and Lau & Lee (2021).	Less than 1 equals fiscally sustainable level, more than 1 equals fiscally unsustainable level.	Literature and the Author's calculation
Financial technology (f)	Some indicators will be utilized, namely: (a) Used the internet to pay bills or to buy something online in the past year (% age 15+), (b) Paid utility bills: using a mobile phone (% age 15+), and (c) Made or received digital payments in the past year (% age 15+).	Percent	Global Findex Database
New fiscal sustainability indicator by incorporating FinTech (nfsf)	New fiscal sustainability indicator is assessed using principal component analysis.	Negative (-) equals fiscally sustainable level, positive (+) equals fiscally unsustainable level.	The Author's calculation
Public Debt-to-GDP ratio (gggd)	Gross debt is the general amount of debt a country has. Gross debt is a good assessment of a country's debt in the long-run. Gross debt is intragovernmental and has no direct impact on an individual government's economy.	Percent	International Monetary Fund
Budget Deficit-to-GDP ratio (bd)	Budget deficit equals General Government Total Expenditure - General Government Revenue. A positive (+) value equals deficit while a negative (-) value equals surplus.	Percent	The World Bank, International Monetary Fund, and Author's calculation
Regulatory quality (rq)	Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	Index	Worldwide Governance Indicators
Rule of law (rl)	Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	Index	Worldwide Governance Indicators
Corruption perception index (cpi)	The CPI scores and ranks countries/territories based on how corrupt a country's public sector is perceived to be by experts and business executives.	Index	Transparency International
Economic growth (eg)	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars.	Percent	The World Bank
Inflation rate (inf)	Inflation rate, consumer prices.	Percent	The World Bank
Unemployment rate (ue)	Unemployment, total (% of total labor force).	Percent	The World Bank

In 2014 developed countries have a minimum and maximum levels of public debt-to-GDP ratio were about 10.45% and 236.07%, respectively. However, in 2017 the minimum and maximum levels of public debt-to-GDP ratio were about 9.16% and

234.99%. The condition denotes that these countries try to control the public debt accumulation. On the other hand, the minimum and maximum levels of budget deficit-to-GDP ratio were about -6.02% and 0.66% in 2014, respectively. It shows that some developed countries obtain a just a few of budget surplus-to-GDP ratio. In contrast, in 2017 the minimum and maximum levels of budget deficit-to-GDP ratio were happened, namely -5.04% and -0.55%.

The minimum levels of public debt-to-GDP ratio for developing countries in 2014 and 2017 were about 0.07% and 0.06%. The condition expresses that several countries did not depend on public debt to financing domestic economy. Conversely, at the same time the maximum levels of public debt-to-GDP ratio were about 137.98% and 117.51%, respectively. Therefore, some developing countries can concern to trim the level of public debt accumulation gradually. Besides, in 2014 and 2017 the minimum levels of budget deficit-to-GDP ratio were about -5.98% and -5.59%, respectively. At the same time the maximum levels of budget deficit-to-GDP ratio were about -0.42% and -0.245, respectively. The condition shows that developing countries try to control the level of budget deficit-to-GDP ratio.

Quality of institutions for developed countries is better than developing countries. For example, in 2014 and 2017 the value of regulatory quality, rule of law and corruption perception index for developed countries is higher than developing countries. Technically, the positive value of institutional indicators reflects the higher quality of institutions and vice versa. Lastly, macroeconomic data for most developed and developing countries are less than two digits (<10%). It tells that these countries promote macroeconomic performance in a better condition.

Principal Component Analysis

The principal Component Analysis (PCA) is utilized to assess new fiscal sustainability indicator by incorporating FinTech dimensions. It is employed to analyze multivariate data and assessed under a composite or multidimensional index (Wold et al., 1987; Jollife, 2002). In particular, Jollife (2002) argued that the central idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the data set.

This study provides the basic equation of new fiscal sustainability indicator by incorporating FinTech (NFSF) following PCA. It is drawn by Equation (1) as follows:

$$NFSF = w_1 X_i^{pg} + w_2 X_i^{ra} + w_3 X_i^f + \varepsilon_i \tag{1}$$

X^{pg}, X^{ra}, X^{se} and X^f denote the dimensions of primary gap, recursive algorithm, and financial technology, respectively. The primary gap is assessed following Sulaiman et al. (2015); Uryszek (2016); and Nxumalo & Hlophe (2018). Besides, the recursive algorithm is assessed following Cruz-rodriguez (2014); Sulaiman et al. (2015); Asava-vallobh et al. (2018); and Lau & Lee (2021). The "i" represents the 88 developing and 35 developed countries, while ε is the total variations in two orthogonal parts, consisting of the variation caused by causal variables and the variation that comes from errors.

Table 2. Descriptive Statistics

Variables	2014				2017			
	Mean	St Dev	Min	Max	Mean	St Dev	Min	Max
Developed Countries								
New fiscal sustainability indicator by incorporating FinTech (nfsf)	0.92	0.66	-0.39	2.02	1.38	0.87	-0.47	2.87
Public Debt-to-GDP ratio (gggd)	74.84	46.15	10.45	236.07	71.13	45.77	9.16	234.99
Budget Deficit-to-GDP ratio (bd)	-1.59	3.06	-6.02	0.66	-1.71	1.24	-5.04	-0.55
Regulatory quality (rq)	1.26	0.50	0.33	1.95	1.29	0.52	0.24	2.09
Rule of law (rl)	1.32	0.65	-0.05	2.10	1.24	0.61	-0.04	2.03
Corruption perception index (cpi)	67.80	15.50	43.00	92.00	67.86	14.33	43.00	89.00
Economic growth (eg)	2.34	2.08	-1.86	8.71	3.32	1.60	1.51	8.15
Inflation rate (inf)	0.57	0.94	-1.60	2.76	1.70	0.80	0.25	3.72
Unemployment rate (ue)	9.48	5.35	3.04	26.50	7.02	3.92	2.83	21.45
Developing Countries								
New fiscal sustainability indicator by incorporating FinTech (nfsf)	-0.70	0.63	-2.16	0.95	-0.24	0.81	-1.74	2.14
Public Debt-to-GDP ratio (gggd)	42.05	23.17	0.07	137.98	50.87	24.67	0.06	117.51
Budget Deficit-to-GDP ratio (bd)	-2.74	1.78	-5.98	-0.42	-2.55	2.24	-5.59	-0.24
Regulatory quality (rq)	-0.24	0.79	-1.90	2.23	-0.25	0.77	-1.96	2.16
Rule of law (rl)	-0.34	0.72	-1.92	1.86	-0.35	0.72	-2.26	1.82
Corruption perception index (cpi)	37.86	14.30	5.00	84.00	37.58	14.16	6.00	84.00
Economic growth (eg)	4.13	2.43	-3.89	9.25	3.28	3.44	-10.67	8.50
Inflation rate (inf)	5.17	4.06	-1.09	12.17	10.00	16.48	-0.90	38.12
Unemployment rate (ue)	7.42	6.27	0.69	35.30	7.73	6.51	0.14	30.50

FinTech is proxied by three indicators published by Global Findex Database in 2014 and 2017 cover using the internet to pay bills or to buy something online in the past year (% age 15+), paying utility bills using a mobile phone (% age 15+), and making or receiving digital payments in the past year (% age 15+). These indicators were selected following Nizam, et al (2020). They stated that the PCA estimation has a relatively difficult stage but the findings and conclusions are more precise and robust.

Finally, the new fiscal sustainability indicators by incorporating FinTech dimension can be formulated, resulting:

$$NFSF = \frac{1}{2}\left[\frac{\sqrt{pg_k^2 + ra_k^2 + f_k^2}}{\sqrt{n}} + \left(1 - \frac{\sqrt{(z-pg_k)^2 + (z-ra_k)^2 + (z-f_k)^2}}{\sqrt{n}}\right)\right] \qquad (2)$$

z indicates the weight of w_i which is determined intrinsically. *pg, ra,* and *f* are index dimensions which consist of primary gap, recursive algorithm, and financial technology. The finding of NFSF can be interpreted following two conditions, namely: fiscally sustainable level occurs when the value of NFSF is negative (-) and fiscally unsustainable level occurs when that of is positive (+). The condition is defined following the literature of the existing fiscal sustainability indicator.

The Econometric Technique

This study estimates the threshold levels of public debt and budget deficit by considering quality of institutions on new fiscal sustainability indicator by incorporating FinTech. The cross-section threshold regression is employed introducing Hansen (1999, 2000). The basic empirical model follows previous studies published by Tran (2018), Bajo-Rubio et al. (2006), and Ali & Ahmed (2017). Cross-section threshold regression will be selected to qualify study objective. Equation (3) denotes the regression of threshold level of public debt-to-GDP ratio (GGGD) on NFSF, while Equation (4) indicates the regression of threshold level of budget deficit-to-GDP ratio (BD).

$$NFSF_{(gggd)i} = \alpha_0 + \beta_1 GGGD_i + \beta_2 X_i + \beta_3 Z_i + \varepsilon_i \qquad (3)$$

$$NFSF_{(bd)i} = \alpha_0 + \beta_1 BD_i + \beta_2 X_i + \beta_3 Z_i + \varepsilon_i \qquad (4)$$

GGGD is general government gross debt-to-GDP ratio as a proxy of public debt, BD equals budget deficit-to-GDP ratio, X describes macroeconomic variables, while Z is institutional indicators. The i presents 1, 2, ….n. The β is parameter of independent variables, while ε is error term. The macroeconomic variables consist of economic growth (Akram & Rath, 2019), inflation rate (Ali & Ahmed, 2017), and unemployment rate (Giesenow et al., 2020). The institutional indicators cover regulatory quality and rule of law. Besides, the corruption perception index published by Transparency International is also selected following Cooray et al. (2017).

Equation (3) and (4) can be rewritten to draw cross-section threshold regression model, resulting:

$$NFSF_{(gggd)i} = (\beta_1 GGGD_i + \lambda_1 Z_i)I(GGGD_i \leq \gamma) + (\beta_2 GGGD_i + \lambda_2 Z_i)I(GGGD_i \\ > \gamma) + \varepsilon_i \tag{5}$$

$$NFSF_{(bd)i} = (\beta_1 BD_i + \lambda_1 Z_i)I(BD_i \leq \gamma) + (\beta_2 BD_i + \lambda_2 Z_i)I(BD_i > \gamma) + \varepsilon_i \tag{6}$$

Equation (5) exhibits the cross-section threshold regression of institutional threshold level on new fiscal sustainability indicator by incorporating FinTech dimension for public debt-to-GDP ratio, while Equation (6) shows that of for budget deficit. GGGD and BD equal public debt-to-GDP ratio and budget deficit as threshold variables. The γ is the unknown threshold parameter, while $I(.)$ is an indicator function of low or high regime. Lastly, ε denotes the error term.

Therefore, Equation (5) and (6) are formulated in threshold form as follows:

$$NFSF_{(gggd)i} = \begin{cases} \beta_0^1 + \beta_1^1 GGGD_i + \beta_2^1 X_i + \beta_3^1 Z_i + \varepsilon_i. & GGGD_i \leq \gamma \\ \beta_0^2 + \beta_1^2 GGGD_i + \beta_2^2 X_i + \beta_3^2 Z_i + \varepsilon_i. & GGGD_i > \gamma \end{cases} \tag{7}$$

$$NFSF_{(bd)i} = \begin{cases} \beta_0^1 + \beta_1^1 BD_i + \beta_2^1 X_i + \beta_3^1 Z_i + \varepsilon_i. & BD_i \leq \gamma \\ \beta_0^2 + \beta_1^2 BD_i + \beta_2^2 X_i + \beta_3^2 Z_i + \varepsilon_i. & BD_i > \gamma \end{cases} \tag{8}$$

$\beta^1_{\,1}$ is the parameter for countries with low regime, while $\beta^2_{\,1}$ expresses the parameter for countries with high regime. The parameters will determine the threshold level of public debt-to-GDP ratio and budget deficit both in 35 developed and 88 developing countries in 2014 and 2017.

RESULT AND DISCUSSION
Public Debt-to-GDP Ratio Threshold on New Fiscal Sustainability

This section demonstrates the empirical findings of the cross-section threshold regression of public debt-to-GDP ratio on new fiscal sustainability indicator by incorporating FinTech following Equation (5). The finding revealed that the threshold levels of public debt-to-GDP ratio for developed and developing countries in 2014 were 100.37% and 63.04%, respectively (Table 3).

The new fiscal sustainability indicator by incorporating FinTech of Global OLS and Regime 1 (q<=100.37) for developed countries is determined by the corruption perception index (CPI), inflation rate (INF), and unemployment rate (EU) at 1% level. It means that higher CPI level, inflation rate, and unemployment rate will lead fiscally unsustainable level. Conversely, economic growth (EG) has a negative and significant impact at 1% level following Regime 1, which means that higher economic growth will guarantee fiscally sustainable level. The number of samples for developed countries is 35 countries which are divided into 27 countries under Regime 1 and 8 countries under Regime 2. The findings of the threshold level of public debt on new fiscal sustainability indicator by incorporating FinTech dimension following Regime 2 are determined negatively and significantly at 1% level by inflation rate and unemployment rate. It indicates that increased inflation and unemployment rates will enhance fiscally sustainable level. Economic growth has a positive impact at 1% level, which shows that a higher level of growth will lead fiscally

unsustainable level. However, regulatory quality stresses the level of fiscal sustainability. Therefore, policymakers should focus on maintaining fiscally sustainable level in the long-run by managing inflation and unemployment rates, including encouraging sustainable economic growth in the long-run and stimulating quality of institutions.

Table 3. Public Debt Threshold on New Fiscal Sustainability Indicator in Developed and Developing Countries, 2014

Dependent Variable: New Fiscal Sustainability Indicator by Incorporating FinTech

	Developed Countries			Developing Countries		
	Global OLS	Regime1 (q<=100.37)	Regime2 (q>100.37)	Global OLS	Regime1 (q<=63.04)	Regime2 (q>63.04)
Intercept	-1.71** [0.63]	-1.58*** [0.44]	5.17*** [0.14]	-0.34 [0.58]	-0.02 [0.68]	-0.05 [0.94]
RQ_i	0.26 [0.41]	0.18 [0.31]	-0.96*** [0.19]			
RL_i				0.38 [0.23]	0.56** [0.26]	-1.11* [0.55]
CPI_i	0.03*** [0.01]	0.03*** [0.01]	-0.01 [0.01]	0.01 [0.01]	-0.01 [0.01]	0.05*** [0.01]
INF_i	0.22** [0.09]	0.27*** [0.07]	-0.87*** [0.08]	0.01 [0.01]	0.02* [0.01]	-0.15*** [0.05]
UE_i	0.05*** [0.01]	0.05*** [0.01]	-0.23*** [0.01]	-0.01 [0.01]	-0.01 [0.01]	-0.09** [0.04]
EG_i	-0.01 [0.05]	-0.08*** [0.02]	0.18*** [0.01]	-0.06*** [0.02]	-0.04* [0.02]	-0.32*** [0.09]
R-squared	0.62	0.86	0.98	0.25	0.26	0.70
Heteroskedasticity Test (P-Value)	0.77			0.89		
Threshold	100.37			63.04		
0.95 Confidence Iterval	[100.37, 100.37]			[15.60, 67.21]		
LM-test for no threshold	11.37			8.11		
Bootstrap P-Value	0.20			0.78		
Observation	35	27	8	88	74	14

Notes: The standard errors are reported in parentheses. ***, ** and ** indicate significance at 1%, 5% and 10% levels, respectively.

Developing countries receive a benefit of rule of law. The rule of law has a positive impact on new fiscal sustainability indicator following Regime 1 at 5% level for 74 countries and negative impact following Regime 2 at 10% level for 14 countries. It reveals that 74 countries should be careful in controlling the risk of fiscally unsustainable level when the quality of institutions is getting better. In contrast, 14 countries benefit from the improvement of institutional quality to ensure fiscally sustainable level. Besides, Regime 2 provides a significant impact of corruption perception index (CPI) and macroeconomic

variables. For example, higher quality of corrupt practice control will drive higher value of new fiscal sustainability indicator, which can probably mean a fiscally unsustainable level. The higher inflation rate, unemployment rate and economic growth promote in declining value of new fiscal sustainability, which will benefit policy makers in ensuring fiscally sustainable level.

In 2017 developed and developing countries still faced higher threshold level of public debt-to-GDP ratio on new fiscal sustainability by incorporating FinTech. The threshold level for these countries were 90.09% and 84.28%, respectively (Table 4). It is lower than the threshold level of public debt-to-GDP ratio for developed countries and higher than those of developing countries as described in Table 2. The findings spell out that developed countries can suppress the level of public debt, while developing countries suffer higher level of public debt-to-GDP ratio.

Table 4. Public Debt Threshold on New Fiscal Sustainability Indicator in Developed and Developing Countries, 2017

Dependent Variable: New Fiscal Sustainability Indicator by Incorporating FinTech

	Developed Countries			Developing Countries		
	Global OLS	Regime1 (q<=90.09)	Regime2 (q>90.09)	Global OLS	Regime1 (q<=84.28)	Regime2 (q>84.28)
Intercept	-1.94** [0.79]	-2.14*** [0.62]	1.92*** [0.61]	0.47 [0.42]	0.14 [0.63]	-0.02 [0.49]
RQ_i	0.47 [0.37]	0.69** [0.30]	0.61 [0.63]			
RL_i				0.71*** [0.17]	0.6*** [0.24]	-0.16 [0.41]
CPI_i	0.03*** [0.01]	0.03*** [0.01]	-0.02* [0.01]	-0.01 [0.01]	0.01 [0.01]	0.01 [0.01]
INF_i	0.12 [0.10]	-0.01 [0.08]	0.84*** [0.15]	0.01 [0.01]	-0.01 [0.01]	-0.07*** [0.01]
UE_i	0.06*** [0.02]	0.16*** [0.03]	-0.02 [0.03]	0.01 [0.01]	0.01 [0.01]	-0.02* [0.01]
EG_i	-0.08 [0.05]	-0.07** [0.03]	-0.49*** [0.08]	-0.09*** [0.02]	-0.09*** [0.02]	0.19*** [0.05]
R-squared	0.70	0.84	0.91	0.35	0.37	0.71
Heteroskedasticity Test (P-Value)	0.84			0.94		
Threshold	90.09			84.28		
0.95 Confidence Iterval	[87.14, 90.09]			[84.28, 84.28]		
LM-test for no threshold	7.61			8.40		
Bootstrap P-Value	0.81			0.70		
Observation	35	26	9	88	78	10

Notes: The standard errors are reported in parentheses. ***, ** and ** indicate significance at 1%, 5% and 10% levels, respectively.

Table 4 snapshots the determinant of public debt-to-GDP ratio threshold levels on new fiscal sustainability indicator by incorporating FinTech for developed countries in 2017. It explores that the corruption perception index (CPI) has a positive impact at 1% level following Global OLS and Regime 1. Nonetheless, the CPI has a negative and significant impact at the 10% level, which means that the increasing quality of controlling corrupt practices stimulates fiscally sustainable level. Besides, two macroeconomic variables also have a significant impact on the new fiscal sustainability indicator following Regime 2, which consists of the inflation rate and economic growth. The inflation rate has a positive and significant impact at 1% level, as is the impact of the unemployment rate following Global OLS and Regime 1. Interestingly, economic growth has a negative and signficant impact at 1% level, which gives a positive indication to policymakers to guarantee fiscally sustainable level. Similarly, the negative impact of economic growth also occurs in the findings of Regime 1. The number of samples for developed countries can be classified as follows: 35 countries under Global OLS, 26 countries under Regime 1, and 9 countries under Regime 2.

The quality of institutions (rule of law) has a positive effect at 1% level following Global OLS and Regime 1 for developing countries. It portrays that policymakers should be more careful in encouraging fiscally sustainable level in relation to the improvement of institution quality. In addition, Regime 2 exhibits that inflation rate and unemployment rate have a negative effect at 1% and 10% levels, respectively. It means that higher inflation and unemployment rate will encourage fiscally sustainable level. Furthermore, economic growth has a negative effect at 1% level following Global OLS and Regime 1. It expresses that increasing economic growth drives in achieving fiscally sustainable level. However, economic growth has a positive effect at 1% level following Regime 2, which illustrates that policymakers should pay more attention to enhance economic growth and the value of the new fiscal sustainability indicator. The next, the number of samples for developing countries is 88 countries, consisting of 78 countries under Regime 1 and 10 countries under Regime 2.

Budget Deficit-to-GDP Ratio Threshold on New Fiscal Sustainability

This section estimates Equation (6) to reveal the threshold level of budget deficit on new fiscal sustainability indicators by incorporating FinTech for developed and developing countries in 2014 and 2017. The main findings were outlined by Table 5 that the threshold levels of budget deficit-to-GDP ratio for developed and developing countries in 2014 were -3.04% and -1.24%, respectively.

Interestingly, the empirical findings reveal that the threshold level of budget deficit on new fiscal sustainability indicator for developed countries is determined negatively and significantly by quality of institutions (regulatory quality) at 5% level following Regime 1. It explains that increased quality of institutions will stimulate fiscally sustainable level. However, corruption perception index (CPI) contributes positively and significantly at 1% level following Global OLS and Regime 1, which

means that strengthening corruption-free practices can encourage an increase in the value of fiscal sustainability. Thus, policymakers are expected to pay more attention to control corruption level in achieving fiscally sustainable level. Inflation rate have a positive and significant impact following Global OLS and Regime 2. Similarly, a positive and significant impact is also contributed by unemployment rate following Global OLS and Regime 1 at 1% level. Interestingly, economic growth has a negative and significant impact at 1% level, which means that improving economic growth will encourage achieving fiscally sustainable level. Therefore, policymakers can focus on sustainable economic growth, low inflation rate, and low unemployment rate to ensure a level of fiscally sustainable. The number of samples for developed countries can be categorized as follows 35 countries under Global OLS, 16 countries under Regime 1, and 19 countries under Regime 2.

Table 5. Budget Deficit Threshold on New Fiscal Sustainability Indicator in Developed and Developing Countries, 2014

Dependent Variable: New Fiscal Sustainability Indicator by Incorporating FinTech

	Developed Countries			Developing Countries		
	Global OLS	Regime1 (q<=-3.04)	Regime2 (q>-3.04)	Global OLS	Regime1 (q<=-1.24)	Regime2 (q>-1.24)
Intercept	-1.71*** [0.63]	-3.93*** [0.40]	0.43 [0.74]	-0.63* [0.33]	-0.57* [0.32]	-2.39 [1.87]
RQ_i	0.26 [0.41]	-0.67** [0.30]	0.23 [0.48]	0.30*** [0.12]	0.34*** [0.11]	-0.23 [0.47]
CPI_i	0.03*** [0.01]	0.07*** [0.01]	0.01 [0.01]	0.01 [0.01]	0.01 [0.01]	0.05 [0.05]
INF_i	0.22** [0.09]	-0.10 [0.10]	0.34*** [0.13]	0.01 [0.01]	0.01 [0.01]	0.09*** [0.01]
UE_i	0.05*** [0.01]	0.04*** [0.01]	-0.04 [0.03]	-0.01 [0.01]	-0.01 [0.01]	0.01 [0.02]
EG_i	-0.01 [0.04]	0.09*** [0.02]	-0.11*** [0.04]	-0.05 [0.02]	-0.06*** [0.02]	-0.04 [0.06]
R-squared	0.62	0.89	0.68	0.27	0.33	0.46
Heteroskedasticity Test (P-Value)	0.67			0.53		
Threshold	-3.04			-1.24		
0.95 Confidence Iterval	[-3.13, -1.5]			[-5.39, -1.24]		
LM-test for no threshold	14.41			7.94		
Bootstrap P-Value	0.01			0.80		
Observation	35	16	19	88	77	11

Notes: The standard errors are reported in parentheses. ***, ** and ** indicate significance at 1%, 5% and 10% levels, respectively.

The empirical findings for developing countries demonstrate that quality of institutions (regulatory quality) contributes positively at 1% level following Global

OLS and Regime 1. It portrays that higher quality of institutions encourages higher value of fiscal sustainability. In addition, an interesting finding was presented by the negative and significant impact of economic growth following Regime 1, which gives the appropriate signal for policymakers in maintaining fiscally sustainable level. The number of samples for developing countries can be categorized into the following: 88 countries under Global OLS, 77 countries under Regime 1, and 11 countries under Regime 2.

Another finding is exhibited by the cross-section threshold regression for developed and developing countries in 2017 (Table 6). The threshold levels of budget deficit-to-GDP ratio for developed and developing countries were -0.97% and -5.75%, respectively. It indicates that developed countries have stimulated to trim the level of budget deficit-to-GDP ratio, while developing countries faced a risk of higher budget deficit-to-GDP ratio. Therefore, the developed countries should control the level of budget deficit in maintaining fiscally sustainable level in the long-run.

Table 6. Budget Deficit Threshold on New Fiscal Sustainability Indicator in Developed and Developing Countries, 2017

Dependent Variable: New Fiscal Sustainability Indicator by Incorporating FinTech

	Developed Countries			Developing Countries		
	Global OLS	Regime1 (q<=-0.97)	Regime2 (q>-0.97)	Global OLS	Regime1 (q<=-5.75)	Regime2 (q>-5.75)
Intercept	-1.94** [0.79]	-1.48 [1.02]	-11.54*** [-1.06]	-0.17 [0.37]	7.31*** [0.92]	-0.44 [0.36]
RQ_i	0.47 [0.37]	0.86* [0.40]	-1.35 [0.84]	0.43** [0.17]	2.13*** [0.30]	0.41** [0.17]
CPI_i	0.03*** [0.01]	0.02* [0.01]	0.02 [0.14]	0.01 [0.01]	-0.15*** [0.03]	0.01 [0.01]
INF_i	0.12 [0.10]	0.40*** [0.14]	-0.22 [0.48]	-0.01 [0.01]	-0.01 [0.01]	0.01 [0.01]
UE_i	0.06*** [0.02]	0.05** [0.02]	0.02 [0.45]	0.01 [0.01]	-0.04 [0.03]	0.01 [0.01]
EG_i	-0.08 [0.05]	-0.15** [0.07]	-0.15 [0.17]	-0.08*** [0.02]	-0.17* [0.10]	-0.08*** [0.02]
R-squared	0.70	0.81	0.90	0.34	0.83	0.41
Heteroskedasticity Test (P-Value)	0.73			0.97		
Threshold	-0.97			-5.75		
0.95 Confidence Iterval	[-2.80, -0.81]			[-5.76, -2.20]		
LM-test for no threshold	13.2			13.57		
Bootstrap P-Value	0.04			0.08		
Observation	35	24	11	88	10	78

Notes: The standard errors are reported in parentheses. ***, ** and ** indicate significance at 1%, 5% and 10% levels, respectively.

Quality of institutions (regulatory quality) has a positive and significant effect for developed countries (Regime 1) and developing countries (Global OLS, Regime 1 and Regime 2). It explains that improving the quality of institutions will create an increase in the value of fiscal sustainability. The increasing value of fiscal sustainability indicator promotes the risk of fiscally unsustainable level. Besides, a positive and significant impact is also shown by the inflation rate (Regime 1) and unemployment rate (Global OLS and Regime 1) for developed countries. Specifically, the findings are presented by economic growth, which has a negative impact for developed countries (Regime 1) and developing countries (Global OLS, Regime 1 and Regime 2). It denotes that developing countries benefit from increased economic growth in ensuring the level of fiscally sustainable level. The sample size for developed countries is 35 countries, consisting of 24 countries under Regime 1 and 11 countries under Regime 2. Meanwhile, the sample size for developing countries is 88 countries, which includes 10 countries under Regime 1 and 78 countries under Regime 2.

DISCUSSION

Public debt-to-GDP ratio, budget deficit-to-GDP ratio and institutions broadcast a significant contribution on new fiscal sustainability indicator by incorporating FinTech following Table (3) – (6). The findings of public debt-to-GDP ratio depict that developed countries can trim the threshold level from 2014 (100.37% of GDP) to 2017 (90.09% of GDP). Conversely, developing countries face a risk of higher public debt-to-GDP ratio is about 63.04% to 84.28% of GDP. Similarly, the countries suffer the higher budget deficit-to-GDP ratio is about -1.24% to -5.75%. Interestingly, developed countries also able to control the level of budget deficit-to-GDP ratio from -3.04% to -0.97%. Besides, two institutional indicators deliver significant impact on new fiscal sustainability indicator such as regulatory quality and rule of law. Corruption perception index (CPI) also contributes in a certain finding. Nguyen & Luong (2021) state that weak governance in controlling corruption leads to higher accumulation of public debt.

The current literature argued that higher public debt-to-GDP ratio can sustain without leading a risk of fiscal sustainability (Alloza, et al, 2020). They found that prudent debt level for Spanish can be obtained following an anchor of 60% of GDP. It tells that the level of public debt-to-GDP ratio will stimulate fiscally sustainable level when it threshold around 60% of GDP. In particular, Wang et al. (2021) revealed that the higher external debt stresses economic growth in low- and middle-income countries during 1970-2018. It means that the external borrowing of public sector stimulate the macroeconomic fragility. In term of threshold level, Law et al.s (2021) express that 71 developing countries obtained public debt-to-GDP ratio about 51.65% during 1984-2015.

Furthermore, literature also provide empirical evidence of budget deficit-to-GDP threshold. For example, Peppel-Srebrny (2021) the higher budget deficit due to higher

government investment can trim the effect of inflationary of fiscal policy and bond yield. It delivers an insight that the budget deficit can be decided in maintaining fiscal sustainability under government investment policy. However, Ahmad & Aworinde (2019) argued that about 12 African countries suffer an inflationary effect of budget deficit during 1980:1 – 2018:4. Therefore, policymakers should manage and control the level of budget deficit-to-GDP ratio to guarantee fiscal sustainability and avoid inflationary effect. Besides, Pfeiffer et al. (2021) argued that low interest rate of government bond will stimulate the optimal mix between spending and revenue. The budget deficit is also delivering a burden impact to national economy as well as the level of well-being for future generation (Al-Rubaie & Ahmed, 2021).

Bergman et al. (2016) emphasize institutions' contributions to promoting sustainable public finances. They argue that the effect of institution is less critical as government efficiency increases. This shows that fiscal rules and government efficiency are institutionally equivalent. In addition, Cooray et al. (2017) revealed the relationship between corruption, the shadow economy, and public debt. They found that (a) a 1-unit increase in the corruption index of Transparency International leads to a 0.13% increase in the debt-to-GDP ratio, and (b) a 1-unit increase in the Kaufmann et al. corruption index leads to a 0.11% increase in the debt to GDP ratio. Pradhan (2019) state that continuous assesment of fiscal sustainability is essential for identifying the sources of risk and vulnerability in the fiscal and macro structure of a country. Makala (2022) suggest that the fiscal policy authorities to integrate the expenditure rule in their fiscal policy framework.

CONCLUSION

This study examines threshold levels of public debt and budget deficit by considering institutions on new fiscal sustainability indicator by incorporating FinTech for 88 developing and 35 developed countries in 2014 and 2017 using cross-section threshold regression. It provides new evidence on literature of fiscal sustainability. In particular, FinTech stimulates governments to conduct fiscal policy using e-budgeting and e-taxation. The main results show that the public debt-to-GDP ratio threshold for developed countries in 2014 was higher than in 2017, while it was lower for developing countries in 2014. It indicates that developed countries can reduce public debt accumulation. Conversely, developing countries cannot control higher public debt accumulation. Surprisingly, the findings about the public debt threshold also apply to the budget deficit threshold. It shows that a higher budget deficit-to-GDP ratio causes a higher public debt-to-GDP ratio in developing countries.

On the other hand, lower public debt-to-GDP ratio accumulation is stimulated by lower budget deficit-to-GDP ratio for developed countries. Besides, two institutional indicators contribute significantly to the public debt threshold covering regulatory quality and the rule of law. The threshold level of a budget deficit is determined by regulatory quality on a certain regime. The corruption perception index also benefits the threshold regression of public debt and budget deficit in a certain regime. Finally, the findings

present that macroeconomic data contribute significantly to new fiscal sustainability indicators by incorporating FinTech for public debt and budget deficit threshold levels in a certain regime.

Policymakers must seek to keep the public debt and budget deficit at sustainable levels for the economy. By doing this, they will be able to sustain government revenue and repay the current and future public debt. They also should pay more attention to improving the quality of institutions, such as regulatory quality and the rule of law. Better control of corrupt practices will provide a better and more transparent fiscal policy in the long run. In addition, policymakers should incorporate FinTech (e-budgeting and e-taxation) into fiscal policy to guarantee fiscal sustainability in the long run. E-budgeting and e-taxation can enhance fiscal sustainability and prudence and promote ideal levels of public debt and budget deficits.

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Migrant Labor Determinants:
Do Socio-Economic Factors Affect?

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Abstract

This study aims to determine the social and economic variables that influence workers to become migrant workers. This research was conducted in Central Lombok Regency, West Nusa Tenggara. As a sample in this study, we surveyed 100 people, consisting of 50 ex-migrant workers and 50 local workers. The analytical tool used was logit analysis. The estimation results show that the influential social variables are gender, age, marital status, and education. Economic variables that affect former migrant workers include ownership of savings, ownership of loans, ownership of agricultural land, and ownership of livestock, all of which have a negative effect. The policy implications of this research are the need for new regulations or revisions to previous regulations to improve human resources at the time of pre-placement. This regulation should involve training in language skills and the abilities required for the relevant field of work to increase competitiveness. Furthermore, policies to empower migrant workers post-placement should be implemented to provide more significant opportunities and support for working or starting businesses in their home countries.

Keywords:

migrant workers; local labor; economic; social

INTRODUCTION

Migrant workers are a phenomenon of international migration. Migration refers to the movement of people from one region to another, and it can be classified into two types: internal and international migration (Haryono, 2017). According to the Indonesian Migrant Workers Protection Agency (BP2MI, 2020), Indonesia placed over a quarter of a million citizens as migrant workers in various countries from 2014-2020, despite a 59% decrease in 2020 due to the Covid-19 pandemic. West Nusa Tenggara (NTB) is a significant contributor to Indonesia's migrant worker population, with the fourth highest number of placements in 2019, according to data from the Indonesian Migrant Workers Protection Agency (BPPMI). However, regarding the ratio of migrant workers to the total population, West Nusa Tenggara ranks first at 1.22%, compared to East Java, which has the highest number of migrant workers in absolute terms at only 0.35%. Central Lombok Regency is one area that provides placement services for migrant workers in West Nusa Tenggara Province. In 2018, it opened the One-Stop Integrated Service (LTSP-P2TKI), which increased the number of Indonesian migrant workers from Central Lombok. The Head of the Manpower Placement Division of the Central Lombok Manpower and Transmigration Agency reported that in the first quarter of 2018, about 3000 people were placed abroad as Indonesian migrant workers, with 90-100 people registering to become Indonesian Migrant Workers (PMI). In addition, the Central Lombok Manpower and Transmigration Agency placed 9,192 migrant workers in 2019. Based on Table 2 data, Jonggat District had the highest number of migrant workers in 2019.

The existence of migrant workers has both positive and negative impacts. According to Wulan et al. (2018), migration can be categorized as planned change (planned social change). However, it can also become an expected and unintended change in international migration. Intended change can be interpreted as a positive impact on the migration process. However, if it is not planned correctly, it can cause unintended change resulting in social costs of migration. Several studies show that changes in family function and structure have led to an increase in divorce rates among families and communities of origin of migrants. This condition is considered a negative impact of international migration. The phenomenon of migrant workers, according to Tamtiari (2016), is recognized to solve labor problems in Indonesia and increase the country's foreign exchange. Mainly, working abroad helps improve the fate of migrant workers and their households in their areas of origin. However, migrant workers also have a negative impact. There is a significant negative impact on the relationship and integrity of the household from a socio-psychological perspective. One of these impacts is divorce because someone who is left behind for migration tends to experience stress and psychological disturbances (Tamtiari, 2016; Lu, 2012).

Studies have shown that children of migrant workers experience a decline in social skills, academic performance, and increased stress, despite the mother's high attachment and the excellent upbringing provided by the father (Puspitasari & Setioningsih, 2011; Indah Prastiwi, 2020). Furthermore, the duration of time that a mother spends as a

migrant worker impacts her child's well-being. Additionally, upon returning to their home regions, former migrant workers with low education levels have low productivity and struggle to compete with the local workforce in areas with high population densities and unemployment rates. Establishing a business in Indonesia can also be challenging due to limited access to financing for small businesses, prompting many ex-migrant workers to return to migration to avoid unemployment and provide for their families (Maksum, 2021). Moreover, migrant workers are vulnerable to occupational health and safety risks and sexual and psychological risks for both themselves and their families left behind, which can result in divorce (Simkhada et al., 2017).

Other impacts, as revealed by a 2015 study conducted by the Indonesian Tunas Alam Foundation (Santai) in Wanasaba Village, East Lombok district, include the negative consequences for children left behind by migrant worker parents. The study found that many children are forced to marry at an early age, with around 136 cases reported and approximately 100 couples consisting of children of fellow migrant workers. The Head of the Division for Child, Youth, and Community Empowerment at the Santai Foundation cited two contributing factors: the lack of parental supervision due to both parents working as migrant workers, and the economic problems experienced by children, leading them to hope that marriage can change their fate. However, becoming a migrant worker does not necessarily reduce poverty. Even though incomes may increase, poverty rates remain high due to spending on housing and vehicles rather than investing in businesses for future development.

Even though migration has a negative impact on families, many people still want to pursue it. Understanding the driving factors behind workforce migration can help formulate programs to reduce the desire to migrate, given the negative impacts it can have. Simpson (2017) identifies that there are push and pull factors of migration. Push factors refer to conditions that encourage people to leave their country, while pull factors refer to conditions that attract them to migrate. Economic and non-economic factors influence both types. Sukamdi (2007) suggests two explanations for migration: the individual and structural approaches. Several studies have explored the topic, and Puspitasari (2010) suggests that age, income, original occupation, education level, marital status, and land ownership encourage people to become migrant workers. Workers migrate because they want to improve their families standard of living. From a macro perspective, Puspitasari & Kusreni (2017) state that factors affecting Indonesian labor migration abroad include the number of unemployed, GRDP per capita, the average length of education, and poverty. However, among these factors, the number of unemployed and poverty are the most significant drivers of Indonesian workers' migration abroad. Franc et al. (2019) indicate that the emigration rate responds quickly to changes in GDP per capita and the youth population's unemployment rate in the immigration country. The lack of jobs contribute to an increase in poverty and, thus, the number of unemployed. According to Hajian et al. (2020), who reviewed twenty-five articles on migration, push and pull theory was the most popular way to describe the driving factors behind migration. They classified factors into three categories: macro,

meso, and micro-level. Poor income, unfavorable socio-economic conditions, political instability, lack of professional and educational opportunities, and family and personal concerns are common reasons for migration. However, Bidwell et al. (2014) found that salary, career progression, and poor working conditions were not significant migration drivers for health workers. In South Africa, migration is driven by security, crime, and racial tensions.

Various factors drive Indonesian workers to become migrant workers, including personal needs, family economic conditions, limited job opportunities in Indonesia, and the desire to seek work experience and higher income. Husniawati (2017) found that personal needs and expectations are the dominant factors, the most important being the need for higher income. Rizqi (2018) identified low education level as a determinant of a person's decision to become a migrant worker. It offers an opportunity to earn a higher salary, save money, and invest in businesses and homes in Indonesia. Intan & Yuliati (2016) and Wafirotin (2016) suggest that individual motives, family, and driving factors from the area of origin and pull factors from the destination area also play a significant role. Family, in particular, influences a person's decision to become a migrant worker, with many respondents having family members who are also migrant workers. Raharto (2017) identified three reasons women decide to work abroad: the choice of activities, the person leaving, and economic factors.

Sometimes, school-age girls become migrant workers due to their parents' economic conditions. Migration decisions are also influenced by job experience abroad, income, marital status, family burdens, and length of stay in the destination country (Waridin, 2007). Other research suggests that migration decisions are influenced by satisfaction with personal finances, household asset index, and standard of living (Aslany & Sommerfelt, 2020). The existence of inequality, socio-economic injustice, and lack of opportunities to get a better livelihood also affect migration decisions, as well as social networks such as friends, family, and neighbors who can provide information on migrant destination countries (Dinbabo et al., 2021). In addition, a study in Indonesia found that the population's decision to undertake internal migration in Indonesia is based on income, employment status, education, age, number of family members, marital status, residential ownership status, and agricultural land ownership (Khoeri & Atmanti, 2021)."

Previous studies have mainly focused on general socio-economic factors, such as income, education, gender, and age, concerning migrant workers' decision-making processes. However, there needs to be more exploration of the role of ownership of assets, such as savings, loans, and livestock, as a factor in workers' migration decisions. Using the Sustainable Livelihood Framework approach, this study addresses this gap by incorporating a more comprehensive understanding of economic factors, including income and asset ownership. By identifying and analyzing the relationship between asset ownership and migrant workers' decisions to migrate, this study can provide new insights into the factors influencing workers' migration decisions.

It is necessary to control the departure of migrant workers to minimize the problem. One of the controls is investigating the factors that affect the decisions of

migrant workers. This study examines the social and economic effects on the decisions of migrant workers and local workers. This study utilizes social variables such as gender, age, marital status, number of family members, and education. The economic variables in this study are income, occupation type, savings ownership, loan ownership, agricultural land ownership, and livestock ownership. Information on these factors is expected to construct policies to develop a more sustainable workforce both economically and social-psychologically.

METHODS

This study employs primary quantitative data and qualitative data collected through a questionnaire. The unit of analysis is individuals who have worked either as migrant workers or local workers, irrespective of their gender. They provide data or information based on the variables used in this study. As a result, this study aims to identify the socio-economic factors that affect the decisions of migrant workers.

Previous research has mainly focused on migrant workers. However, this study contributes to empirical research by including samples of both former migrant workers and local workers to gain a more comprehensive understanding of their decision-making process. The population of this study includes all ex-migrant workers and local workers in Perina Village. Therefore, the sample for this study comprises 100 individuals, consisting of 50 ex-migrant workers and 50 local workers.

This study uses non-probability sampling with the convenience method as the sampling technique. The research was conducted in 2020 using a survey method, with ex-migrant and local workers as the dependent variable and socio-economic variables as the independent variable. The social variables include gender, age, marital status, number of family members, and education. In contrast, the economic variables include income, occupation type, savings ownership, loan ownership, agricultural land ownership, and livestock ownership.

This study uses logit regression analysis, as described in previous research by Puspisanti (2014). Dependent variable predicting the variable on a nominal scale: 1 for ex-migrant workers and 0 for local workers.

In general, the equations of the logit regression model are as follows:

$$\ln \frac{p}{1-p} = \beta o + \beta_1 X_i + \beta_2 X_i + \beta_3 X_i + \beta_4 X_i + \beta_5 X_i + \beta_6 X_i + \beta_7 X_i + \beta_8 X_i + \beta_9 X_i +$$

$$\beta_{10} X_i + \beta_{11} X_i + e \tag{1}$$

Where 1 denotes ex-migrant worker, 0 denotes local worker; X_1 denotes gender; X_2 denotes age; X_3 denotes marital status; X_4 denotes household size; X_5 denotes education; X_6 denotes income; X_7 denotes job; X_8 denotes savings ownership; X_9 denotes loan ownership; X_{10} denotes agricultural land ownership; X_{11} denotes livestock ownership; and e denotes error term.

Therefore, the model will analyze the effect of the independent variables individually. This test is used to observe the effect of the independent variables on the dependent

variable simultaneously by referring to the significant Chi2 probability value with an alpha of 5% (0.05). The Pseudo R-Squared.

Test is conducted to see how all independent variables can explain the dependent variable. The test is run by looking at the Pseudo R-Squared value. This test is also used to test the effect of the independent variables on the dependent variable individually. The test is run by looking at the p-value of each significant variable with an alpha of 5% (0.05).

RESULT AND DISCUSSION
Empirical Result

Perina Village is in the Jonggat District, Central Lombok Regency, West Nusa Tenggara. The village has a population of 3604, consisting of 1721 males and 1883 females. The village has 176 hectares of rice fields and 112.70 hectares of dry land. Most of the population work as farmers and farm laborers, with 874 individuals working as farmers, 2,079 as farm laborers, and only three having farming businesses. However, many individuals find that their farming income is insufficient to meet their daily needs. Finding work outside the planting and harvesting seasons is complex, and meeting daily expenses, such as paying for their children's schooling, is challenging. Many become migrant workers to fulfill their needs and expectations, such as building homes. This condition is particularly true for households where individuals marry at a young age, quit school, or still live with their parents.

Table 1 provides a detailed description of the respondents' social and economic variables. Many ex-migrant worker respondents are 70% male and 30% female, while local workers are 58% male and 42% female. Table 1 shows that those over 30 dominate local workers, while ex-migrant workers are predominantly between 17 and 30. The marital status of ex-migrants and local workers is similar, with married individuals being the majority. The number of family members shows that ex-migrant workers are predominantly in households with more than three people, while local workers are primarily in households with 1-3 family members. Most ex-migrant workers have a junior high school education or lower, while local workers are predominantly high school graduates, followed by elementary school, junior high school, and college graduates. The income variable shows that 48% of local worker respondents have incomes below 1 million, 40% between 1-2 million, and 12% above 2 million. For ex-migrant workers, the majority (52%) have incomes below one million, 44% between two and three million, and only 4% with incomes over two million.

Table 1 also shows that 76% of ex-migrant worker respondents work in non-farming occupations, while the remaining 24% work as farmers. Among local workers, 44% work as farmers, while the remaining 56% work in non-farming occupations. Most local worker respondents have more significant savings than ex-migrant workers, indicating that most respondents do not have savings. Loans: Regarding loan ownership, most ex-migrants, and local workers do not have loans. 80% of ex-migrant worker

respondents do not own agricultural land, whereas 62% have agricultural land, indicating that local workers have more significant agricultural land ownership. Additionally, local workers have 48% higher livestock ownership, while ex-migrant workers have only 8%.

Table 1. The Ex-Migrant Workers and Local Workers Description

Category		Ex-Migrant Workers	Local worker
		Percentage	Percentage
Age	17-30	40	60
	>30	60	40
Gender	Male	70	58
	Female	30	42
Marital status	Unmarried	34	24
	Married	60	64
	Widowed	6	10
Family number	1-3	52	48
	>3	48	52
Education	Elementary school	32	22
	Secondary school	42	18
	High school	26	52
	Undergraduate	-	8
Income	< 1 million	52	48
	1-2 million	44	40
	>2 million	4	12
Occupation	Farmer	24	44
	Non-Farmer	76	56
Saving ownership	Yes	10	46
	No	90	56
Loan ownership	Yes	16	38
	No	84	62
Livestock ownership	Yes	8	48
	No	92	52
Agricultural land ownership	Yes	20	38
	No	80	62

Source: Data processed

Table 2. Logit Regression Output

TK	Coeff.	Standard Error	z	P>(z)	Interval Coefficient 95%	
Gender	2,481	0,941	2,62	0,008*	0,635	4,328
Age	-0,144	0,054	-2,61	0,009*	-0,253	-0,035
Marital Status	2,080	1,093	1,90	0,057***	-0,061	4,223
Household size	0,379	0,310	1,22	0,221	-0,228	0,987
Education	-0,565	0,150	-3,77	0,000*	-0,860	-0,271
Income	4,450	5,240	0,08	0,932	-9,830	1,070
Job	0,090	0,950	0,10	0,924	-1,771	1,952
Saving	-2,582	0,847	-3,05	0,002*	-4,243	-0,922
Loan	-1,959	0,838	-2,34	0,019**	-3,603	-0,315
Land	-2,292	0,953	-2,40	0,016**	-4,161	-0,423
Livestock	-1,893	0,960	-1,97	0,049**	-3,776	-0,010
C	8,104	2,375	3,41	0,001*	2,448	12,760

Logistic Regression	Obs	:	100
	Chi 2 Value	:	77,10
	Prob. Chi2	:	0,0000
Log likelihood = -30,764	R^2	:	0,5562

Information :	Significant at α*	: 1%
	Significant at α**	: 5%
	Significant at α***	: 10%

Table 2 exhibits the estimated logit regression of migrant workers, where the dependent variable is ex-migrant workers = 1 and local workers = 0. The independent variables include social variables and economic variables. The estimation results will be tested using both a priori and statistical tests. Table 3 presents the results of the a priori economic test, which is intended to determine the conformity of the regression coefficient with the theory. The test is conducted by comparing the results of the regression coefficient with the hypothesis. If the regression coefficient matches economic theory, the variable passes the a priori economic test. Table 3 shows that the variables in the study that passed the a priori economic test are occupation type, savings ownership, loan ownership, agricultural land ownership, and livestock ownership. Meanwhile, income did not pass the economic a priori test.

Table 3. The Economic A priori Test

Variable	Hypothesis	Result	Description
Gender	+/-	+	Pass the a priori test
Age	+/-	-	Pass the a priori test
Marital Status	+/-	+	Pass the a priori test
Household size	+	+	Pass the a priori test
Education	+/-	-	Pass the a priori test
Income	-	+	Do not Pass the a priori test
Job	+/-	+	Pass the a priori test
Saving	+/-	-	Pass the a priori test
Loan	+/-	-	Pass the a priori test
Land	+/-	-	Pass the a priori test
Livestock	+/-	-	Pass the a priori test

Furthermore, this study employs both partial and simultaneous tests. The partial test examines the effect of independent variables on the dependent variable individually. This test is executed by looking at the p-value of each significant variable. The variables significantly affecting the probability of becoming an ex-migrant worker are gender, age, marital status, education, savings ownership, loan ownership, agricultural land ownership, and livestock ownership. The variables of the number of family members, income, and occupation type do not significantly affect ex-migrant workers.

Next, this study simultaneously tests the effect of independent variables by looking at the probability value of Chi^2, which is significant with an alpha of 5% (0.05). Based on Table 2, the Chi^2 value is 77.10, and it has a probability of 0.0000, more diminutive than 0.05. The Pseudo R^2 value of 0.5562 means that all economic and social independent variables can explain the dependent variable of 55.62%. The remaining 44.38% is influenced by other variables outside the model used in this study. It means that all economic and social independent variables simultaneously influence ex-migrant workers.

DISCUSSION

The dependent variable of ex-migrant workers serves as the reference analysis in the discussion. Gender, as a social aspect, has a coefficient value of 2.481. This result means that the probability of a male being a migrant worker is 2.481 times greater than that of a female. In other words, females are more likely to become local workers than men. These results align with Ardiyanto & Rijanta's (2014) research, which explains that male migrant workers find it difficult to find work in their area of origin. Sultana & Fatima (2017) propose that a lack of education creates hindrances for females to entering labor markets, and the enhancement of training and skill programs before migration can be fruitful for success.

The coefficient value of -0.144 for age implies that the probability of an older person becoming a migrant worker is 0.144 times lower than that of a younger person. Therefore, younger people are more likely to become migrant workers, while older people tend to work locally. These findings align with previous studies by Puspitasari (2014), Sricharoen (2013), and Khoeri & Atmanti (2021), which suggest that migrant workers are typically aged between 19-28 years and in the productive age range.

According to our analysis, the variable for marital status has a coefficient value of 2,080, indicating that the probability of a married person becoming a migrant worker is 2,080 times higher than that of an unmarried individual. This finding could be explained by the fact that many married migrant workers from Perina Village lack a home, capital, or funds to send their children to school, which compels them to seek work as migrant workers despite being married. This result contrasts with previous studies by Puspisanti (2014) and Khoeri & Atmanti (2021), which suggest that single individuals are more likely to migrate due to the absence of marriage ties. In contrast, married individuals prefer to stay close to their families.

One social variable we examined is the number of family members. Our analysis showed that the number of family members does not significantly affect a person's decision to migrate. This condition may be because the primary motivation for people to become migrant workers is to seek better opportunities, mainly owning a house. 90% of the respondents in our study still live in the same house as their parents. This finding contradicts the results of Refiani's (2006) study, which suggested that having more family members increases needs and may encourage someone to migrate for higher income.

The education variable has a coefficient value of -0.565. This result indicates that the probability of someone with higher education becoming a migrant worker is 0.565 times lower than someone with lower education. In other words, the higher a person's education, the less likely they are to become a migrant worker. This result is consistent with Puspisanti's (2014) study, which found that junior high and high school graduates are the dominant group among migrant workers in Indonesia. This condition may be because undergraduate degree individuals have more diverse employment opportunities. In Perina Village, migrant workers comprise 42% junior high school graduates, 32% elementary school graduates, and only 26% high school graduates.

Our analysis also showed that the income a person earned before becoming a migrant worker does not significantly impact their decision to migrate from an economic perspective. Many migrant workers perceive jobs such as farming, construction, and labor-intensive work as unpleasant and unsatisfactory, despite offering relatively high income. Those who return home as migrant workers and can build houses are often viewed as successful by their community. This finding contrasts with Puspitasari's (2010) study, which suggested that income is a crucial factor in the decision to migrate, as higher income in the destination area can encourage someone to migrate.

The type of occupation does not impact whether a person will become a migrant worker. This result is because the available jobs mainly relate to farming, casual labor,

and heavy labor, which offer similar wages. However, this result contrasts with Adriyanto's (2014) study, which suggests that occupation type is one of the determining factors for migration. According to Adriyanto, most migrant workers are farmers, laborers, entrepreneurs, and students from their areas of origin. On the other hand, the ownership of savings significantly affects ex-migrant workers, with a coefficient value of -2.582. This result means that the probability of someone with savings becoming a migrant worker is 2.582 times less than those without savings. In other words, having savings makes a person more likely to work locally, and the more assets or savings they have, the less interested they are in migrating.

Agricultural land ownership significantly affects ex-migrant workers, with a coefficient of -2,929. This result means that the probability of someone who owns agricultural land is 2.292 times less likely to become a migrant than one who does not own agricultural land. In other words, someone who owns agricultural land tends to become a local worker. This result aligns with Munir (2008) and Khoeri & Atmanti (2021). Munir (2008) explains that people who do not own land in their area of origin will migrate. The same finding also applies to livestock ownership, which significantly affects ex-migrant workers, with a coefficient of -1.893. The probability of owning livestock and becoming a migrant worker is 1,893 times smaller than that of one who does not own livestock. In other words, someone who owns livestock tends to become a local worker.

CONCLUSION

This study concludes that the social variables affecting ex-migrant workers are gender, age, marital status, and education. Specifically, gender, age, and marital status positively affect migrant workers, while education has a negative impact. On the other hand, the number of family members does not affect migrant workers. In terms of economic variables, savings, loans, agricultural land, and livestock ownership have a negative impact on ex-migrant workers, while income variables and occupation type do not affect them.

The policy implications of this research suggest the need for new regulations or revisions to existing ones that focus on improving human resources during pre-placement, including language skills and abilities in the field of work, to increase competitiveness. The study also suggests a need to focus on post-placement stages to empower migrant workers and provide more significant opportunities and support to work or start businesses in their home countries. To achieve these policy objectives, the government should establish Job Training Centers (BKL) at the city or district level and sub-district level to provide skill courses in various areas, such as agriculture and animal husbandry, to ensure that the new generation in these sectors has the necessary skills to become farmers or ranchers instead of migrant workers. The study also recommends that males improve their education by completing high school or attending skills courses offered by the government, especially since most migrant workers are junior high school

graduates. Additionally, youth and productive workers are advised to prioritize education in schools and skills courses to gain work experience and improve their job prospects. Those with higher education should seek to improve their skills to broaden their job opportunities. Married individuals are advised to look for work in their area of origin to stay closer to their families, particularly if they have children, as many children are abandoned by their parents, drop out of school, or marry early. Finally, people without loans are recommended to remain local workers. Those without agricultural land can collaborate with those who own agricultural businesses to help manage the land and raise cattle, with profit-sharing and mutual benefit.

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Determinants of Strategic Factors for Digital Transformation in Micro and Small Enterprises in Makassar City

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Abstract

The Indonesian government aims to promote information and communication technology (ICT) among micro and small enterprises to enhance their competitiveness in the global market. A survey was conducted among 180 micro and small enterprise owners in Makassar City using the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The results showed that Performance Expectancy (PE) and Effort Expectancy (EE) insignificantly affect the Behavioral Intentions (BI) of the enterprise owners. It also indicated that Social Influence (SI) and Facilitating Conditions (FC) positively influence the adoption of ICT in micro and small enterprises. This study is novel and significant as it addresses a gap in the literature on digital transformation strategies, particularly in Makassar City, where such investigations are rare. Consequently, this study presents an original contribution to the field.

Keywords:

technology adoption; micro and small enterprise; unified theory of acceptance and use of technology

INTRODUCTION

The Indonesian government is committed to enhancing economic activity and the quality of life for citizens in urban and rural areas by investing in infrastructure development. Technology infrastructure has been instrumental in addressing various challenges, including COVID-19, which hit the country in March 2020. In response, the government implemented large-scale social restrictions, community activity restrictions, and emergency measures to curb the spread of the virus. Using the internet for activities like teaching and learning, remote work, and enterprise transactions has enabled individuals to avoid in-person contact during the pandemic. As technology use increases, some activities can continue to function effectively through digitalization. This trend is expected to continue even as COVID-19 cases decline, vaccines become more available than before, and community activities gradually resume. The pandemic has brought about rapid changes in many aspects of life, forcing everyone to adapt to technology. In the economic sphere, Small and Medium-sized enterprises (SMEs), being more agile and able to adapt to the environment, have replaced larger corporations by leveraging Information and Communication Technology (ICT) to reach customers.

According to the Indonesian Ministry of Cooperatives and Small and Medium Enterprises, micro (UM) and small enterprise (UK) are enterprises with a net worth of at least IDR 200,000,000 (excluding land and buildings) and annual sales of up to IDR 1,000,000,000. Medium enterprises (UM) have a net worth of over IDR 200,000,000 to IDR 10,000,000,000 (excluding land and buildings). Micro, Small, and Medium Enterprise (MSMEs) regulation falls under Law No. 20 of 2008. Based on the data from the Ministry of Cooperatives and Small and Medium Enterprises (2022), there were 65.47 million MSMEs in Indonesia in 2019, a 1.98% increase from the previous year's 64.19 million. This data accounts for 99.99% of all enterprises in this country.

In Indonesia, micro and small enterprise need to adopt ICT as it can leverage the extensive and affordable infrastructure to expand the customer reach. Fiki Satari, the Special Staff of the Minister of Cooperatives and SMEs for Creative Economy Empowerment explained that only around 19% of SMEs (approximately 12 million) had adopted this technology. This data is a notable increase from 2020, when only 13% (approximately 8 million) of SMEs had embraced ICT Humas Kementrian Koperasi dan UKM, 2021). From a marketing perspective, digital marketing not only boosts revenue but also employs recommendation systems, known as electronic word-of-mouth (eWoM), to influence consumer purchasing decisions through products or service recommendation algorithms. Bala & Feng (2019) explained that various factors, such as web presence and internet use, positively affect SMEs' success. Enterprise owners believe that technology can help them attract and communicate effectively with new customers and trade partners. Moreover, the rapid increase in internet penetration enables enterprises to obtain enterprise-related information more efficiently.

According to Rupeika-Apoga et al. (2022), digital transformation positively affects an enterprise's revenue through digital orientation. This condition suggests that SMEs need to consider adopting digital devices to achieve their goals and increase revenue.

These results are consistent with Lanlan et al. (2019), where perceived ease of use and usefulness improve the use of Computerized Accounting Systems (CAS) among MSEs in Xi'an, Shaan Xi, China. The study shows that perceived ease of use and usefulness positively affect CAS use intention through multiple regression analysis. Majinda (2019) explained that Performance Expectancy (PE) significantly affects both Behavioral Intention (BI) and actual usage of Facebook marketing. This result contradicts Venkatesh (2022), where PE failed to predict BI but has the highest coefficient for actual usage. Effort Expectancy (EE) does not affect behavioral intention, suggesting that Facebook marketing is less easy for them. The results of the study conducted by Majinda (2019) are different from those of Rupeika-Apoga et al. (2022) & Lanlan et al. (2019).

Meanwhile, Facilitating Conditions (FC) significantly affect the behavioral intention of Tswana SMMEs to use Facebook marketing. FC insignificantly affects actual usage, and this contradicts the findings of El Ouirdi et al. (2016) and Taiwo (2019). Additionally, a level of digital orientation affects the complexity of its enterprise model through digital transformation (Ardito et al., 2021). SMEs face various challenges in entering the digital market due to their need for more technical skills and a stable ecosystem. This stable digital ecosystem supports the SMEs' growth and competitiveness throughout their operations.

Adopting digital marketing makes SMEs increase revenue, expand their market opportunities, and easily access financial services from banks and other institutions. The UTAUT is currently the most widely accepted theory for predicting the adoption of technology services. According to Venkatesh (2022), UTAUT can accurately predict up to 70% of consumer behavior relating to the use of ICT. UTAUT is based on four critical factors that influence a user's decision to adopt technology: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Condition (FC). By understanding these factors, stakeholders can develop effective strategies for encouraging SMEs to adopt digital marketing.

Micro, Small, and Medium-sized enterprises (MSMEs) are recognized as essential components of national development, particularly economic growth. The presence of MSMEs across various industries makes them create many jobs and contribute significantly to the country's gross domestic product (GDP). Indonesia's supporting MSMEs is crucial as they possess a high workforce that can enhance productivity and coexist with a larger enterprise. Law Number 20 of 2008 stipulates that MSMEs are classified as follows: micro enterprises refer to productive enterprises owned by individuals or entities with specific criteria. Meanwhile, small and medium enterprises are independent economic enterprises conducted by individuals or entities that are not subsidiaries.

Sarfiah et al. (2019) have identified four characteristics of MSMEs in Indonesia, which are essential in understanding their strategic positioning. Firstly, starting a small enterprise is relatively more accessible than a large one, primarily due to financing factors. Secondly, no additional academic training is required to fill positions in MSMEs, making it easier to find and hire talent. Thirdly, unlike large enterprises, MSMEs can operate without urban infrastructure and are often located in rural areas. Lastly, MSMEs have shown resilience during economic downturns, such as Covid-19, which adversely affected

1,785 cooperatives and 163,713 SMEs in the country (Thaha, 2020). The most affected sectors were food and beverage, the creative industries, and agriculture.

Entrepreneurship, which uses technology for product and service marketing, has become increasingly crucial in the pandemic. Meanwhile, digital-based SMEs emerged as a solution to help the sector survive during the pandemic (Arianto, 2020). The government, Ministry of Cooperatives, and SMEs have also encouraged digital transformation to respond to the pandemic's impact on the enterprise ecosystem.

According to Venkatesh (2022), the UTAUT is a theoretical model that has evolved from Technology Acceptance Model (TAM) by Davis (2023). UTAUT has two primary objectives: first, it aims to enhance the understanding of the acceptance process by offering theoretical insights into the design and implementation of information systems. Second, it provides a theoretical framework for practical user acceptance testing, which enables system designers and implementers to evaluate new systems before implementation. The diffusion theory of innovation, developed by Rogers in 1961, is a model that explains how new ideas and technology spread quickly. This theory differs from the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB), which focus on individual motivational factors as predictors of behavior. TPB posit that Behavioral Intentions (BI) are the best indicators influenced by attitudes and social norms. It also adds the concept of perceived behavioral controls to TRA. In recent years, Fishbein and colleagues have proposed using Integrated Behavior Models (IBM) that incorporate elements of other significant theories in addition to TRA and TPB.

Several theories can be used to predict an individual's behavior in terms of adopting information technology systems. One of these theories is the UTAUT, which was introduced by Venkatesh (2022). UTAUT is based on PE, EE, SI, and FC, as well as four moderator variables, including gender, age, experience, and voluntariness of use. This model has gained popularity due to its integrating of eight major theories in the field. Also, it has been tested using a large dataset of real-world data. Other studies have investigated the connection between technology adoption and influencing variables, with both the TAM and UTAUT models having been thoroughly examined. Even after introducing the UTAUT model, literature has continued to use TAM for various technology or has enhanced and validated existing models. This study used UTAUT due to its inclusion of both PE and EE and FC and SI, which are not included in the traditional TAM model. UTAUT is also employed because it considers both intentions to use and actual use and incorporates individual and social factors in predicting technology adoption.

According to Alwahaishi & Snásel (2013), "PE refers to the perceived usefulness of technology, which affects an individual's intention to continue using it." This study measures PE based on the perceived benefits of implementing ICT, such as saving time, money, and effort, improving communication with customers, and enhancing the quality of corporate services (Williams et al., 2015). Meanwhile, EE represents the perceived level of effort required to use technology, which affects user satisfaction. It is assessed based on ICT's perceived utility, ease of use, and availability of support for using these services. SI also

plays a significant role in the intensity of technology use, as individuals tend to follow the recommendations or suggestions of others. Therefore, when adopters of ICT are influenced by positive feedback from social networks, they are more likely to have a strong intention to adopt a system. They are also influenced by the perception of technology aligning with the user's lifestyle. FC refers to the resources and knowledge available to explain the benefits of using technology, which is considered greater than the monetary costs involved (Williams et al., 2015). These conditions are measured by accessing the necessary resources and obtaining the support and knowledge required to use ICT services.

The UTAUT has proven to be effective in predicting technology adoption among SME owners (Rozmi et al., 2019). In a study conducted in Malaysia by Rozmi et al. (2019), three of the five UTAUT factors, including EE, SI, and FC, affect SMEs' intention to adopt ICT in their enterprises. Piarna and Fathurohman (2019) investigated factors influencing the adoption of e-commerce in Subang city. The study found that PE, EE, and SI significantly supported BI toward technology adoption. Furthermore, FC was identified as a key factor affecting user behavior. This study aims to measure the adoption of technology among MSMEs owners in Makassar city using the UTAUT model. The model includes five factors: PE, EE, SI, FC, and BI. This study's conceptual framework and hypotheses are based on these factors.

In the city of Makassar, COVID-19 resulted in a decrease in the original regional income (PAD) from IDR 1.30 trillion in 2019 to IDR 1.08 trillion in 2020. As a response, the government has launched the Makassar City Recover program, which comprises three sub-programs: health immunity, social adaptation, and economic recovery. The economic recovery program includes the Digitalization Payment System, developed by various regional revenue management apparatuses as part of the Local Government Transaction Electronification Program. While the research on technology adoption has been abundant, the adoption among micro and small enterprise owners in Makassar City still needs further clarification. Therefore, this study explores how the government can use factors from the Unified Theory of Acceptance and Use of Technology (UTAUT) to support micro and small enterprises in adopting technology to enhance their operations. This study will likely contribute to the growth of national income from micro and small enterprise sectors.

METHOD

In this study, data was collected through a questionnaire that incorporated indicators and variables from other models, to measure the constructs of PE, EE, SI, FC, and BI. The questionnaire is divided into two parts, the first consisting of questions about the respondents' backgrounds, and the second addressing the main topic, with a total of 22 questions, 4 of which pertain to the former and 18 to the latter. Respondents are required to provide answers on a 5-point Likert scale, ranging from strongly disagreeing to strongly agreeing. The study was conducted among owners of micro and small-sized enterprise in Makassar City, including coffee shops, food outlets, laundries, grocery stores, simple lodgings, and boarding houses. Furthermore, the study spanned eight months, from March 2022.

Table 1. Operational Variables

Root Constructs, Definitions, and Items

1. **Performance Expectancy (PE),** "Refers to the perceived usefulness of using technology and influences an individual's intention to continue using it" Alwahaishi & Snásel (2013)

    -   I believe the use of technology is very beneficial for my enterprise (PE1)

    -   Utilizing technology enables me to achieve my enterprise's marketing objectives (PE2)

    -   Utilizing technology as a marketing platform has increased my company's sales and profits (PE3)

2. **Effect Expectancy (EE),** "Represents the perceived level of effort required to use technology and affects user satisfaction, Williams et al. (2015)."

    -   My interaction with the app in helping my enterprise is clear and understandable (EE1)

    -   Operating social media pages to promote the company is simple for me. (EE2)

    -   I devote adequate time to promoting my enterprise on social media. (EE3)

3. **Social Influence (SI),** "is characterized by the belief that when adopters of ICT are influenced by positive feedbacks from social networks, they are more likely to have a strong intention to adopt a system"

    -   People influencing my behavior find marketing through social media use for my enterprise. (SI1)

    -   When using social media or other applications such as ex; GoJek, Grab, etc., my enterprise is supported by my friends and family through the "like" and "share" buttons, which show their support and encouragement. (SI2)

    -   The opinions of my customers play a major role in driving me to market my enterprise effectively using information technology. (SI3)

4. **Fasiliting Condition (FC),** "Refer to the resources and knowledge that are available to explain the benefits of using technology and are considered to be greater than the monetary costs involved, conducted by Williams *et al.* (2015)"

    -   I have the necessary resources to access information technology to facilitate my enterprise (e.g. Wi-Fi connection, computer, smartphone) (FC1)

    -   I have adequate knowledge about marketing on social media by studying digital marketing (FC2)

    -   I have the necessary guides to help me operate social media pages for my enterprise (FC3)

5. **Behavioral Intention (BI)**

    -   I intend to continue to use ICT as my preferred social media marketing platform soon (BI1)

    -   I intend to design a social media marketing strategic plan for my social media pages (BI2)

    -   I plan to use ICT, like social media, for marketing purposes more often soon. (BI3)

6. **Behavior to Use**

    -   I feel very confident in marketing my enterprise using ICT (U1)

    -   Marketing through social media pages makes it easier for my enterprise to engage with new customers (U2)

    -   Marketing my social media pages has resulted in my enterprise gaining a positive reputation with online audiences (U3)

Source: Data Processed by Researchers (2023)

The study aims to survey a total of 176,637 SMEs located in Makassar City. To obtain a representative sample, expert opinions were sought to determine the minimum sample size. Bentler & Chou (1987) recommended a sample size of at least five times the number of free variables in the model, while Hoogland and Boomsma (1998) suggested a sample size of at least 10 times the number of the study variables. Ferdinand (2002) recommended multiplying the number of indicators by five to determine the sample size. As this study involves six variables and eighteen indicators, so the sample size was determined to be 180 respondents (ten times eigtheen indicators). Also conforms to the ten-degree independent path rule of Hair *et al.* (2014). The questionnaire underwent a validation and reliability check before finalization, and necessary changes were made. Moreover, the SEM PLS software was utilized to assess the questionnaire's reliability. Table 1 shows the operational variable from this research.

To evaluate the validity and reliability of the outer model, the measurement model is assessed. The reflexive measurement model is evaluated using convergent and discriminant validity for indicators that form latent constructs, as well as Composite Reliability (CR) and Cronbach Alpha (CA) (Ghozali & Latan, 2015). Furthermore, the measurement model assesses the accuracy of the constructs with the validity test (reliability). The reliability test shows the accuracy, consistency, and precision of the instrument's measurement construction. CR is a better measure for testing construct reliability than CA, as the latter tends to underestimate it. In PLS, the R-Square value for each endogenous latent variable indicates the power to predict the best goodness-of-fit model. R-Square values indicate whether the exogenous latent affects endogenous variables, and the PLS R-Square results show the construct variance of the model. In addition to R-Square, the PLS structural model can be assessed using the Q2 predictive relevance or predictive sample reuse (Ghozali, 2011).

RESULT AND DISCUSSION

Data were analyzed using a two-step technique. The first step involves verifying the reliability, convergent validity, and discriminant validity of the measurement model. Also, the second step focuses on analyzing the structural model to determine the strength and direction of the relationships between the theoretical elements.

According to Zikmund et al. (2013), all measures of CR and CA, which are standard criteria for internal consistency, exceed the recommended minimum level of 0.70 for internal consistency reliability. The study statements that have a CR value of over 0.70 are considered reliable (Chin, 2010). To ensure convergent validity, the indicator's standard value needs to be at least 0.708 of the thresholds values, and each indicator's Average Variance Extracted (AVE) value must be at least 0.5 (Hair et al., 2007). Table 2 presents the results, and the CR value was reduced to less than 0.70 to display the test results in Figure 1.

Figure 1. SEM PLS Results
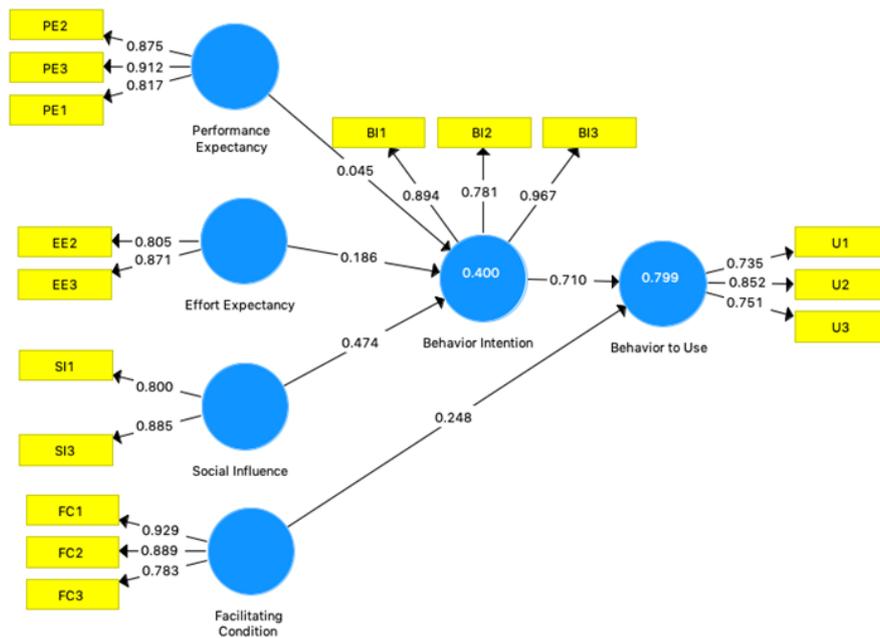
Figure 1 shows that the latent variable of PE can explain more than 81% of the variance in the three indicators, including PE1, PE2, and PE3. The latent variable of EE can account for the variance in the indicators of EE2 and EE3, which are both higher than 80%. Moreover, the latent variable of SI can explain over 80% of the variance in the indicators S1 and SI3. The latent variables of FC, BI, and behavior can explain more than 73% of the variance in their respective indicators. Overall, each latent variable has demonstrated the capacity to explain the variance in the indicators that measure it by more than 70%.

Table 2. Demographic Respondents

Items	Type	Frequency	Percentage
Gender	Male	144	80%
	Female	36	20%
Age	≤29	19	10.5%
	30—39	77	42.7%
	40—49	75	41.6%
	≥50	9	5%
Periods Time	≤2 Years Old	45	25%
	2—3 Years Old	95	52.7
	≥3 Years Old	40	22.3%
Type of Applications	Social Media	112	62.2%
	Online Payment (*FinTech*)	38	21.1%
	Online Application (Grab, GoJek, etc)	135	75%
	Website	18	10%

Source: Data Processed by Researchers (2023)

Table 3. Construct Reliability And Convergent Validity

Construct	Item	Items Loading	CR	CA	Rho_A	AVE
PE	PE1	0.817	0.903	0.857	1.035	0.756
	PE2	0.875				
	PE3	0.913				
EE	EE2	0.805	0.824	0.851	0.954	0.703
	EE3	0.871				
	-	-				
SI	SI1	0.800	0.831	0.955	0.724	0.711
	-	-				
	SI3	0.885				
FC	FC1	0.929	0.902	0.835	0.836	0.755
	FC2	0.889				
	FC3	0.783				
BI	BI1	0.894	0.914	0.856	0.866	0.781
	BI2	0.781				
	BI3	0.967				
Behavior to Use	U1	0.735	0.824	0.865	0.720	0.610
	U2	0.852				
	U3	0.751				

Source: Data Processed by SEM PLS (2022)

Table 2 shows that the study sample primarily comprises male enterprise owners in Makassar city, accounting for approximately 80% of the total respondents. A significant proportion of the participants, approximately 84.3%, fall within the age range of 30 to 49, indicating that many of the enterprise owners included in this study are in their prime working years. Regarding the type of ICT application used to support enterprise operations, 75% of the respondents reported using online motorcycle taxi applications, while only 10% used independent websites. The minority of respondents who use personal websites were mainly involved in industries such as printing, vehicle rentals, travel agencies, and tourism services. Based on Table 3, all variables have a CR and CA value greater than 0.7. It is then concluded that all variables used in this study are reliable.

Experiments were carried out to examine the direct and indirect effects of exogenous variables on endogenous ones. Table 4 presents the results of the loading procedure and the t-statistical value obtained from a sample of 180 individuals and 500 repetitions, which provide an overview of the study's influence test.

This study discovered that the SI variable significantly affects the behavioral intention of micro and small enterprise owners in Makassar City to use ICT. The results showed that SI indirectly influences the actual use of ICT through behavioral intention. As depicted in Table 1 and Figure 2, only two out of the three indicators of the SI variable passed the test with a construction value greater than 0.6. The indicator "When using social media or other applications such as ex, GoJek, Grab, and others. my enterprise

is supported by my friends and family through the "like" and "share" buttons, which shows their support and encouragement." This result indicates that enterprise owners who use ICT to support their enterprise feel a lack of social support, particularly from friends and family. Therefore, it is anticipated that the government can extend its support to promote the extensive use of ICT for micro and small enterprises in Makassar City.

Figure 2. Bootstrapping Result
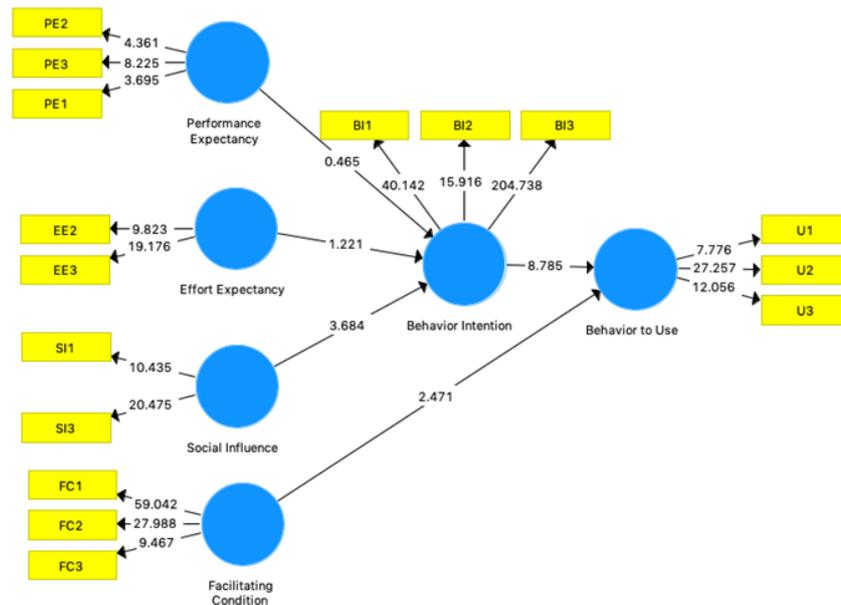
This study showed that PE and EE insignificantly affect the BI or behavior use of ICT. The reason is that each variable's significance value is more significant than 0.05. PE and EE should be given special attention by infrastructure providers in Makassar City when anticipating and predicting the adoption of ICT by micro and small enterprise owners.

Table 4. Direct and Indirect Hypothesis Test

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Sample Mean (M)	Standard Deviation (STDEV)	Results
PE ➜ BI	0.045	0.420	0.675	0.076	0.107	Not Supported
EE ➜ BI	0.186	1.254	0.210	0.188	0.148	Not Supported
SI ➜ BI	0.474	3.691	0.000	0.482	0.128	Supported
FC ➜ BU	0.248	2.535	0.012	0.260	0.098	Supported
BI ➜ BU	0.710	9.097	0.000	0.706	0.078	Supported
PE ➜ BI ➜ BU	0.032	0.403	0.687	0.053	0.079	Not Supported
EE ➜ BI ➜ BU	0.132	1.216	0.224	0.134	0.108	Not Supported
SI ➜ BI ➜ BU	0.336	3.644	0.000	0.338	0.092	Supported

Source: Data Processed by SEM PLS (2022)

The coefficient of determination is a valuable measure that assesses how effectively a model explains the variance in the data. This study's test results show that the PE, EE, SI, and facilitation conditions can explain the variance in the dependent variables of behavioral intention and behavior to use. The SI and FC exhibited the highest capacity to explain the variance in the data, with values of 0.843 and 0.599 (see Table 5). This result shows the significant influence of these variables on the intentions and behavior of micro and small enterprise owners regarding the use of ICT to operate their enterprises in Makassar City.

Table 5. Determinant Coefficients

	R Square	R Square Adjusted
Behavioral Intention	0.400	0.389
Behavior to Use	0.799	0.796

Source: Data Processed by SEM PLS (2022)

This study's structural model shows that PE, EE, and SI significantly influence the behavioral intention of micro and small enterprises regarding their use of ICT. Additionally, the "FC" variable indicates a significant impact on their behavior in using ICT. The model also shows that BI plays a crucial role in supporting the behavior of these enterprise owners in utilizing ICT. Overall, the model successfully explains 79.9% of the variance in the behavior of these enterprise owners concerning their use of ICT.

This study demonstrates the need to thoroughly understand users' attitudes and preferences towards ICT adoption of micro and small enterprise owners in Makassar City. As more and more technological innovations are introduced rapidly, and as they fail, it becomes increasingly important to gain insight into the determinants of adoption and usage.

Social influence significantly impacts adoption intentions as they increase adoption intentions if their peers, investors, shareholders, and other entrepreneurs with whom they deal sincerely advise them to adopt ICT. The results of Rozmi et al. (2019) and Piarna & Fathurohman (2019) show that the social environment has a strong interactive effect on influencing SME owners and, thus, their use of ICT. It is essential to use an ecosystem that encourages SME owners to feel more confident in using ICT for their business. Furthermore, facilitation significantly impacts adoption intentions, as SME owners will adopt ICTs if they are provided with easier access to them.

This study also reports that Facilitating Conditions positively and significantly affect Behavioral intention. Adopting ICT among micro and small enterprise owners in Makassar City is crucial as it can substantially benefit their enterprises. This condition is because the availability of ICT facilities can make it more convenient for enterprise owners to use ICT, saving them time for other activities. Even though Williams et al. (2015) found that FC could have been a better predictor of e-government usage, this contradicts the results of this study. However, Kim & Lee (2020) discovered that FC significantly affects SME owners' ICT adoption. This result implies that the increase in the distribution of facilities that support the use of ICT encourages SME owners to adopt it.

Venkatesh (2022) discovered that intention to use is a factor in how individuals use technology, which is in line with the results of this study. The intention to use ICT is a significant factor supported by perceived ease of use, usefulness, and subjective norm. This result shows that SME owners who believe they intend to use ICT are more likely to adopt it in their enterprise. The number of SME owners adopting ICT is expected to be high as their intention increases. Additionally, the habit of using technology among SME owners in Makassar City plays a crucial role. This result suggests that users' familiarity with ICT through prior experience or favorable FC positively encourages their adoption of it.

In summary, this study shows that several factors, including SI, FC, and BI, can influence the BU of micro and small enterprise owners in Makassar City when adopting ICT. The statistical analysis results prove that among these factors, SI was found to have the most substantial impact, indicating that micro and small enterprise owners are more likely to adopt ICT when receiving positive feedback from their social networks or environment.

CONCLUSION

This study aims to investigate the utilization of ICT among micro and small enterprise owners in Makassar City. The government is committed to promoting ICT adoption by SMEs to facilitate enterprise-customer interactions and boost revenue. This study showed that certain factors, such as PE and EE, insignificantly influence ICT adoption among micro and small enterprise owners in Makassar City. Theoretically, the results show that usage intentions and government initiatives to simplify ICT services are critical in facilitating technology adoption. A practical perspective shows that ICT services' quality still needs to improve. The findings indicate that enterprise owners remain concerned about data security, and some have limited access to the internet.

To gain insight into the utilization of ICT by micro and small enterprise owners in Makassar City, the government must first comprehend their needs, attitudes, and ways of life. This information can then be leveraged to support the city's growth of micro and small enterprises. The study focuses on three indirect drivers that affect how micro and small enterprise owners in Makassar City plan to use ICT services and how they use them. The further review should be conducted to investigate the impact of age, educational level, and trust on the adoption of ICT by micro and small enterprise owners in Indonesia.

The results of this study have important policy implications and strategic factors for switching and utilizing ICT. These insights are precious for ICT service providers in Indonesia. The study's results suggested a greater emphasis on improving factors such as PE and EE, which insignificantly affect behavioral intention and behavior to use. Future reviews, IT professionals, marketing professionals, and micro- and small enterprise owners can use the results of this study to comprehend the threat factors and opportunities in transitioning to using ICT for their enterprises. Additionally, the results can aid in making informed decisions about technology to support the marketing strategies of micro and small enterprise owners in Makassar City.

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Do Interest Rate Policy and Liquidity Affect Banking Credit Risk in Indonesia?

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Abstract

Lending plays a vital role for banks as a source of income from deposits or interest paid by debtors. This study aims to analyze the effect of policy interest rates and liquidity from the money supply on bank credit risk in Indonesia in the short and long term. This study uses the Autoregressive Distributed Lag method and the Granger Causality test as analytical tools. The data used are policy interest rates, total money supply, and total non-performing loans. The data period under study is 2017-2022. The study results show that in the short term, policy interest rates and the money supply negatively affect bank credit risk in Indonesia. However, in the long term, policy interest rates have a negative effect, and the money supply does not affect bank credit risk in Indonesia. Policy interest rates have a one-way causality relationship with bank credit risk. Meanwhile, bank credit risk has a one-way causality relationship to the money supply. This condition represents that policy interest rates can reduce bank credit risk in Indonesia. The Bank of Indonesia, as the monetary authority, needs to pay attention to fluctuations in policy interest rates and mitigate excess money supply so that credit risk does not increase.

Keywords:

policy interest rate; money supply; non-performing loans

INTRODUCTION

Monetary policy is the basis for developing a framework for thinking about a financial system. If the stability of economic conditions is disrupted, monetary policy is used to restore the economy (Bekaert et al., 2013). The influence of monetary policy is reflected in the banking sector. The role of the banking sector is to realize its main function as an intermediary or intermediary agency between debtors and creditors (Disemadi & Shaleh, 2020). Banking is an institution that regulates financial system traffic, controls the economy, and circulates and distributes funds to the public to encourage stable economic development (Arthasari, 2021).

Banking has an important role in the banking financial system's stability during changes in the global cycle, which is reflected in the failure of world banks due to the domino effect of banking in the United States. One of the factors causing the current economic crisis came from bank credit. Credit or loans is a form of business as well as a primary source of income that is managed by banks themselves. Credit is the largest asset and the main source of income for banks. Any provision of credit indirectly poses a credit risk to the banking financial system.

In general, credit risk is projected on the ratio of NPLs (Non-Performing Loans), which is the ratio of total non-performing loans to total loans disbursed by creditors. Banks carry out their duties by extending credit to customers so that they can create credit risks which create obstacles, and delays in the return process or each credit settlement transaction (Otieno et al., 2016). Credit effects are generally defined as a breakdown in the payment of credit or what is called non-performing financing. In this case, several aspects lead to the formation of the NPL itself (Dewi & Ramantha, 2015). Credit growth can also be limited by reducing risk-weighted assets which will affect the level of credit supply. According to Andries et al. (2018), the wealth of the loan market affects the preference of companies for shadow banking or capital markets to raise the necessary funds and asset prices.

Bank Indonesia ensures that a bank must have an NPL value below 5 percent. This policy was issued because the higher the value of bad loans or NPLs at a bank, the greater the risk to the bank. If the borrower experiences a late payment it will create a problem with receivables, or what is known in the banking world as collectibles, which are simply bills that need to be billed. In accounting, receivables are categorized by period. Bank Indonesia is an institution that has the authority to carry out important monetary policies.

Bank Indonesia practices several monetary policies to mitigate risks on the balance sheet, protect the availability of liquidity, and suppress economic development so that it is more balanced and sustainable (Berger & Bouwman, 2017). The implementation of monetary policy in Indonesia is a consequence of an economic crisis which occurred in Indonesia in 1998. During this period there was a decline in investor confidence which affected many sectors including the financial and banking sectors. Hardt et al. (2015) state that macroprudential policy and monetary policy are fundamentally related because they use the same transmission mechanisms to achieve their goals (asset prices, credit, and financial intermediation).

Credit risk is what occurs when the bank zone has interrelated macroeconomic conditions that occur in many countries simultaneously (Bucur & Dragomirescu, 2014). Changes in macroeconomic circumstances create an economy that is very sensitive to any shocks or fluctuations that may occur. The transformation of this macroeconomic situation looks at changes in policy interest rates and banking liquidity, thus creating a banking situation that also faces transformation (Purnawan & Nasir, 2015). A comparison of the macro situation itself with the risk on bank credit can be seen in how the pre-recession phase was very different from the post-recession phase in 2008 (Wulandari, 2016). This increase in credit was directly offset by an increase in non-performing loans (Guo, 2016). Figure 1 shows the bad loans used by commercial banks in Indonesia.

Figure 1. Development of Non-Performing Loans in Indonesia 2011-2020
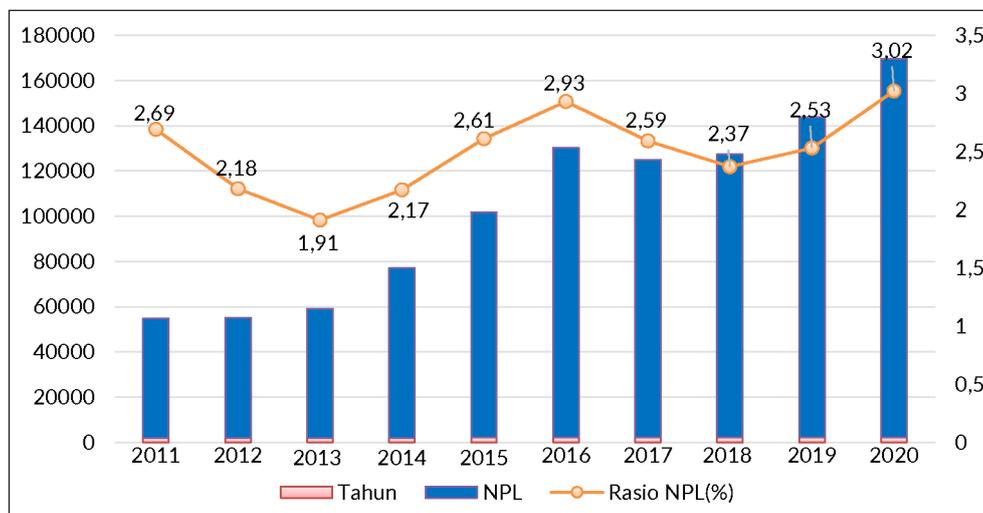
Based on Figure 1, explains the development of bank credit risk or NPL in Indonesia from 2011-2020. According to data from the Financial Services Authority, it can be concluded that NPLs in Indonesia have experienced significant ups and downs. In 2016 the NPL ratio was 2.93 percent, and a decrease in the NPL ratio in the 2017 period was 0.34 percent. During the last ten years, the lowest NPL ratio was in 2013 which was 1.91 percent and the highest NPL ratio was in 2020 which was 3.02 percent, or experienced an increase from the previous year of 0.49 percent.

Changes in this macro situation must be considered in the short term or long term. The length of credit can be determined by the total monthly payments that can be made by the prospective debtor. If the payment period is smoother, repayment of funds to the bank will be faster and the bank's record of customer collectability is high. If the debtor takes longer to pay in installments, the lower bank's ability to recover it (Dharma, 2018). The length of time for credit repayment has an indirect impact on credit risk in the short and long term. This policy interest rate is used as a standard interest rate reference for government and private banks (Khan & Sattar, 2014). Changes in policy interest rates will also affect bank credit risk in Indonesia (Puspitasari et al., 2019).

Various factors can affect the demand for and the provision of credit in banking, including macro factors such as interest rates (Messai & Jouini, 2019). The policy interest rate where the interest rate is set directly by Bank Indonesia as the basic benchmark for interest rates on loans and deposits by banks and financial institutions in Indonesia (Bank Indonesia, 2020). An increase in the policy interest rate will cause an increase in bank interest rates. Banks can raise interest rates on deposits or loans. Research by Dewi & Ramantha (2015) shows that the policy interest rate has a positive effect on bank credit risk. But Arthasari (2021), the results show that the policy interest rate has a significant negative effect on bank credit risk. Wulandari (2016) shows that the money supply has no significant effect on bank credit risk. The results of previous studies still produce different findings, so it is interesting for researchers to re-test at different times and use different research methods.

The increase in deposit rates will encourage people to postpone consumption activities because they prefer to save in banks (Raza et al., 2019). In making this decision the central bank must also consider how its actions run stably in the entire banking financial system. Therefore, changes in the money supply each year will have an impact on the bank's liquidity. Unstable liquidity has a negative impact on banks so credit risk (NPL) cannot be controlled. Liquidity, which is reflected in the money supply, is one of the bank's assets that can affect the bank's non-performing loans (NPLs). Therefore, the need for banks to pay attention to the growth of the money supply. It is interesting to further analyze the impact of one of the macro indicators, namely the policy rate and liquidity of the bank as an illustration of future credit risk management, because it can affect the possibility of banking profit and loss (Tovar et al., 2012). This is because the role of banking is very large as a determinant of economic development, economic growth and can improve welfare in society. Thus it can be hypothesized that changes in interest rates and liquidity can affect the credit risk of banks in Indonesia.

Several previous studies on credit risk (NPL) in Indonesia and other countries have been carried out to determine the effect of macroeconomic factors on non-performing loans, including the BI rate (Wijaya, 2019), and the impact of non-performing loans on the banking sector in Turkey, such as capital adequacy (Wijaya, 2019; Yurtadur et al., 2019). Another empirical study was conducted to measure the impact of interest rates on the lending market in Rhode Island (Fekrazad, 2020), and earlier research examined the transmission of capital shocks to credit supply in Indonesia (Catalan et al., 2020; Sobarsyah et al., 2020; Matousek, 2019). The dynamics of non-performing loans during the banking crisis increased the resolution of banking credit risk (Ari et al., 2021). The difference in this study, besides using the policy interest rate variable, this research also uses bank liquidity variables and long-term and short-term effects that have been proven using the method of Autoregressive Distribution Lag (ARDL). Simultaneously, this study also tested and analyzed using Ganger Causality to see the causal relationship between the variables studied to answer the question of whether there is a relationship between these variables.

This study aims to identify and analyze the effect of policy interest rates and liquidity on bank credit risk in Indonesia in the short and long term. It also examines the causal

relationship between policy interest rates, liquidity, and bank credit risk in Indonesia. As a contribution, this research becomes a reference for banking in maintaining the financial system in a stable condition so that every credit risk can be controlled. In addition, most of the previous studies only discussed the effect of policy interest rates without including the influence of the bank's liquidity. This is the critical point of empirical research that underlines policy interest rates and liquidity on the rate of bank credit risk. The results of this research are expected to the development of knowledge about bank credit risk in Indonesia and as a consideration in decision making. Banking parties must be more careful in extending credit to the public to overcome the problem of bad credit in Indonesia.

METHODS

This research is a quantitative analysis that uses secondary data in the form of monthly data that spans a period of 61 months, to analyze and determine the magnitude of the influence of policy interest rate settings and liquidity on bank credit risk in Indonesia. The data used in this study is in the form of monthly time series data for the period of 2017 to 2022. Data collection was carried out from January 2017 to January 2022. Data in this study, namely secondary data, can be obtained from the official websites of institutions such as Bank Indonesia (BI), the Financial Services Authority (OJK), and the Central Bureau of Statistics (BPS).

This study uses the variable bank credit risk or Non-Performing Loan as the dependent variable, while the independent variables in this study are policy interest rates and the money supply. Bank credit risk is measured using a ratio in percentage units. The policy interest rate is the BI7-Day (Reverse) Repo Rate, which is measured in percentage units. The amount of money in circulation (M1) is the total amount of money in circulation during the time this study was conducted and is measured in units of billions of rupiah. The initial hypothesis of this study is that there is an influence of policy interest rates and liquidity on bank credit risk in Indonesia in the long and short term. Also, there is a causality relationship between research variables.

The data analysis method in this research is the regression analysis method with the ARDL model. The test stages carried out were the causality tests, classic assumption tests, and hypothesis testing (Nkoro, 2016). The following is a model (see equation 1) that will be used in the ARDL approach referring to research (Zaretta & Yovita, 2019) to test short-term and long-term relationships, namely:

$$\Delta Y_t = \beta_0 + \sum_{t=1}^{p} \beta_1 \Delta Y_{t-1} + \sum_{t=1}^{P} \delta_1 \Delta X_{t-1} + \varphi_1 Y_{t-1} + \varphi_2 X_{t-1} + \varepsilon_t \qquad (1)$$

To explain the variables of Non-Performing Loans, Policy Interest Rates, and Money Supply in this study, the ARDL equation model (see equation 2), is as follows:

$$\Delta NPL_t = \beta_0 + \sum_{t=1}^{p} \beta_1 \Delta NPL_{t-1} + \sum_{t=1}^{p} \delta_1 \Delta SK_{t-1} + \sum_{t=1}^{p} \delta_2 \Delta JUB_{t-1} + \varphi_1 NPL_{t-1} + \varphi_2 SK_{t-1} + \varphi_3 JUB_{t-1} + \varepsilon_t \qquad (2)$$

Where NPL_t is the value of the ratio of Non-Performing Loans at the time t, NPL_{t-1} is the value of the ratio of Non-Performing Loans at t-1; SK_{t-1} is the value of the Policy

Interest Rate at t-1; JUB_{t-1} is the value of the Amount of Money Supply in circulation at t-1; β_0 is constant; β_1, δ_1, δ_2 are short run coefficients; φ1, φ2, φ3 are Long term coefficients; $\mathcal{E}_t$ is Error Correction Term.

Based on the model conditions, the suitability of the ARDL model can be checked by running the following stability test: The cumulative sum on recursive residues (CUSUM) as well as the cumulative sum on the squared times of recursive residues (CUSUMQ). The stability test helps to determine the stability of short-term and long-term parameters. If the CUSUM plot has a significant value at the 5 percent confidence level, it indicates that the parameter is stable (Nur & Sukmana, 2020). Before estimating the stationarity test, the length of the lag must be determined, and a bound test must be performed. The first condition for using the ARDL method is that the data must be stationary at the level or stationary at the first difference and it is better not to suggest being stationary at the second difference only (Gourgoura & Nikolaidou, 2017).

This study also conducted the Granger causality test, which is an analytical method that describes whether the variables are interrelated (have a two-way relationship) or only have one direction. The causality test is designed to see how the past affects the current situation, so the data used is time series data. The presence or absence of a causal relationship can be tested by F-test or confirmed by probability. Three things can be interpreted from the results of the Granger causality test (Gujarati, 2013: 315): (a) The one-way causality relationship between X to Y is expressed as unidirectional causality; (b) Bidirectional causality is a two-way causality also called mutual influence; (c) *No causality* means that there is no relationship between these variables.

Initial equation form (see equation 3) model Granger causality test refers to research by Apriansyah & Bachri (2006), as follows:

$$\Delta Y_t = a_0 + \sum_{j=1}^{m} a_j \Delta y_{t-j} + \sum_{i=0}^{n} b \Delta x_{t-j} + U_t \tag{3}$$

The equation model is formulated (see equation 4) in this study to explain the reciprocal relationship between the variables of Non-Performing Loans, Policy Interest Rates, and the Money Supply to become:

$$\Delta NPL_t = a_0 + \sum_{j=1}^{m} a_j \Delta NPL_{t-j} + \sum_{i=0}^{n} b \Delta SK_{t-j} + \sum_{i=0}^{n} c \Delta JUB_{t-j} + U_t \tag{4}$$

Where *NPL* is the ratio value of Non-Performing Loans, *SK* is the value of the Policy Interest Rate, *JUB* is the value of the total money supply, *Ut* is error term (interference error), and *tj* is lagging operation (lag/past).

RESULT AND DISCUSSION

The results of this study are based on data analysis that has been carried out using the ARDL method and the Granger Causality test. From these tests, the ARDL estimation results show that the policy interest rate variable has a negative and significant effect on NPL in the long and short term. Meanwhile, the ARDL estimation test results show that the money supply variable has a negative and significant effect on NPL in the short term and a negative and insignificant effect on NPL in the long term. The results of the Granger

causality test show that policy interest rates and bank credit risk have a one-way causality relationship. Bank credit risk and the money supply have a one-way causality relationship. Meanwhile, the policy interest rate and the money supply do not have a causal relationship.

A stationary test using the unit root test (PP) is shown in Table 1, and from these results it can be seen that the stationary variables are at different levels. JUB is stationary at level and NPL and SK at first difference. It can be concluded that the ARDL model is suitable for use in this study because it has a stationary value, not at the second difference (Saadaoui & Mokdadi, 2022).

Table 1. Stationary Data Test Results

Variable	Probability	Levels	First Difference
NPL	0.0000	Not Stationary	Stationary
JUB	0.0444	Stationary	
SK	0.0005	Not Stationary	Stationary

Determination lags are very important in the ARDL model to determine the optimum lag length used for further analysis. According to Table 2, after the Length Criteria lag test was carried out the test results show that the lag with the most stars is lag 4 so the next cointegration test will use lag 4. The lag will be used in ARDL estimation.

Table 2. Optimum Lag Determination Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11.15687	NA	0.000151	-0.286206	-0.178677	-0.244417
1	196.8533	345.3302	3.06e-07	-6.486081	-6.055965*	-6.318923
2	213.5113	29.22463	2.35e-07	-6.754784	-6.002081	-6.462258*
3	223.3016	16.14541	2.30e-07	-6.782514	-5.707224	-6.364619
4	235.8253	19.33483*	2.06e-07*	-6.906152*	-5.508275	-6.362889

At this cointegration testing stage, there is a goal to see the long-term correlation between research variables. The results of the Bound Test in Table 3 produce a value in the F-statistic of 8.375, which has an F-statistic value that must be bigger than the value I (0) and I (1). Thus, it can be concluded that the variables in this study indicate that they have cointegrated.

Table 3. Cointegration Test Results

Test Statistics	Value	Prob.	I(0)	I(1)
F Statistics	8.375	10%	4.19	5.06
K	2	5%	4.87	5.85
		2.5%	5.79	6.59
		1%	6.34	7.52

Testing of the consistency of the parameters can be seen in the CUSUM Test and CUSUMsq Test. This can be seen on the CUSUM line (blue line) which is between the 5 percent significant line (red line). In Figure 2 it can be seen as well as Figure 3 the test results on the consistency of the parameters. According to Figure 2 and Figure 3, it can be seen that each cumulative value in CUSUM and CUSUMsq is in a significant area. It can be concluded that there is consistency in the parameter estimates within this study period. After going through all the testing stages, the ARDL model can be used in research.

Figure 2. CUSUM Test Results
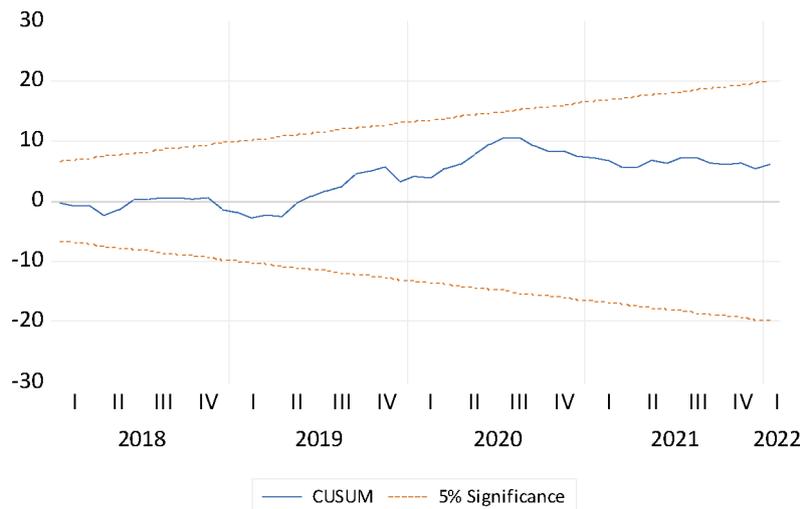
Figure 3. CUSUMsq Test Results
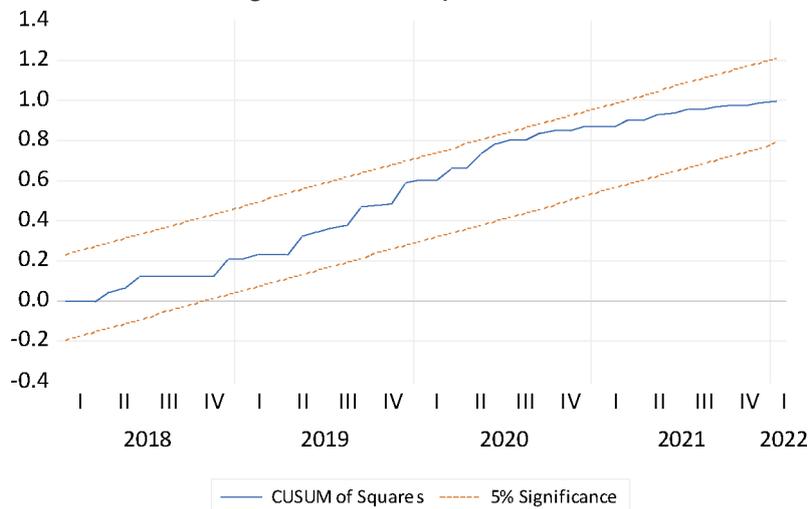
The results of estimating ARDL have obtained two models, namely to describe the relationship between variables in the short term and long term. Based on the results from Table 4, the long-term estimation results can be seen that the policy interest rate shows a negative and significant effect on NPLs in the long term. The results of this study are in line with the research by Nurismalastri (2017) and Arthasari (2021) showing that

policy interest rates have a negative and significant influence. The results of this study are also in line with the theory put out by Keynes, namely the theory of interest rates. Keynes said that the interest rate can affect the decision of the debtor.

Table 4. Long-Term Estimation Results

Variable	Coefficient	Std-Error	t-Statistics	Prob.	Information
SK	-0.394402	0.134717	-2.927642	0.0052	Significant
LJUB	-6.383234	4.729795	-1.349579	0.1834	Not significant

The implementation of the interest rate policy issued by Bank Indonesia is one of the ways to suppress increasing credit growth accompanied by increasing credit risk in banks. However, the money supply is shown not to have an effect on NPLs in the long term. The results of this study are in line with Wulandari (2016), which shows that the money supply has no significant effect on bank credit risk. If the money supply in the community increases, it will have an impact on the movement of credit, so it is necessary to pay attention to the amount of money in circulation so that it may be balanced so as not to cause changes in banking performance to reduce NPL increases.

Table 5. Short-Term Estimation Results

Variable	coefficient	std. Error	t-Statistics	Prob.	Information
NPL(-1)	0.503400	0.119249	4.221436	0.0001	Significant
NPL(-2)	0.119624	0.130002	0.920175	0.3620	Not significant
NPL(-3)	0.434781	0.123974	3.507020	0.0010	Significant
NPL(-4)	-0.259580	0.117534	-2.208556	0.0319	Significant
SK	-0.079581	0.029760	-2.674042	0.0102	Significant
LJUB	-1.287980	0.389946	-3.302968	0.0018	Significant
C	18.95326	5.320213	3.562501	0.0008	Significant
@TREND	0.011489	0.003286	3.496110	0.0010	Significant

The ARDL model in the short term can be seen in Table 5. ARDL estimation results in the short term are used to describe the short-term relationships between the variables studied. In general, policy interest rates have an effect on NPLs in the short term. The policy interest rate shows a negative and significant effect on NPL in the long and short term. The results of this study are in line with Dewi & Ramantha (2015) and Madeira (2019) which show that policy interest rates affect bank credit risk. If the policy rate increases, people usually don't want to borrow money from the bank because interest rates also increase. When policy interest rates increase, people usually tend to want to save (Aizenman et al., 2017). Therefore, an increase in SK will reduce non-performing loans which are marked by a decrease in NPLs.

The tightening of monetary policy has affected the lending capacity of banks. This is especially true for banks that rely heavily on deposits for loans. This tightening of

monetary policy affects every bank's lending capacity. This is especially true for banks that rely heavily on deposits for loans (Iddrisu & Alagidede, 2020). The policy interest rate has a coefficient that shows the value where the policy interest rate increases, and the NPL decreases. When credit interest rates rise, the obligation to pay interest expenses also increases. Therefore, an increase in this policy interest rate causes people to want to save or save their money in banks. When an increase in interest rates occurs, the amount of people who use credit also decreases so that the risk of non-performing loans can also be controlled. This can be seen from the value of the NPL ratio which continues to decline.

Based on the estimation results in Table 5, it can be concluded that the money supply has a negative and insignificant effect on NPLs in the long run. Meanwhile, in the short term, the money supply has a negative and significant effect on NPL. This is in line with the results of research by Poudel (2013) and Yurdakul (2014). Therefore, if the money supply increases, it can reduce bank non-performing loans, which are marked by a decrease in NPLs. The money supply can not only be determined by central bank policies but can also be influenced by people's behavior (Nurschafia & Abduh, 2014). If the money supply increases, people will pay for their credit, so credit risk to banks will decrease. When the money supply continues to increase, it will become a problem.

Wulandari (2016) shows that the money supply has no significant effect on bank credit risk, contrary to the results of this study. The results of this study support the theory that fluctuations in the money supply have an effect on NPLs in Indonesia. When the money supply increases, NPL decreases in the short term. This can be interpreted as when people hold money, they will channel the money to repay credit. Meanwhile, interest rate policy has a negative effect on credit risk. Banks with high credit risk will issue a policy of increasing interest rates to stabilize the money supply (Taiwo et al., 2017).

Partially, the coefficients of the independent variables describe a significant influence on NPLs in the long run. Estimates from the ARDL estimation results based on Table 5 are free from model specification errors. The value of the Coefficient of Determination (R^2) indicates that the variation in changes in the rise and fall of NPLs can be explained by policy interest rates and the money supply of 91.35 percent. Meanwhile, the remaining 8.65 percent is explained by other variables not examined in the study. This study shows very good estimation results.

The causality test method of analysis is carried out to determine the variables that have a two-way relationship or only have one direction. The importance of this test is to find out the effects of the past compared to the present, using data called this time series. Table 6 can be concluded after testing that the variables that have a causal relationship are variables that have a smaller probability value than the alpha value of 0.05. Therefore, it can be seen from Table 4.6 that SK significantly affects NPL with a probability of 0.0073 < 0.05, but NPL does not significantly affect SK with a greater probability (Column 4). It can be concluded that SK and NPL only have a one-way causality relationship. This policy interest rate can affect credit risk, so it is necessary to have a monetary policy that controls the increase in credit through policy interest rates.

If the level of interest rates experiences a high increase, it can result in high credit interest rates as well, thus in this condition non-performing loans (NPL) are formed. What happens in this scenario is that debtors will experience difficulties in paying off loans taken to banks because credit interest rates rise, so financing to pay off credit also increases. Based on Table 6, JUB also does not significantly affect NPL, while NPL significantly affects JUB. It can be concluded that JUB and NPL have a one-way causality relationship. Furthermore, it can be seen in Table 6 that JUB does not significantly affect SK, and SK also does not significantly affect JUB with a greater probability (Column 4). The results of this study are in line with Yurdakul (2014) and Guerra (2017).

Table 6. Causality Test Results

Null Hypothesis	Obs	F-Statistic	Prob.
SK does not Granger Cause NPL	60	7.73755	0.0073
NPL does not Granger Cause SK		1.03845	0.3125
LJUB does not Granger Cause NPL	60	2.92499	0.0927
NPL does not Granger Cause LJUB		4.65390	0.0352
LJUB does not Granger Cause SK	60	2.07006	0.1557
SK does not Granger Cause LJUB		0.95785	0.3319

The results of this study have determined using the classical assumption test. Classical assumption testing provides certainty that the equation in the regression obtained in the test has accestimation, accuracy, is consistent, and is not biased. This study passed the classical assumption test. To strengthen the results of this study, a robustness test was conducted. Robustness testing in this study is used to test the robustness or validity of the research results using the main model (Saragih & Khoirunurrofik, 2022). The Robustness test is carried out by using t-test, F test, and the coefficient of determination (Afiska et.al, 2021).

Table 7. Robustness Check-NPL

Variable	Coefficient	t-Statistic	Prob.
SK	-0.285645	-2.674042	0.0000
LJUB	-0.163058	-3.302968	0.2215
F-Statistic	73.91108		
Adj. R Squared	0.901126		

The results of the robustness test strengthen the results of the main method of this study. Based on the estimation results in Table 7, the policy interest rate is significantly negatively related to bank credit risk. Meanwhile, the money supply has a negative and insignificant effect on bank credit risk. The results of this robustness are in line with the regression results of the main method of this study. The t-test was conducted to see the effect of the independent variables partially on the dependent variable of this study.

The t-table value for this research is 1.67943. Based on the results of testing, it can be seen that policy interest rates and the money supply have a partial effect on bank credit risk (NPL) in Indonesia. This can be seen from the t-statistic value of each (Table 7) which is greater than the t-table value. The estimation results in Table 7 show that the F-statistic, namely 73.91108 is greater than 3.204317 in the F-table, which means that policy interest rates and the money supply have a simultaneous effect on bank credit risk (NPL) in Indonesia. Furthermore, the value of Adjusted R-squared was recorded at 0.901126, which means variations in the bank's credit risk can be explained by policy interest rates and the money supply by 90.11 percent. Meanwhile, the other 9.89 percent can be explained by other variables not examined in this study.

The results of this study are based on data analysis that has been carried out using the ARDL method and Granger Causality test. Each variable interacts with the other so that the growth of non-performing loans can be controlled. It can be concluded from this test that the estimation results show that the policy interest rate variable has a negative and significant effect on NPL in the long term and short term. The increase in the policy interest rate set by the central bank has a direct effect on the financial sector, especially in the banking system. The results of this study are in line with Bekaert et al. (2013). This indicates that the policy interest rate is used as a reference in the use of credit by the public because if the policy interest rate rises, the rate of return on funds will also be greater. This happens because of the limited means in which the community can earn a decent income. When credit interest rates rise, the obligation to pay interest expenses also increases. Therefore, the increase in policy interest rates causes people to want to save or save their money in banks. When an increase in interest rates occurs, the use of credit also experiences a decrease so that the risk of non-performing loans can also be controlled.

Meanwhile, the ARDL estimation test results show that the money supply variable has a negative and significant effect on NPL in the short term and has a negative and insignificant effect on NPL in the long term. Policy interest rates and the money supply have a partial influence and jointly have an influence on bank credit risk (NPL) in Indonesia. Developments in the money supply in society can affect bank credit risk. Of course, the risk of bad credit will be detrimental to the bank. Meanwhile, these bad loans can result in higher costs for banks to produce the production assets they have to provide, reduce profit potential, and reduce the capital available to banks. Instability in the money supply will increase a bank's production costs, thereby affecting bank credit risk.

CONCLUSION

The results of this study indicate that policy interest rates and liquidity have an influence on credit risk in the short and long term. In the short term, policy interest rates and the money supply have a negative effect on bank credit risk in Indonesia. In the long term, the policy interest rate has a negative effect, while the money supply does not affect credit risk in Indonesia. Therefore, policy interest rates and the money

supply can affect the growth of bank credit risk in each period. Policy interest rates and banking credit risk have a one-way causality relationship. Meanwhile, bank credit risk and the money supply have a one-way causality relationship. The policy interest rate and the money supply do not have a causal relationship. This means that interest rates can affect credit risk conditions and this condition will have an impact on the money supply.

The results of this study can be an important reference to be applied to banking. Bank Indonesia as the central bank needs to maintain macroeconomic flexibility, especially for policy interest rates and the money supply, and pay attention to credit risk conditions in containing external and internal shocks in the banking sector. Policy management on credit must be good, especially risk assessment and mitigation to prevent a buildup in the level of non-performing loans in the banking sector. Bank Indonesia must also implement strategic steps with great care in the macroeconomic sphere, in order to encourage more responsible lending amid increasing global economic challenges.

One factor that can reduce bank credit risk so that it can be controlled is the fact that the bank also needs consistently monitor economic conditions. This is done to make macroeconomic guidelines more effective. The low level of public awareness in reducing credit risk will have an impact on the economy. Therefore, the banking sector needs to be aware of the important role it plays in controlling credit risk. It is important to pay attention to fluctuations in policy interest rates and mitigating excess money supply because these two factors have a significant influence on the level of non-performing credit risk in banks. Further research is neeeded to understand the influence of other variables such as inflation, industrial production index, and other variables that can affect non-performing loans.

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Determinant of Efficiency in the Indonesian Islamic Banks

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Abstract

This study aims to analyze the factors that influence the efficiency level of Islamic commercial banks in Indonesia. The research employs a panel data analysis and a non-parametric Data Envelopment Analysis (DEA) to measure efficiency. The panel data analysis showed that company size, profitability, liquidity, and management significantly affect the level of efficiency of the Islamic banks in Indonesia. At the same time, capital and funding risk have no significant impact. The efficiency of the Islamic banks in Indonesia should be maintained by balancing the distribution of assets, ensuring portfolio diversification, maintaining sufficient liquidity, and paying attention to management quality. The originality of this study, to the best of the author's knowledge, is that it is the first study to examine the determinants of efficiency in Indonesian Islamic commercial banks using quarterly data from the period of 2015-2020. As a result, the data analyzed has a sufficient amount.

Keywords:

efficiency; data envelopment analysis; panel data models; Islamic bank

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INTRODUCTION

Efficiency is a key performance parameter in the financial industry, reflecting how well an Islamic bank manages its resources and selects the right factors to achieve its goals (Spong et al., 1995; Noor & Ahmad, 2012; Mezzi, 2018; Shah et al., 2019). Islamic banks implement various measures to enhance efficiency, which allows them to increase their income per unit of cost and offer low margins to customers (Lucchetti et al., 2001). Hence, for an Islamic bank or the Islamic banking industry, efficiency plays a crucial role in maintaining a healthy and sustainable financial performance (Rosman et al., 2014).

Hadad et al. (2003) state that to achieve maximum efficiency in the banking sector, banks must find a balance between optimal and available input levels or minimize input while maximizing output. However, Islamic banks need help achieving good efficiency levels in their operations. To comply with the principles of Islamicness and Shariah, Islamic banks must abide by specific criteria in conducting financial transactions, which can add complexity to their operations and increase costs, thus affecting their overall efficiency (Hadad et al., 2003; Laila et al., 2019). In Islamic banking, the operational cost-to-operating income ratio is a widely used performance indicator to assess the efficiency of operational activities. Figure 1 shows the overview of the average operational cost to operating income ratio of Islamic banks in Indonesia.

Figure 1. The Operational Cost to Operational Income Ratio of Islamic banks in Indonesia
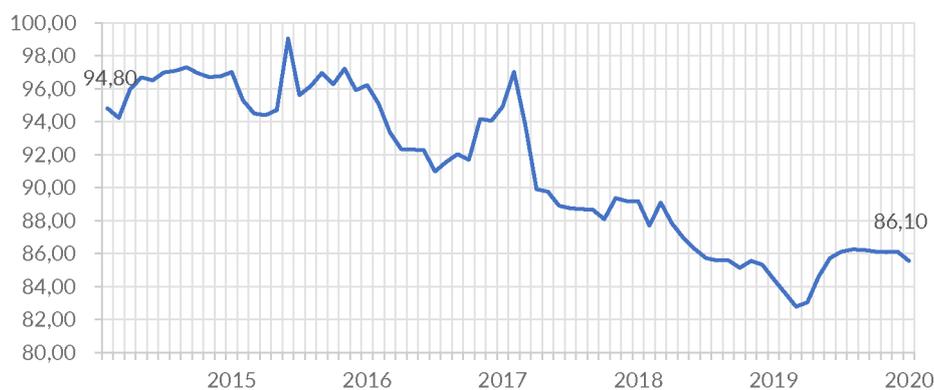
Source: Financial Services Authority, 2021

According to Islamic banking statistics, it is known that the operational cost to operating income ratio has decreased, which can be interpreted that, on average, Islamic banks in Indonesia are becoming more efficient. In other words, Islamic banks in Indonesia generate more income from each unit of cost spent. On the other hand, the efficiency level can also show the competitive conditions in the Islamic banking industry. In 2020 there were 14 full-fledged Islamic banks and 20 Islamic business units operating in Indonesia. Figure 2 describes the efficiency conditions of each Islamic bank in the Islamic banking industry.

Efficiency level becomes crucial for each Islamic bank to handle the intensifying competition in the Islamic banking sector (Firdaus & Hosen, 2013). As a whole, Figure 2

indicates that the efficiency level in the Islamic banking industry in Indonesia is quite diverse. The Bank of Aladin Sharia is the most efficient Islamic commercial bank, with an operational cost-to-operating income ratio of 65.16. On the contrary, the Bank of Shariah Bukopin is known to be the least efficient, with a ratio value of 100.

Figure 2. Operational Cost To Operational Income Ratio Of Each Islamic Commercial Bank In Indonesia

Source: Financial Services Authority, 2021

The differences in the efficiency levels of each Islamic bank can be attributed to various factors (Haris & Hastuti, 2013; Muljawan et al., 2014; Sutawijaya & Lestari, 2009). To enhance their efficiency, Islamic banks must identify these factors. Knowing the factors affecting efficiency will assist the Islamic bank in formulating the appropriate strategy to improve its performance. Improved efficiency enhances customer and investor confidence in the Islamic bank (Sahrullah & Suprayogi, 2022).

Sahrullah & Suprayogi (2022) state that efficiency can be influenced by factors beyond those used in efficiency analysis. Previous studies have revealed that firm size can have a positive impact on efficiency, as demonstrated in research by Jiménez-Hernández et al. (2019), Kamarudin et al. (2019), Liviawati et al. (2019), Lotto (2019), Devi & Firmansyah (2020), and Darlis & Utary (2022).

Larger companies have more significant resources in capital ownership, labor, and technology that can be used to improve the performance of their operational activities. Significant capital will strengthen the company's financial position, allowing the Islamic commercial bank to finance operational activities and investments without adding capital from other sources, as evidenced in the research of Lotto (2019) and Samad (2019).

Conversely, research conducted by Samad (2019), Fernandes et al. (2018), and Liang et al. (2018) found the opposite larger banks are prone to inefficiency issues stemming from complex bureaucratic processes. These numerous divisions hinder communication between management and staff and the difficulties in adapting to changes in the business

environment. Additionally, it has been observed that adverse effects on efficiency occur during overinvestment and incorrect investment decision-making.

Positive profitability boosts the bank's resilience and supports its investments. It can also serve as an indicator for comparing a bank's efficiency to its competitors (Kamarudin et al., 2019; Liang et al., 2018; Lotto, 2019; Sufian & Kamarudin, 2015). Liang et al. (2018) and Lotto (2019) found that profitability significantly positively affects bank efficiency. However, Darlis & Utary's (2022) findings suggest that profitability negatively affects efficiency. Conversely, the studies conducted by Miftahurrohman (2019) and Devi & Firmansyah (2020) found that profitability has little impact.

The research conducted by Lotto (2019) found that liquidity positively impacts the efficiency of the Islamic banks. Adequate liquidity enables faster transaction processes in Islamic banks. Conversely, a higher level of liquidity in Islamic banks can have a negative impact on efficiency, which can occur when Islamic banks allocate too much of their funds to unproductive activities such as reserves that exceed their needs (Yuniari & Badjra, 2019).

Financing risk can negatively affect the efficiency of the Islamic banks, as evidenced by numerous studies, including the studies conducted by Fernandes et al. (2018), Jiménez-Hernández et al. (2019), Liang et al. (2018), Samad (2019), and Wanke et al. (2016). In theory, financing risk decreases the income of Islamic banks and increases the bank's burden to address the risk.

The impact of management on the efficiency of the Islamic banks can be assessed through the net operating margin (NOM) ratio. NOM reflects the bank's ability to earn profits from its revenue. Research by Pambuko (2016) and Liviawati et al. (2019) has shown that management, as measured by the NOM ratio, positively affects efficiency. The higher the NOM ratio, the more profit the bank can make from its revenue, and therefore, the Islamic bank can allocate more funds for reserve, capital enhancement, or lending to third parties.

Based on the previous studies discussed above, it is known that there needs to be more consistency in the findings of the investigations regarding the impact of differentiating factors on the efficiency of Islamic commercial banks in Indonesia. The position of this study is to study further the factors that cause differences in the efficiency levels of each Islamic commercial bank in Indonesia. Previous studies used relatively small sample data. The study conducted by Lestari & Huda (2020) used 40 research samples, Koiri & Erdkhadifa (2022) used 26 samples, Darlis & Utary (2022) used 60 samples, and Sahrullah & Suprayogi (2022) used 55 research samples. This study aims to fill this research gap by utilizing more research samples. So, this research will examine the determinants of efficiency in the Indonesian Islamic banking industry.

METHODS

The observed object in this research is the population of Islamic commercial banks operating in Indonesia. The sample used in the research consists of 9 full-fledged Islamic banks, including Bank of Central Asia Shariah (BCAS), Bank of Jabar Banten Shariah (BJBS), Bank of Muamalat Indonesia (BMI), Bank of Mega Shariah (BMS), Bank of Negara Indonesia Shariah (BNIS), Bank of Panin Dubai Shariah (BPDS), Bank of Rakyat Indonesia Shariah (BRIS), Bank of Shariah Bukopin (BSB), and Bank of Shariah Mandiri (BSM).

The data used in the research is secondary data collected from the financial statements of each Islamic commercial bank for six years, from 2015 to 2020. The data period used is quarterly data. Hence, the total number of samples analyzed in this research is 216.

The method used in this study to analyze the factors impacting the efficiency of Islamic commercial banks is panel data analysis. Before that, the efficiency level of these banks was analyzed using the non-parametric Data Envelopment Analysis (DEA) method. The DEA is a mathematical model applied to data observations to produce a relative efficiency score and the potential for efficient production (Rusydiana & Hasib, 2020; Cooper et al., 2011). The analysis tool used in this study is MaxDEA 8 Basic.

A decision-making unit (DMU) is considered efficient if it scores 100%. Full efficiency is reached when neither inputs nor outputs need to be improved. The efficiency frontier is the limit of efficiency, and the efficiency scores generated from processing inputs and outputs with different sizes and amounts for each DMU determine it.

To analyze efficiency using the DEA method, the input variables used consist of Labor Costs (I1), Deposit Funds (I2), and Other Operating Expenses (I3). The output variables consist of Murabahah financing (O1), Musyarakah and Mudharabah investment (O2), Ijarah/Leasing financing (O4), and Securities (O5).

This study uses Panel Regression as the data processing method to analyze the factors affecting the efficiency of Islamic commercial banks in Indonesia. This method was selected because the data being analyzed is panel data, which combines time series and cross-section data.

The first step in panel regression testing is to determine the best method among Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM) models. The hypothesis test will be based on chi-square statistics. As this test uses three different tests, there are three criteria for rejecting the null hypothesis. These three criteria are explained below:

Chow Test: H_0 is rejected if Prob F < α (0.05).

LM Test: H_0 is rejected if the Chibar2 Probability < α (0.05).

Hausman Test: H_0 is rejected if the Chi2 Probability < α (0.05).

Based on the variables used, the regression model is as follows:

$$SEF_{it} = \alpha + \beta_1 TTA_{it} + \beta_2 ROA_{it} + \beta_3 CAR_{it} + \beta_4 FDR_{it} + \beta_5 NPF_{it} + \beta_6 NOM_{it} + \varepsilon_{it}$$

The used variables in the regression model are: SEit, which is the efficiency score obtained from the DEA analysis; TTAit, which is the total assets of bank i in period t and serves as a proxy for the bank's size; ROAit, which represents the return on asset of bank i in period t and serves as a proxy for the profitability factor; CARit, which is the capital adequacy ratio of bank i in period t and serves as a proxy for the capital factor; FDRit, which is the financing to deposit ratio of bank i in period t and serves as a proxy for the liquidity factor, which is believed to have a positive impact on the efficiency of Islamic commercial banks; NPFit, which is the non-performance financing of bank i in period t and serves as a proxy for the financing risk factor; and lastly, NOMit, which represents the net operating margin of bank i in period t and serves as a proxy for the management factor.

RESULT AND DISCUSSION
Result

The efficiency condition of Islamic commercial banks in Indonesia from 2015 to 2020 is generally obtained by looking at the average efficiency score of nine Islamic commercial banks in Indonesia over the research period. Figure 3 shows the average efficiency score of all full-fledged Islamic banks.

Figure 3. Average Efficiency Score of All Full-fledged Islamic Banks
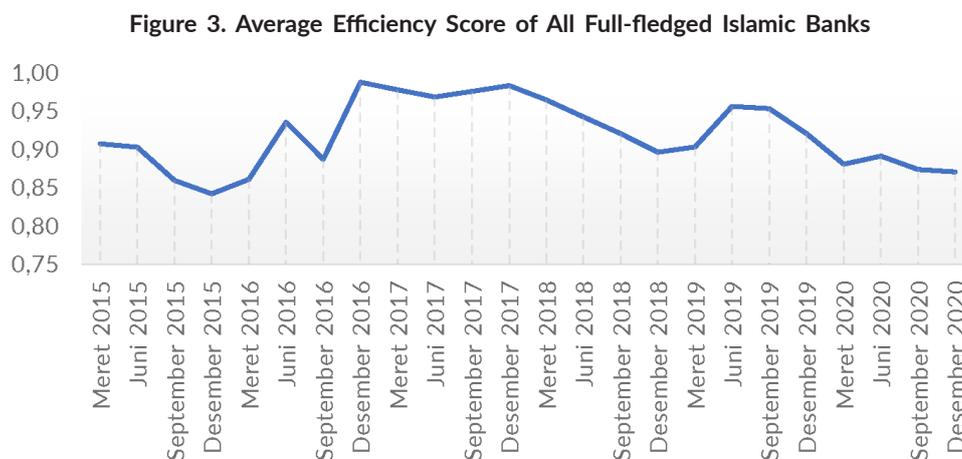
Source: Output from MaxDEA 8 Basic software

The analysis results show that the average combined efficiency score obtained by Islamic commercial banks in Indonesia has a fluctuating trend. This result aligns with previous research by Lestari & Huda (2020), who also found that the efficiency trend of the Islamic banking industry occasionally experiences fluctuations. The highest efficiency level occurred in December 2016 at 0.99. Meanwhile, the lowest efficiency level of Islamic commercial banks occurred in December 2015 at 0.84. At the end of 2020, the average efficiency score was 0.87. The lowest average efficiency score of the combined Islamic commercial banks was 0.84 in December 2015. Furthermore, the efficiency analysis results for each Islamic commercial bank are shown in Table 3.

Table 3. Efficiency of Islamic Commercial Banks from 2015 to 2020

No.	DMU	Average	Number of Perfect Efficiencies	Rank
1	BCAS	0,959	12	4
2	BJBS	0,872	7	7
3	BMI	0,986	12	2
4	BMS	0,786	2	9
5	BNIS	0,984	11	3
6	BPDS	0,939	8	5
7	BRIS	0,936	7	6
8	BSB	0,827	7	8
9	BSM	0,987	20	1

Sumber: Output software MaxDEA 8 Basic

Table 3 presents the results of the efficiency testing of 9 full-fledged Islamic banks in Indonesia. The full-fledged Islamic bank with the perfect efficiency score of 1 in each period is Bank of Shariah Mandiri (BSM), with 20 out of 24 periods of perfect efficiency. Conversely, the bank with the lowest efficiency (highest inefficiency) with an average score of 0.786 is Bank of Mega Shariah (BMS), with only two periods of efficiency. The second-ranked Islamic commercial bank is the Bank of Muamalat Indonesia (BMI), which has an average efficiency score of 0.986 and achieved perfect efficiency 12 times. The third-ranked bank is the Bank of Negara Indonesia Shariah (BNIS), with an average efficiency score of 0.984 and 11 instances of perfect efficiency. Bank of Central Asia Shariah (BCAS) ranks fourth with an average efficiency score of 0.959 and 12 instances of perfect efficiency. The fifth-ranked bank is the Bank of Panin Dubai Shariah (BPDS), with an average efficiency score of 0.939 and 8 instances of perfect efficiency. Bank of Rakyat Indonesia Shariah (BRIS) ranks sixth with an average efficiency score of 0.936 and 7 instances of perfect efficiency. Bank of Jawa Barat dan Banten Shariah (BJBS) ranks seventh with an average efficiency score of 0.872 and 7 instances of perfect efficiency. The eighth-ranked Islamic commercial bank is the Bank of Shariah Bukopin (BSB), with an average efficiency score of 0.827 and 2 instances of perfect efficiency.

The panel data analysis test was conducted to analyze what factors determined the efficiency level of full-fledged Islamic banks in Indonesia during 2015-2020. In the panel data analysis, in order to obtain a regression model, the best model needs to be selected. Table 4 shows the summary of the best model selection test.

Table 4. Summary of the Results of the Best Model Selection Test

Test	Model Selection	Result	Selected Model
Uji Chow	PLS or FEM	0,000 < α (0,1).	FEM
LM Test	PLS or REM	0,000 < α (0,05).	REM
Hausman Test	REM or FEM	0.0575< α (0,05).	REM
Conclusion: The selected model is REM.			

Table 3 shows that the results of the Chow test produced a probability value of 0.0000. This result indicates that the probability value is smaller than 0.05. Hence, this model's null hypothesis (H0) is rejected, and the best estimation method used is the Fixed Effect Model (FEM). Additionally, the LM test results resulted in a probability value of 0.000, which is also less than 0.05. As a result, the null hypothesis was rejected, and the conclusion was that the Random Effect Model (REM) is the best model for studying the impact of cash flow on efficiency.

The final test to determine the best model was the Hausman test, which produced a probability value of 0.1413. This value indicates that the probability value is larger than the significance level (0.05), so the null hypothesis for this model is accepted. Hence, based on the Hausman test, the best model was determined to be the Random Effect Model (REM).

The regression model, which was obtained, next, of the factors affecting the efficiency level of Sharia Commercial Banks in Indonesia is as follows:

$$SEF_{it} = -0{,}9635 + 0{,}0541\,TTA_{it} + 0{,}0276\,ROA_{it} + 0{,}0443\,CAR_{it} + 0{,}2463\,FDR_{it} - 0{,}0085\,NPF_{it} - 0{,}0175\,NOM_{it} + \varepsilon_{it}$$

The results of the panel regression testing showed that the constant value is -0.9635. This indicates that if all the independent variables are equal to zero, the efficiency value would be -0.9635. The findings indicate that the size of the company, profitability (P<|t|), capital, liquidity, loan risk, and management have a significant impact on efficiency when considered together. To examine the impact of each individual independent variable on the dependent variable, partial tests or T-tests are performed. If the probability value is less than 0.05, it can be concluded that the independent variable has a significant effect on the dependent variable. Table 5 shows the results of the t-test.

Table 5. T-test Result

	Coef.	Std. Err.	Z	P<|t|	[95% Conf.	Interval
Total Asset (TTA)	0,0541	0,0141	3,840	0,0000	0,0265	0,0818
Return on Asset (ROA)	0,0276	0,0104	2,650	0,0080	0,0072	0,0481
Capital Adequacy Ratio (CAR)	0,0443	0,0327	1,360	0,1750	-0,0197	0,1084
Financing to Deposit Ratio (FDR)	0,2463	0,0665	3,700	0,0000	0,1159	0,3767
Non-Performing Financing (NPF)	-0,0085	0,0098	-0,870	0,3820	-0,0276	0,0106
Net Operating Margin (NOM)	-0,0175	0,0075	-2,330	0,0200	-0,0322	-0,0028
cons	-0,9635	0,1929	-4,990	0,0000	-1341636	-0,5854

Source: Stata Output Results, 2022

The analysis of each variable revealed that the size of the company (TTA), profitability (ROA), liquidity (FDR), and management (NOM) had a significant impact on efficiency. Meanwhile, capital (CAR) and loan risk (NPF) was found not to have a significant impact. The panel regression results showed that the coefficient of determination (R Square) of the research model had an overall R Square value of 0.2628, indicating

that the size of the company, profitability, capital, liquidity, loan risk, and management contributed 26.28% to the efficiency of Sharia Commercial Banks. The remaining 73.72% is influenced by other variables not studied.

DISCUSSION

The results of the panel data analysis, as shown in Table 5, indicate that bank size has a significant and positive impact on efficiency. The panel regression analysis found that the size of the full-fledged Islamic bank, as measured by total assets (TTA), has a coefficient of 0.0541. This result means that a one-unit increase in total assets leads to a 0.0541-unit increase in efficiency and vice versa. This finding aligns with the results of efficiency analysis using the DEA method. The most efficient bank was the full-fledged Islamic Bank with the most significant asset ownership, BSM.

This finding is consistent with previous studies, such as those by Devi & Firmansyah (2020), Darlis & Utary (2022), Jiménez-Hernández et al. (2019), Kamarudin et al. (2019), and Lotto (2019), which suggest that larger banks have more resources and capabilities that can positively impact efficiency. This condition is due to several factors, such as larger companies having more resources like capital, labor, and technology to enhance their operational performance, better risk management capabilities, and more significant opportunities to improve efficiency through broader market access and economies of scale (Darlis & Utary, 2022; Devi & Firmansyah, 2020; Miftahurrohman, 2019).

However, studies by Haryanto (2018) and Samad (2019) suggest that large size only sometimes leads to high efficiency. Large banks can suffer from inefficiencies due to complex bureaucracy, poor communication, and difficulty adapting to changing business environments. Additionally, the regression analysis shows that profitability, proxied by Return on Assets (ROA), significantly impacts efficiency, with a value of 0.0276. This result means that a one-unit increase in profitability leads to a 0.0276-unit increase in efficiency. High profitability reflects the bank's ability to generate profits through effective management of its assets, which is consistent with previous research by Liang et al. (2018) and Lotto (2019).

Positive profitability helps increase the bank's resilience and facilitates future investments, as retained profits can become a source of funding that improves operational performance. As a result, general Islamic banks that generate more profit can allocate their profits as a source of capital for business growth rather than relying on external funding sources. This result means that profitability significantly impacts the efficiency of the Islamic banks (Sari & Saraswati, 2017; Bayuny & Haron, 2017). However, the findings of this research are in contrast with those of Miftahurrohman (2019), Devi & Firmansyah (2020), and Koiri & Erdkhadifa (2022), who found that profitability does not have a significant impact on efficiency. Meanwhile, research conducted by Darlis & Utary (2022) found that profitability has a negative impact on efficiency.

Next, the Capital Adequacy Ratio (CAR) variable, which serves as a proxy for bank size, has a positive impact of 0.0443, indicating that capital (CAR) positively affects efficiency. Therefore, if capital (CAR) increases by one unit, efficiency will increase by

0.0443 units and vice versa. However, the data shown in Table 5 suggests that the impact of capital is insignificant. Generally, a more extensive capital base strengthens a company's financial position, allowing Islamic banks with more capital to boost production capacity and enlarge their production scale. Furthermore, with more significant capital, Islamic banks can reduce their unit transaction costs by adopting more advanced technology. Previous studies by Lotto (2019) and Samad (2019) have found a significant positive effect from the CAR variable.

Conversely, studies conducted by Fernandes et al. (2018) and Liang et al. (2018) have revealed a negative impact. A negative effect on efficiency can occur if overinvestment occurs or investment decisions are misguided due to a lack of attention to reducing high costs. Negative impacts can also result from over-expansion, which may slow decision-making processes and lead to unnecessary expansion.

The panel data analysis test shows that liquidity is the most significant factor affecting efficiency, as measured by the Financing to Deposit Ratio (FDR) variable, which has a value of 0.2463. It has been established that liquidity positively impacts the efficiency of the Islamic banks. A one-unit increase in liquidity (FDR) leads to a 0.2463-unit increase in efficiency and vice versa. These findings align with the research of Liviawati et al. (2019), who also found that liquidity positively impacts the efficiency of the Islamic banks. The study conducted by Lotto (2019) also supports these findings. It revealed that an increase in liquidity, as reflected by a higher FDR ratio, leads to an increase in financing disbursement, a primary source of income for Islamic banks. Increased financing leads to higher profit potential and improved operational efficiency. These results demonstrate that Islamic banks with high FDR ratios effectively manage their funds and make intelligent investments, improving operational efficiency (Pambuko, 2016). Therefore, liquidity plays a crucial role in supporting the sustainability and growth of Islamic banks.

However, previous research has provided different results. Yuniari & Badjra (2019) and Darlis & Utary (2022) found that high liquidity negatively impacts the efficiency of the Islamic banks. A high FDR indicates that more funds are being disbursed for financing, leading to a more significant margin for the bank. However, when the bank disburses funds to sectors with low profitability, it faces a significant burden to meet its obligations to fixed-term deposits. This results in an opportunity cost for the bank.

The following findings suggest that the risk-financing factor, as represented by the Non-Performing Financing (NPF) variable, has a negative impact on efficiency, as indicated by a coefficient value of -0.0085. This result means that if the financing risk increases by one unit, efficiency will decrease by 0.0085 units, and vice versa. However, Table 5 shows that the NPF variable has an insignificant effect on efficiency, which aligns with the research of Miftahurrohman (2019), Koiri & Erdkhadifa (2022), and Darlis & Utary (2022). This result contradicts earlier studies by Fernandes et al. (2018), Jiménez-Hernández et al. (2019), Liang et al. (2018), Samad (2019), and Liviawati et al. (2019), which found that NPF has a significant impact on efficiency.

According to Liviawati et al. (2019), an increase in NPF in an Islamic commercial

bank can lead to operational disruptions, particularly in liquidity. The higher NPF results in increased costs for collecting debt and potential legal action, negatively impacting the bank's capital and solvency ratio. This condition reduces the bank's ability to disburse new credit and slows business growth, resulting in inefficiencies. Additionally, high NPF increases costs associated with losses, further impacting the bank's liquidity and reducing the quality and availability of financing provided by the bank (Miftahurrohman, 2019). The impact of NPF on liquidity issues in Islamic commercial banks leads to a tightening of financing, decreasing efficiency levels (Jiménez-Hernández et al., 2019; Liang et al., 2018; Samad, 2019; Wanke et al., 2016).

The panel data analysis results indicate that the management factor, proxied by the Net Operating Margin (NOM) variable, has a negative and significant effect on efficiency, with a coefficient of -0.0174. This result means that a one-unit increase in the management value (NOM) results in a 0.0174 unit decrease in efficiency, and vice versa. The low negative impact of management suggests that the Islamic commercial bank could be more efficient in managing operational costs and generating profit from operations. This conclusion aligns with previous research by Liviawati et al. (2019) and Suryanto & Susanti (2020). Furthermore, the findings indicate that a high net operating ratio does not guarantee that the Islamic commercial bank has good efficiency. This condition is because if the income of the Islamic commercial bank is derived from an unstable source, such as margins from investment products, then a high net operating margin does not guarantee a high level of efficiency in the bank (Suryanto & Susanti, 2020).

CONCLUSION

This research aims to analyze the impact of firm size, profitability, capital, liquidity, financing risk, and management on the differences in the efficiency levels of Sharia commercial banks in Indonesia. The Data Envelopment Analysis (DEA) results indicate that BSM is the Sharia commercial bank with excellent efficiency and ranks first in the average efficiency score, with 20 out of 24 periods and an average perfect efficiency score of 1. In contrast, BMS is the Sharia commercial bank with the highest level of inefficiency. BMI is ranked second, followed by BNIS, BCAS, BPDS, BRIS, BJBS, and BSB. The panel data analysis showed that firm size (TTA), profitability (ROA), liquidity (FDR), and management (NOM) significantly affect the differences in efficiency levels in Sharia commercial banks in Indonesia. At the same time, capital (CAR) and financing risk (NPF) have no significant impact.

In order to operate efficiently, Islamic banks must manage their total assets with a balanced and proportional distribution between productive assets and assets with potential profits and assets with an acceptable level of risk. They should ensure that investing some funds in productive assets such as investment financing and others in assets with good potential profits diversifies the asset portfolio. Additionally, Islamic banks should closely monitor their liquidity levels to remain adequate and meet banking transaction requirements. On the gathering side, they need to manage sufficient liquid assets to match liquidity needs for financing operations. Therefore, banks that have yet to reach

a perfect level of efficiency should work towards improving their liquidity by receiving funds from various sources to boost financing disbursements. On the management side of financing disbursements, evaluations of financing diversification offered in various products should be conducted based on each Sharia contract pattern. Moreover, Islamic banks must address the adverse effects of management factors by analyzing management performance that may lead to operating costs and continually evaluating the performance of their workforce, taking corrective action if required. Adopting more efficient technology to support smoother operational processes can also achieve this condition.

Some limitations of this research include the limited data used in this study, as Islamic banks continue to grow and have diverse data conditions. Additionally, this research only examines Islamic commercial banks as the study sample, so it does not reflect the broader Islamic finance industry. The variables used in this study may need to be revised for the conditions and circumstances of the observed Islamic banks, which can impact the research outcomes. Hence, it is hoped that future research will broaden the observation scope and either replace or supplement the observation variables to be more pertinent.

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Impact of Zakat-Based Business Capital on Mustahiq's Welfare Post-Disaster in Sigi Regency

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Abstract

This study investigates the BAZNAS Microfinance Desa (BMD) Sigi program's impacts on the material and spiritual well-being of the Mustahiq (zakat beneficiaries). The quantitative CIBEST model and qualitative observation were performed on 100 households recruited using a random sampling technique. The results show that BMD Sigi's program positively impacted Mustahiq's material and spiritual well-being, with increases of 35.39% and 10%, respectively. The welfare index rose 19%, and the material poverty index fell by 1%. Both spiritual poverty and the absolute index fell by 6% and 12%, respectively. Our direct observation further supports the quantitative findings, showing that monitoring and technical support provided by BMD Sigi is crucial for the successful implementation of the program. This study contributes to the novelty of measuring the impact of zakat distribution on productive means using quantitative and qualitative approaches with particular evidence from a post-disaster area.

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INTRODUCTION

Sigi, Donggala, and Palu City are the three administrative regions in Central Sulawesi that experienced earthquake, tsunami, and liquefaction disasters in September 2018, adversely affecting economic growth (Arouri et al., 2015). The natural disaster ultimately impacted the poverty and well-being of people in the Sigi regency and its environs (Bank Indonesia, 2019b). Sigi Regency had a more significant economic impact than Donggala and Palu City. The Bank of Indonesia reported in 2019 that trade, accommodation, and agriculture were the three slow-growth sectors during that period. Although economic growth was recorded at 5.37% in the fourth quarter of 2018, such growth was lower than in the previous quarter at 7.05%. Such natural catastrophes also boosted inflation by 2.52% (QoQ).

The cause of the increasing poverty in the areas affected by natural disasters is the loss of productive assets and employment opportunities. Boustan et al. (2020) explain that a disaster's most consistent economic impact is a decline in productivity and demand for labor, as happened in Sigi Regency. Following the disasters in 2018, the Central Bureau of Statistics Indonesia (BPS) Sigi recorded a 0.31% increase in poverty, from 29,78 thousand people in 2018 to 30,82 thousand people in 2019. This number represented the third and the lowest poverty rate out of 13 regencies in Central Sulawesi. Further, the per capita poverty line index in Sigi Regency was IDR 344,631 per month in 2019, which was higher than that in 2008 with IDR 316,949 (BPS Sigi, 2020). Figure 1 shows the number of poor people in the Sigi Regency from 2015 to 2019.

Figure 1. Number of Poor People in Sigi Regency from 2015 to 2019
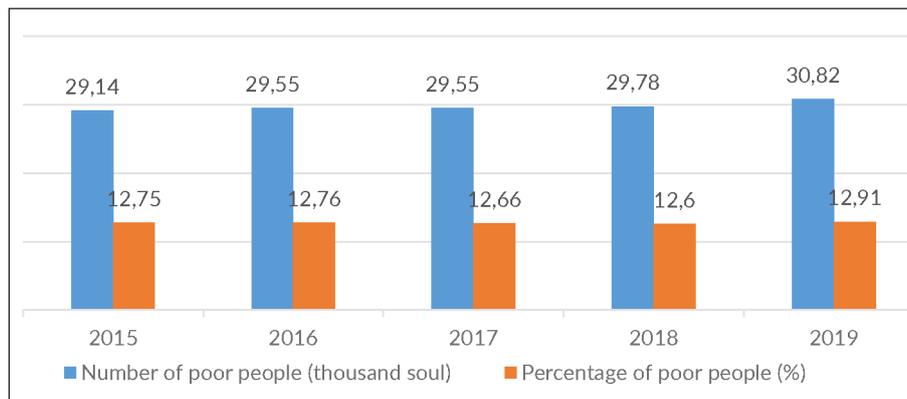
Micro, Small, and Medium Enterprises (MSMEs) are one of the economic sectors that significantly contribute to Indonesia's macro economy. The MSMEs are among the sectors in Sigi's economy affected by the disaster that need recovery support. Daly et al. (2020) argue that the main problem MSME entrepreneurs face is the lack of capital support. The root of the problem is that poor people do not have collateral that meets banks' credit access requirements (Rusydiana & Devi, 2016). As such, those underprivileged MSME entrepreneurs cannot access formal financial services (Suratini, 2018). Arifin & Anwar (2021) further added that long-term support

in capital injection for post-disaster economic recovery is greatly anticipated among MSMEs entrepreneurs.

Zakat has substantially supported the economic recovery from natural disasters alongside aid from the government and other non-government organizations (NGOs) (Esawe et al., 2019). Hoque et al. (2015) and Ibrahim (2015) noted that a zakat is a powerful tool for socio-economic community empowerment and poverty alleviation (Ali & Hatta, 2014). Some countries have contextualized such practices, e.g., Jordan and Sudan (Bilo & Machado, 2020); Nigeria (Adebayo, 2020; Kareem & Bankole, 2016); Pakistan (Aziz et al., 2020; Hasan & Ali, 2019); Indonesia (Rini et al., 2020; Sutrisno & Haron, 2020; Widiastuti et al., 2021), Brunei Darussalam (Jaelani, 2016; Masri, 2020), Malaysia (Ali et al., 2022; Razak, 2020), Egypt (Esawe et al., 2019) and Tunisia (Bouanani & Belhadj, 2020). Scholarly evidence has shown that zakat is an effective mechanism for achieving sustainable development by reducing social inequalities, increasing economic activity, and stimulating a country's growth (Jedidia & Guerbouj, 2021).

Victims of natural disasters are among the poor and needy (Sulistyowati, 2018). Hence, the zakat distribution for them follows the Sharia (Islamic law). The administration of zakat in Indonesia is regulated by Law No. 23 of 2011, allowing distribution for consumptive and productive purposes. Studies have shown that productive zakat distribution can turn a mustahiq into a muzakki. Furqani et al. (2018); Ladiku et al. (2021); Kholis & Mugiyati (2021) found that the productive use of zakat, e.g., capital lending strategy, the provision of labor tools, among others, has helped reduce the poverty of the mustahiqs as sampled in their studies.

Furthermore, Najmudin et al. (2021) performed quantitative work with evidence from Pandeglang Regency, suggesting that productive zakat distribution for MSMEs entrepreneurs positively increased the well-being of the Mustahiq. The study explained that the sampled mustahiqs experienced increased income and better fulfilling their needs after receiving such productive zakat. The findings supported previous works, e.g., Damanhur et al. (2017), Mayes et al. (2017), Romdhoni (2018), Hamidi et al. (2019) and Rini et al. (2020), who found a positive impact on the productive zakat's effects on increasing recipients' income and economic capability. Further evidence from Nurzaman (2016) and Wardani & Al Arif (2021) shows the impact of productive zakat on the Human Development Index (HDI). Their studies have found that zakat positively correlates with economic growth, particularly in reducing poverty and income inequality. Similarly, Rahmat & Nurzaman (2019), Khasandy & Badrudin (2019), and Pasha & Pratama (2021) found a positive effect of zakat on recipients' education, with a small impact on their health and lifetime productivity.

Islamic microfinance institutions effectively reduce poverty and improve the well-being of the disadvantaged community (Fianto et al., 2019; Nurhayati et al., 2020). Yumna & Clarke (2019) explained that one benefit of zakat funds is the opportunity to support people experiencing poverty through microfinance programs. The Zakat fund is designed to provide initial capital. This capital is a long-term business aid for mustahiq, which can turn the long-term goal of zakat in transforming the mustahiq into muzakki

(Adnan et al., 2019). Sabiti & Effendi (2017) stressed that zakat could be the right tool for micro-enterprises, especially in rural areas, as it positively impacts micro-enterprises and boosts the village economy. Widiastuti et al. (2021) explained that such a method has a significant long-term impact on poverty reduction compared to consumptive zakat. Therefore, the empowerment of zakat microfinance increases the effectiveness of zakat, not only in following Islamic principles but also in contextualizing zakat to be adaptable in responding to the recent issues of poverty.

While the existing studies on zakat and poverty alleviation have overstated the impact of zakat with material indicators, a study that takes a comprehensive view of understanding the impact of zakat on both the material and the spiritual remains insignificant. The Social Welfare Law No. 11 of 2009 requires the government to meet the material, spiritual and social needs of citizens to live decently and develop personally as citizens. That is, the influence of zakat on material and spiritual aspects is considered crucial for scholarly investigation.

The CIBEST model was developed in 2015 by IPB University experts to measure zakat's material and spiritual effects. The CIBEST model consists of four indices; 1) the Welfare Index, 2) the Material Poverty Index, 3) the Spiritual Poverty Index, and 4) the Absolute Poverty Index, representing the Islamic concept of poverty and welfare (Beik & Arsyianti, 2015). Previous studies that have used the CIBEST model, e.g., Maulidia & Mukhlis (2021); Beik & Arsyianti (2016); Nurzaman et al. (2017); Ayuniyyah et al. (2018); Ayyubi & Saputri (2018); Tolkah (2019); Rijal et al. (2020); Fathoni et al. (2021), have shown that zakat can improve mustahiq's material and spiritual well-being. However, their studies were limited to the CIBEST model analysis and did not consider post-disaster evidence. This paper aims to fill such knowledge gaps by measuring the impact of zakat distribution by BAZNAS Microfinance Desa (BMD) Sigi in an area where a natural disaster occurred in 2018.

Microfinance institutions are one of the best ways to improve the living standards of poor people and promote economic growth by providing them with credit and training to startup businesses (Azmi & Thaker, 2020). This business model aims to train mustahiq's entrepreneurial skills and responsibilities to repay the principal loan. Therefore, a mustahiq is expected to be gradually improved into a bankable group with financial access to growing the business (Wijayanti et al., 2021). The BMD Sigi is a kind of such institution that significantly contributes to actualizing financial inclusion among disadvantaged MSMEs entrepreneurs, e.g., providing access to capital for victims of natural disasters, specifically micro-business entrepreneurs.

Although the studies discussed above have explored the impact of zakat on improving people's well-being, limited studies have been conducted to analyze the impact of the productive distribution of zakat on MSMEs entrepreneurs in disaster-hit areas. This study shall complement the differences in the results of previous studies by analyzing the impact of BMD Sigi's capital assistance on mustahiq's well-being in the Sigi Regency following the September 2018 natural disaster. This point draws the critical novelty that this work contributes to academia. Using the CIBEST model followed by qualitative

observation is vital to understand the impact of such productive zakat distributions for MSMEs entrepreneurs in a post-disaster area.

METHOD

To measure the impact of productive zakat distribution by BMD Sigi, this study used a mixed method approach that combined qualitative and quantitative approaches (Creswell, 2013). This study first employed CIBEST analysis to generate quantitative evidence of such productive zakat impacts, followed by qualitative observation to understand the facts behind the quantitative results.

The research site was in Sigi Regency, Central Sulawesi Province, Indonesia. The population was 250 families, i.e., the beneficiaries of micro-enterprise capital from BMD Sigi in 2019. BMD Sigi is a non-profit microfinance institution that facilitates access to capital for micro-entrepreneurs. It was established on April 11th, 2019 in Sigi Regency, Central Sulawesi. BMD Sigi's mission is to provide micro-enterprises with access to finance, provide business development services and support business capacity building through training, workshops and other similar activities. Being a non-profit institution, BMD Sigi focuses on adding value to the institution through a funded business development strategy, not on funding services. BMD Sigi provides funds to the victims of the natural disaster in 2018 for entrepreneurial aims. Each business group consisted of 10 sponsored members. One member of each group is required to be an MSMEs entrepreneur. The sample of this study considered 100 families as grounded by a simple random procedure. The data collection was performed from 2020 to 2021.

This work used primary data collected through questionnaires and interviews for CIBEST analysis. The variables of this study consisted of the independent variable, i.e., zakat-based business capital, and the dependent variable, i.e., mustahiq's well-being. Table 1 describes the indicators as applied in the CIBEST model.

Table 1. CIBEST Indicators

Variable research	Dimension	Indicator
Zakat-Based Business Capital (X)	Business Capital, Training, Assistance, Business supervision to the mustahiq	Quadrant I: Rich materially and spiritually
Mustahiq Welfare (Y)	Material aspects: household income below the poverty line per capita per month Spiritual aspects: prayer, fasting, zakat, infaq/alms, family environment, and government policies	Quadrant II: Materially poor and spiritually rich Quadrant III: Materially rich and spiritually poor Quadrant IV: Materially and spiritually poor

Source: Primary data processed (2021)

This study used two datasets to analyze poverty. The first is household income data before receiving zakat, and the second is household income data after receiving zakat. Income data before and after receiving zakat was collected using a questionnaire completed by mustahiq BMD Sigi one year after joining the microenterprise capital scheme. Also,

two datasets were used for the analysis of spirituality, i.e., data on spiritual aspects before and after receiving zakat from questionnaire. The mustahiq's material income data and spiritual aspects data before and after receiving zakat assistance were then analyzed using the CIBEST model, which includes the Welfare Index, Material Poverty Index (MV), Spiritual Poverty Index and Absolute Poverty Index (Beik & Arsyianti, 2015).

Household incomes that are below the MV value are further classified as materially poor. Conversely, households above the MV value are classified as materially wealthy. The results of the MV calculation are shown in table 2. The MV calculation results show that *mustahiq* households with income below IDR 1,378,524 per month were categorized into materially low-income families.

Table 2. Material Poverty

Districts	Total population (people)	Number of households (H)	PL / capita / month	Average H	MV /H/month
Sigi	239.420	56.308	344.631	4	1.378.524

Source: primary data processed (2021)

The fulfillment of spiritual needs is calculated based on five variables in the indicator of spiritual needs. The Likert scale was used to assess the score on each variable. Table 3 shows the indicators of spiritual measurements.

Table 3. Spiritual Needs Indicator

Variables	Likert Scale					Poverty Standart
	1	2	3	4	5	
Prayer	Blocking others to pray	Against the concept of prayer	Performing obligatory prayer but not regularly	Always performing obligatory prayer but not in congregational prayer	Performing congregational prayer for obligatory one and performing recommended prayer	
Fasting	Blocking others to undertake fasting	Against the concept of fasting	Not fully performing obligatory fasting	Performing only obligatory fasting	Performing obligatory fasting and recommendable fasting	The average score for spiritually poor households is equal to 3 **(SV=3)**
Zakat and Infak	Blocking others to pay zakat and infaq	Against the concept of zakat and infaq	Not paying infaq at least once a year	Paying zakat fitrah and zakat maal	Paying zakat fitrah, zakat maal, and infak	
Household Environment	Forbid ibaadah	Against implementation of ibaadah	Consider ibaadah as a private matter for a household member	Support execution of ibaadah	Creating an environment that obligates the execution of ibaadah	
Government Policy Environment	Forbid ibaadah	Against implementation of ibaadah	Consider ibaadah as a private matter	Support execution of ibaadah	Creating an environment that obligates execution of ibaadah	

Source: Beik & Arsyianti (2015)

The average score for spiritually poor households is 3 (SV=3) based on the table above. Therefore, mustahiq households with an SV score of 3 or less are categorized as spiritually poor. Following the calculation of the MV and SV values, the number of families in each CIBEST quadrant can be seen. Finally, the actual combination of MV and SV values is arranged in Table 4.

Table 4. Combination of MV and SV Value

Results	$\leq$ MV value	> MV value
> SV value	Spiritual rich, material poor (Quadrant II)	Spiritually rich, materially rich (Quadrant I)
$\leq$ SV value	Spiritually poor, materially poor (Quadrant IV)	Spiritual poor, material rich (Quadrant III)

After the sampled households are categorized into the CIBEST quadrant, the welfare index, material poverty index, spiritual poverty index, and absolute poverty index are further executed using the following formula in Table 5.

Table 5. CIBEST Index Formula

CIBEST Index	Formula	Description
Material Poverty	$Pm = \dfrac{Mp}{N}$	Pm = material poverty index; $0 \leq Pm \leq 1$ Mp = number of families who are materially poor but spiritually rich N = total population (observed households)
Spiritual Poverty	$Ps = \dfrac{Sp}{N}$	Ps = spiritual poverty index; $0 \leq Ps \leq 1$ Sp = number of families who are spiritually poor but materially rich N = total population (observed households)
Absolute Poverty	$Pa = \dfrac{Ap}{N}$	Pa = absolute poverty index; $0 \leq Pa \leq 1$ Ap = number of families who are spiritually and materially poor N = total population (observed households)
Welfare	$W = \dfrac{w}{N}$	W = welfare index; $0 \leq W \leq 1$ w = number of prosperous families (materially and spiritually rich) N = Total population (observed households)

Source: Beik & Arsyianti (2015)

RESULT AND DISCUSSION

Respondents in this study were 100 households as zakat recipients of micro-enterprise capital assistance initiated by BMD Sigi, with 66% of those households comprising 4-6 family members. The respondents were 90% male and 10% female. The age of the respondents was in the range of 21–80, with respondents in the 36–50 age range representing the majority (43%) of the total respondents. The majority (89%) of respondents are married. Regarding education, most of the respondents (33%) graduated from high school. The majority of the respondents (38%) are farmers. Table 6 details the characteristics of the respondents sampled in this study.

Table 6. Demographic Characteristics of Respondents

Characteristics	Total	Percentage (%)
Gender		
Male	90	90%
Female	10	10%
Age		
21 – 35 years	20	20%
36 – 50 years	43	43%
51 – 65 years	34	34%
66 – 80 years	3	3%
Marital status		
Marry	87	87%
Not married yet	1	1%
Divorced	5	5%
Death divorce	7	7%
School		
No school	9	9%
Elementary school	30	30%
Junior high school	25	25%
Senior high school	33	33%
Diploma/Bachelor	3	3%
Type of Business/Job		
Employee	4	4%
Trader	17	17%
Farmer	38	38%
Laborer	8	8%
Craftsman	5	5%
Sew	3	3%
Other	25	25%
Number of family members		
1 – 3	28	28%
4 – 6	66	66%
> 6	6	6%

Source: primary data processed (2021)

The first calculation of the CIBEST Welfare Index is to measure the material value (MV). This material value measures the condition of the mustahiq material, which is measured based on household income. The MV calculation is performed before and after the mustahiq receives the zakat aid.

BMD Sigi facilitates mustahiq's access to IDR 2,000,000-3,000,000 as business capital. The institution also supports MSMEs entrepreneurs' business improvement through coaching, workshops, and monitoring. After receiving the business capital support, there was a significant change in mustahiq's income. Analysis of material indicators shows that BMD Sigi's business capital support has a positive impact on mustahiq's household income. Table 7 informs the changes in mustahiq's median income.

The median income of a mustahiq household before receiving the assistance was IDR 2,980,700 and after receiving the aid was IDR 4,035,700. This shows an increase in operating profit revenue with an average change of 35.39% or IDR 1,055,000. This is evident that the productive zakat distribution of BMD Sigi for capital support has a positive impact on mustahiq's business income. This result is consistent with Arifin & Anwar (2021) who found that productive zakat could increase economic income of mustahiq after a disaster, and with Najmudin et al. (2021) who found the same outcomes for MSME entrepreneurs after the Sunda Straits tsunami disaster in Pandeglang Regency. This finding is also confirmed by Furqani et al. (2018); Ladiku et al. (2021); Mayes et al. (2017); Hamidi et al. (2019); Romdhoni (2018); Rini et al., (2020); Jedidia & Guerbouj (2021), who found that the productive-based zakat distribution for business capital effectively increases MSMEs income and thus improves the quality of life of those disadvantaged MSMEs.

Table 7. Average Income Change Mustahiq

Average income of mustahiq (IDR)		Average change (IDR)
Before receiving Capital assistance	After receiving Capital assistance	
2,980,700	4,035,700	1,055,000

Source: primary data processed (2021)

The second step of the CIBEST Welfare Index is to measure Spiritual Value (SV) pre and post receiving the assistance. This SV assesses the mustahiq's spiritual state based on several indicators, such as the practice of worship (prayer, fasting, zakat and infaq), the family environment and the local government policies. A Likert scale from 1 to 5 was used for the study. The higher the scores, the better the spirituality and vice versa the lower scores. In general, this study finds a 10% increase in SV from the sample, indicating that the zakat distribution has affected the spirituality of the beneficiaries. Table 8 shows the result of the second step of measuring the CIBEST Welfare Index.

Table 8. Mustahiq Household Spiritual Score Average
Before and After Receiving Business Capital Assistance

| Variable	Average Spiritual Score		Change
	Before	After	Percent (%)
Prayer	3,59	3,98	9,8%
Fasting	3,77	4,11	8,3%
Zakat and infak	3,95	4,45	11,2%
Household environment	4,02	4,47	10,1%
Government policy environment	3,97	4,45	10,8%
Average spiritual score of the total observed household	3,86	4,29	10%

Source: primary data processed (2021)

Prior to receiving zakat aid, mustahiq households had an average spiritual score of 3.86. After receiving business capital support from BMD Sigi, the average spiritual score

rose to 4.29. This increase was previously supported by Maulidia & Mukhlis (2021); Beik & Arsyianti (2016); Nurzaman et al. (2017); Ayuniyyah et al. (2018); Ayyubi & Saputri (2018); Tolkah (2019); Rijal et al. (2020); Fathoni et al. (2021), who found that zakat distribution for productive purposes is associated with the increase in spirituality of mustahiq households.

The material value (MV) and spiritual value (SV) above demonstrate that productive zakat distribution by BMD Sigi positively affects the material and spiritual needs of the mustahiq households following the 2018 Sulawesi natural disaster. The CIBEST quadrant analysis was further carried out. There are four quadrants in CIBEST, i.e., quadrant I (material and spiritual needs are met), quadrant II (materially poor), quadrant III (spiritually poor) and quadrant IV (absolutely poor or materially and spiritually poor). The CIBEST quadrant of current MV and SV is shown in Figure 2.

Figure 2. CIBEST Quadrant Before and After Receiving Business Capital Assistance
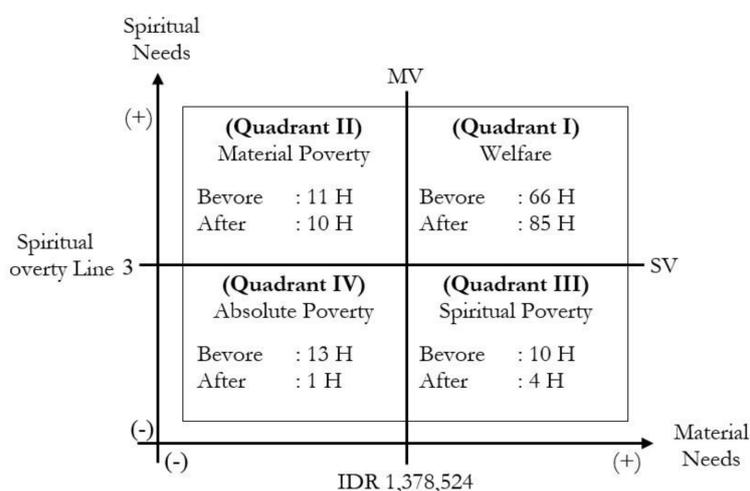
Source: primary data processed (2021)

Before receiving capital support from zakat fund, the difference in the number of mustahiq households in quadrant I compared to other quadrants is quite significant. Figure 2 illustrates that up to 66 (out of 100 households) have their material and spiritual needs met. In the wake of receiving the capital support, the number grew to 85 mustahiq households. In quadrant II, the number of materially poor households was 11 prior to receiving the assistance, which was further decreased to 10 families after receiving the assistance. In quadrant III, the number of spiritually poor households prior to receiving the aid was 10 and further decreased to 4 families after being assisted with zakat fund. In quadrant IV, the number of absolutely poor households was 13, which decreased to 1 family after receiving capital assistance from zakat. These results are in line with Maulidia & Mukhlis (2021); Beik & Arsyianti (2016); Nurzaman et al. (2017); Ayuniyyah et al. (2018); Ayyubi & Saputri (2018); Tolkah (2019); Rijal et al. (2020); Fathoni et al. (2021). In detail, the change in the CIBEST quadrant percentage in terms of pre and post receiving zakat assistance for productive purposes is explained in Table 9.

**Table 9. Percentage Change in Number of Mustahiq Households
Before and After Receiving Capital Assistance**

Quadrant	Number of Households *Mustahiq* (H)		Change
	Bevore	**After**	**Percent (%)**
Quadrant I (Welfare)	66	85	19 %
Quadrant II (Material Poverty)	11	10	-1%
Quadrant III (Spiritual Poverty)	10	4	-6%
Quadrant IV (Absolute Poverty)	13	1	-12%

Source: Primary data processed (2021)

Qualitative Observation

Direct observation was conducted during the survey for the CIBEST analysis, using unstructured interviews with respondents. This move has allowed us to better understand the facts behind the quantitative results in the CIBEST Index, as explained above. The BMD Sigi's model works to provide credit to support MSMEs entrepreneurs on a revolving basis. Recipients must repay the principal loan in monthly installments. The amount is adjusted to the turnover of the business income. BMD neither charges interest on loans nor does it impose penalties for late installment payments. Our unstructured interviews gained a critical insight on this particular issue, showing that such a practiced business model was really helpful for the sample households as they can avoid interest on debt loans.

Furthermore, direct observation has allowed us to understand that the BMD Sigi forms the team to supervise the mustahiq in managing their business. The guidance, monitoring and technical support is effectively carried out for 12 months. The information from the unstructured interview indicates that such supervision is beneficial for the mustahiqs to understand the technical and practical aspects of managing MSMEs business, e.g., cash-flow management, and leadership organization, among others. That is, such supervision is key to the success of asnaf entrepreneurship programs. Aside from this, our interview has revealed critical understanding of the respondents regarding their spirituality. The assistance contributed by the BMD Sigi is not only to be advantaged financially, but also spiritually beneficial. This is evident from our face-to-face talk with the respondents, expressing their thoughts that the disaster was the test from the Almighty.

Furthermore, direct observation has allowed us to understand that the BMD Sigi forms the team to oversee the mustahiqs in conducting their business. The guidance, supervision and technical support is effectively carried out for 12 months. The information from the unstructured interview shows that such monitoring is beneficial for the mustahiqs to understand the technical and practical aspects of running MSMEs business, e.g., cash flow management, managerial organization and others. That said, such oversight is key to the success of asnaf entrepreneurial programs. Apart from that, our interview revealed a critical understanding of the interviewees regarding their spirituality. The assistance provided by the BMD Sigi was not only be financially beneficial, but also emotionally advantageous. This is evident from our personal conversations with respondents, that they expressed their thoughts upon the disaster happened as test from the Almighty.

CONCLUSION

Zakat fund has a proven long-term benefit if it is directed for productive venture capital on a rolling basis, followed by coaching, monitoring, and business assistance for the mustahiq. This study has gained scholarly evidence for this claim from 100 respondents of BMD Sigi's zakat recipients. This study found that this institution's productive zakat distribution program, which provides capital support, positively impacted mustahiq's household income with an average increase of 35.39%. It also positively affects mustahiq's spirituality, with a 10% increase after gaining business support. Specifically, the CIBEST quadrant in our study shows a 19% growth in Quadrant I (material and spiritual well-being), a 1% decrease in Quadrant II (material poverty), a 6% decrease in Quadrant III (spiritual poverty), and a 12% decrease in quadrant IV (absolute poverty). This evidence is essential to explain the contribution of zakat to improving the well-being of disadvantaged MSME entrepreneurs in a post-disaster area.

The findings of this paper imply that the government should implement policies that support zakat institutions in maximizing their role. The government can fully support zakat-based Islamic microfinance institutions with a proven track record of helping the community by providing people experiencing poverty with easy access to micro-enterprise capital. In addition, BMD Sigi can increase the number of target groups and new Mustahiq while expanding the service area to other disaster-hit places in Donggala Regency and Palu City, considering that the disaster victims, in particular, MSMEs entrepreneurs in the region still need capital support.

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Preferences for Donating to Religious and Non-Religious Philanthropic Institutions: Evidence in Indonesia

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Abstract

This research aims to determine the factors influencing online donation decisions in religious and non-religious philanthropic institutions. 105 questionnaires were disseminated to the respondents in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi), Indonesia, and analyzed using logistic regression. The findings reveal that in religious philanthropic institutions, the impact has a significant effect, while ease of use, convenience, and innovation have no effect on online donation decisions. In non-religious philanthropic institutions, convenience, innovation, and impact have a significant effect, while ease of use has no effect on online donation decisions. There is a slight difference in factors influencing online donation decisions in religious and non-religious philanthropic institutions. Religious philanthropic institutions should expand their impact to raise their donors. Meanwhile, non-religious philanthropic institutions should improve the quality of their digital platform and expand the innovation and impact of the programs to increase their donors.

Keywords:

ease of use; convenience; innovation; impact; online donation decision

INTRODUCTION

Islam has taught us to share and help fellow human beings. Sharing is a form of worship and a reflection of the values of compassion and humanity. Sharing can be material or non-material. In Islam, sharing in the form of material is closely related to zakat, infaq, alms, and waqf. Sharing or giving something to others can be interpreted as donating. A donation is a form of blessing from others voluntarily without expecting any strings attached or profit. Usually, donations are made for social causes through food, clothing, money, and others.

Institutions that support donations are called philanthropic institutions. Philanthropy is an activity aimed at social and voluntary activities for the benefit of the public. Philanthropy is a religious doctrinal process of doing good. Cohen (2005) said that not all teachings in philanthropy are based on religion but on compassion and humanity. According to Thomas H. Jeavous in Widyawati (2011), four essential elements of religion encourage its adherents to do philanthropy sincerely: First, religion has a doctrine that encourages its followers to give to those less fortunate. Second, religious institutions act as both recipients and sources of gifts. Third, religion has a significant influence on the formation of philanthropic institutions. Fourth, religion can play a role in creating social space for philanthropic activities and institutions.

Philanthropic institutions are used as bridges for kindness and help reduce disparities between the rich and the poor (Tamin, 2011). Philanthropic institutions significantly reduce inequality, especially in essential issues (Tamin, 2011). Many philanthropic institutions have emerged in Indonesia, both religiously and non-religiously based. Religious-based philanthropic institutions include BAZNAS, LAZIS NU, LAZIS MU, Dompet Dhuafa, etc. Meanwhile, non-religious-based philanthropic institutions include Kitabisa.com, Ayopeduli, Gandeng Tangan, etc.

Figure 1. Highest Scoring Countries in 2020
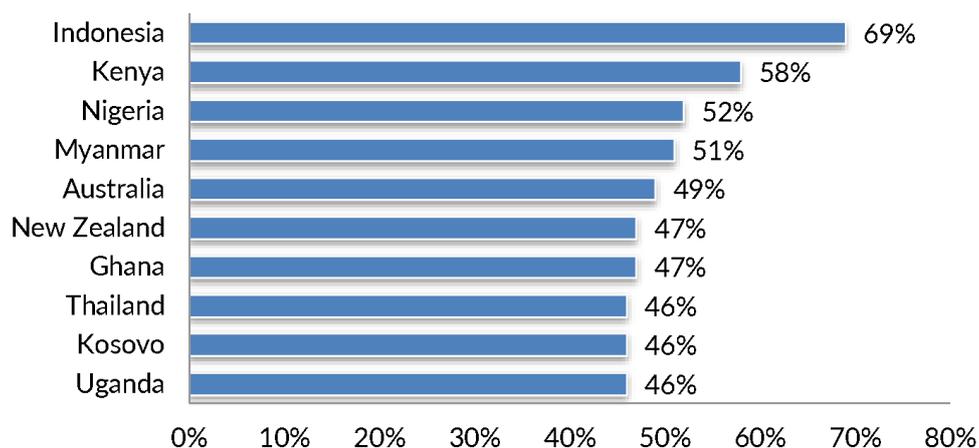
Source: World Giving Index, 2021

Figure 1 shows the world giving index for 2020. According to the World Giving Index 2020, Indonesia has been one of the most generous countries with a score of 69%, followed by Kenya and Nigeria in the second and third positions at 58% and 52%. Myanmar and Australia were in the fourth and fifth positions with respective scores respectively of 51% and 49%, and the last position is Thailand, with a value of 46% (Charities Aid Foundation, 2021). Based on this, there is enormous philanthropic potential for developing crowdfunding institutions in Indonesia. Therefore, many non-profit institutions in Indonesia have survived to this day.

The rapid development of technology helps philanthropic institutions in an effective fundraising process. The potential for donations through technology is very promising, as evidenced by the increase in online donations yearly. With digital donations, the fundraising process will be faster and more effective. Therefore, many philanthropic institutions, such as OVO, Gopay, and LinkAja, cooperate with digital wallets to facilitate payment. The rise in internet users has been accompanied by the increase in digital wallet users. A survey conducted by APJII indicates a significant increase in internet users in Indonesia (see Figure 2).

Figure 2. Internet User Penetration 2019-2020 (Q2)
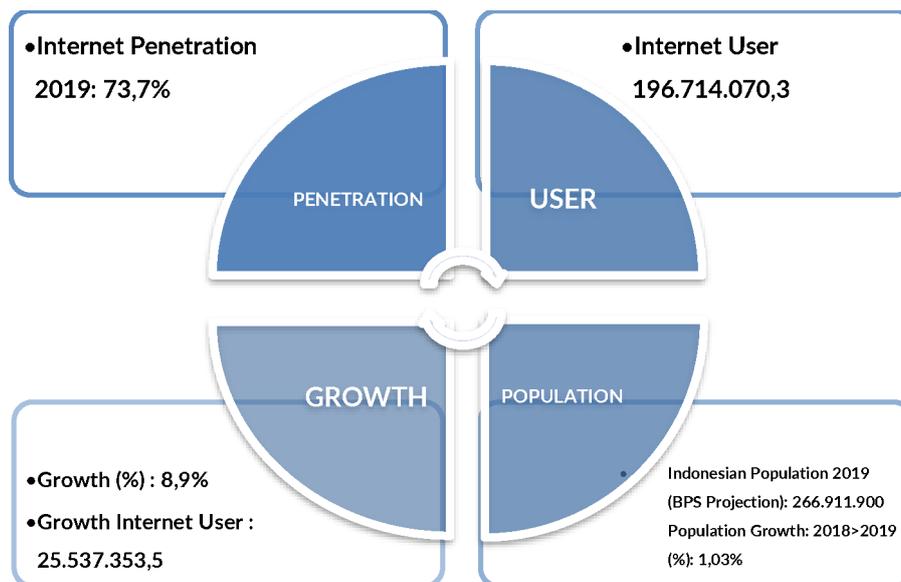
Source: APJII, 2020

It can be seen from the survey results that internet usage penetration reaches 73.7% and will continue to increase along with the increase in population and technological advances (APJII, 2020). The growth of internet usage and technology makes almost all sectors use technology, including the financial industry or fintech. Due to the widespread use of this technology, fintech is increasingly favored by the public.

Increased activity and online transactions will increase online trading, which can help philanthropic institutions raise funds. Based on Figure 3, payment holds the fintech

business category in Indonesia with a value of 39%, lending at 24%, 11% for aggregators and others, crowdfunding at 8%, and personal finance at 7% (Suleiman, 2018).

Figure 3. Financial Technology Business in Indonesia
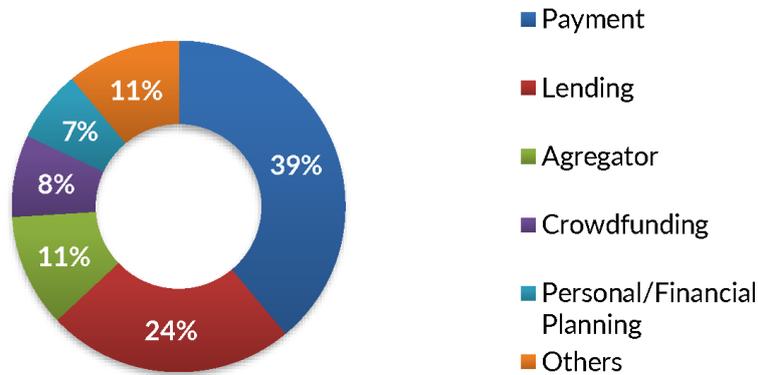
Source: Suleiman (2018)

With the rapid progress of financial technology, many philanthropic institutions have sprung up. More and more philanthropic institutions are raising funds, making a person more selective in choosing an institution to donate to, especially online donations. In 2019, the IDN Research Institute study featured some of Indonesia's most popular philanthropic institutions. It shows that Dompet Dhuafa is a philanthropic institution with the first rank as a place for online donations, followed by Ayopeduli, Kitabisa, Gandeng Tangan, and lastly, Peduli (IDN Research Institute, 2019).

Figure 4. The Donation Site Used by Millenials in 2019
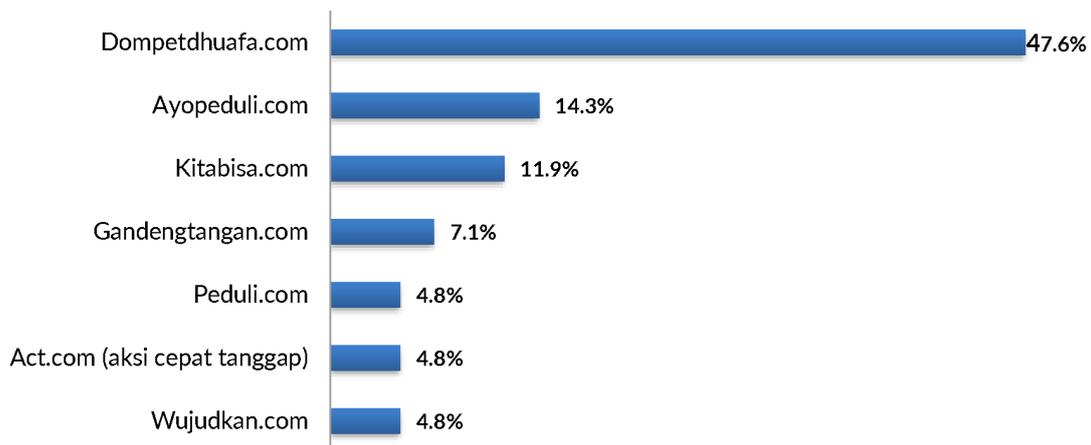
Source: IDN Research Institute (2019)

There have been some researches studying donors' behaviors using technology-related theories. One of them is Technology Acceptance Model (TAM). It is a theory that establishes two beliefs, namely perceived usefulness and perceived ease of use,

as determinants of attitudes toward behavioral intentions and the use of information technology (Davis, 1989). It is a model adapted from the model Theory of Reasoned Action (TRA), which is then adjusted to measure user acceptance of information systems (Asastani et al., 2018). The researchers use the perceived ease of use variable as one of the independent variables that will be analyzed as one of factors influencing the decision to donate.

Perceived ease of use refers to a user's willingness to use a system where they do not need to put any effort into it. The researchers believe that the higher the perceived ease of use of the technology, the higher the likelihood that the platform will be used (Prastiawan et al., 2021). Ease of use positively affects the intention and intensity of donors to donate through word funding (Li et al., 2018; Chen et al., 2019). However, Rohmah et al. (2020) stated that the ease of donating using fintech crowdfunding significantly negatively affects the intention to pay ZIS.

Other researchers are interested in other factors influencing intention or participation to donate. Shukor et al. (2017), Shatar et al. (2021), Kenang & Gosal (2021), and Won-jun & Lee (2018) analyzed the effect of convenience on cash waqf participation and online donation intention in crowdfunding. The convenience of a service is a judgment made by consumers according to their sense of control over the management, utilization, and conversion of their time and effort in achieving their goals associated with access to and use of the service (Farquhar & Rowley, 2009). Shukor et al. (2017) and Shatar et al. (2021) found that convenience has a positive effect on cash waqf participation, and Kenang & Gosal (2021) found that convenience has a positive effect on online donation intention in crowdfunding. However, different results were found by Won-jun & Lee (2018) that convenience has no significant effect on the intention to use Bitcoin fintech. He assumed that the respondents in his research might think convenience is a potential threat to their financial assets.

In another study, Hasna & Irwansyah (2019) analyzed the effect of innovation on the intention to donate to crowdfunding. Innovation is new invention that can be implemented and has beneficial impact. It is not an event or activity but a concept, process, practice, and capability that defines successful organizations (Serrat, 2017). Hasna & Irwansyah (2019) found that innovation was a determining factor influencing people to donate to crowdfunding, namely Kitabisa.com. The innovation will affect when a company innovates effectively and on target. Meanwhile, Wijaya et al. (2019) said that innovation could have positive or negative impacts.

One of the indicators that determine the success of a donation is the impact it causes—the more significant the impact caused by a donation activity, the greater the decision to donate. In addition to these factors, when someone donates, they will see who will receive the donation and the impact on society (Mubarokah et al., 2018). The tendency of Muslims to donate to religious institutions and organizations is relatively high. This aligns with the Muslim view that religious institutions and organizations are more trusted in distributing aid than non-religious institutions (Fauzia, 2010). However,

it cannot be denied that donations to non-religious philanthropic institutions continue to increase yearly, as experienced by Kitabisa.com. Until 2020, the number of donations received at the Kita Bisa Foundation has reached Rp. 835 Billion. Total donations have significantly increased since 2017, reaching only 103 billion (Aziz et al., 2019).

The findings of previous studies show differences in research results regarding the factors that influence interest, intention, and people's participation to donate, especially on the factors that are the focus of this study, namely ease of use, convenience, innovation, and impact. Most research analyzes the interest and intention to donate using fintech crowdfunding. No previous research analyzes the factors influencing people to donate online to philanthropic institutions, comparing religious and non-religious ones. Therefore, the study aimed to analyze the relationship between ease of use, convenience, innovation, impact and online donation decisions in religious and non-religious philanthropic institutions. The result of this study is expected to provide recommendations for philanthropic institutions to improve their strategy in collecting donations by considering the factors that influence people's decisions to donate online.

METHODS

This study used primary data by distributing questionnaires in Google Forms. The research population is people who live in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi), Indonesia. The Jabodetabek area was chosen as the research case study because there have been many religious and non-religious philanthropic institutions in this area that have a high potential for collecting donations. This study used the purposive sampling method, a sampling technique based on specific criteria. The specified criteria are people who live in Jabodetabek, are aged 15-64 years, have smartphones, and have donated to religious philanthropic and non-religious philanthropic institutions. Malhotra & Mukherjee (2004) argue that the number of samples in research that uses a questionnaire should be 4 or 5 multiples the number of question items. The number of questions in this research questionnaire is 21 questions. Therefore, the respondents in this research are 105 people.

The independent variables consist of ease of use (X1), convenience (X2), innovation (X3), and impact (X4), while the decision to donate (Y) as the dependent variable that forms the dummy is 1 to donate online in religious philanthropy and 0 to donate online in non-religious philanthropy. Table 1 explain the operational definition of each variable. Variables were measured using a Likert scale: one means strongly disagree, two means disagree, three means moderately agree, four means agree, and five means strongly agree. The data were analyzed using the statistical logistic regression method to determine the effect of the independent variable on the dependent variable. Logistic regression is formulated to predict and explain one categorical variable (Hair et al., 2010).

Table 1. Definition Variable

Variable	Operational Definition	Indicator
Ease of use	The degree to which a person believes using technology will be effort-free (Davis, 1989).	1. Easy to learn 2. Controlled 3. Clear and understandable 4. Flexible 5. Easy to be skilled 6. Easy to use
Convenience	Convenience orientation refers to the value given to the active search for a product to lead to personal convenience, saving time in certain activities (Ling et al., 2010).	1. Attractive website design 2. Ease of transaction processing 3. Speed in transaction processing
Innovation	Innovation can be defined as the development and practical improvement from an initial invention to a usable technique (process innovation) or product (product/ outcome innovation) (Rasyid & Indah, 2018; Kahn, 2018).	1. New product 2. Improved service performance 3. Offers innovation that is different from other platforms 4. Donation advertising innovation 5. Good governance (transparency and accountability)
Impact	Everything arising from an event or development within the community that makes a difference in either positive or negative effect on survival (Soekanto, 2005).	1. Impact on individuals 2. Impact on the community 3. Impact on society
The online donation decisions	People's decision to donate through religious and non-religious philanthropic institutions	Online donation decisions to religious philanthropy = 1 Online donation decisions to non-religious philanthropy = 0

The regression equation model for online donation decisions to religious and non-religious philanthropic institutions is as follows:

$$Y(1) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \qquad (1)$$

$$Y(0) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \qquad (2)$$

Where:

$Y(1)$: Online donation decision to religious philanthropy institution
$Y(0)$: Online donation decisions to non-religious philanthropy institution
$X1$: Ease of use
$X2$: Convenience
$X3$: Innovation
$X4$: Impact

RESULT AND DISCUSSION

Respondents in this study are people who live in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, Bekasi) and have donated to religious philanthropy and non-religious philanthropic institutions. Table 2 shows that 47 people live in Jakarta, 10 in Bogor, 13 in Depok, 27 in Tangerang, and 8 in Bekasi. Respondents were divided into four age groups. 14 people were aged less than 20 years, 83 people aged 21 to 30, 3 people aged 31 to 40, and 5 people aged more than 40. Respondents in this study have different profession, including 77 students, 8 teachers, 6 employees, 2 housewives, 10 entrepreneurs, and 2 other jobs.

Table 2. Demographic Respondents

Classification	Notes	Frequency	Percentage
Domicile	Jakarta	47	45
	Bogor	10	9
	Depok	13	12
	Tangerang	27	26
	Bekasi	8	8
Age	≤ 20 year	14	13
	21 – 30 year	83	79
	31 – 40 year	3	3
	> 40 year	5	5
Occupation	Student	77	73
	Teacher	8	8
	Employee	6	6
	Housewife	2	2
	Entrepreneur	10	9
	Other	2	2

Source: Primary Data (processed), 2021

Table 3. shows that the variables of ease of use, convenience, innovation, and impact had a VIF value smaller than 10 or a tolerance value of 0.10, which means no multicollinearity between independent variables.

Table 3. Coefficients

Variable	Religious Philanthropy		Non-religious Philanthropy	
	Tolerance	VIF	Tolerance	VIF
Ease of use (X1)	0.473	2.114	0.918	1.089
Convenience (X2)	0.359	2,786	0.733	1.365
Innovation (X3)	0.589	1,697	0.676	1.48
Impact (X4)	0.817	1,224	0.757	1.321

Source: Primary Data (processed), 2021

Based on Table 4, the significant value in the Hosmer table and Lemeshow test is 0.159 and 0.299, more than 0.05, proving that this data is suitable for logistic regression or fit use. The chi-square value is 10.554 and 8.391, which means the model used is good and can be continued to the next stage.

Table 4. Hosmer and Lemeshow Test

Type	Chi-square	df	Sig.
Religious Philanthropy	10.554	7	0.159
Non-religious Philanthropy	8.391	7	0.299

Source: Primary Data (processed), 2021

Table 5. shows that the results of block 0 had not been obtained - 2 logs of likelihood are 142.104 and 139.551. While in block 1, where after entering the independent variables, namely ease of use, convenience, innovation, and impact, the results obtained were -2 logs of likelihood are 125.816 and 106.834 smaller than 142.104 and 139.551. These results indicate that the regression model that used the independent variables resulted in more minor effects. This means the logistic regression involving the independent variables fits the data better.

Table 5. Iteration History

Religious Philanthropy		Non-religious Philanthropy	
Block 0	Block 1	Block 0	Block 1
142.104	125.816	139.551	106.834

Source: Primary Data (processed), 2021

Table 6. shows that the independent variables affect the dependent variables by 19.4% in religious philanthropic institutions and 36.4% in non-religious philanthropic institutions. At the same time, the rest was influenced by other variables not included in this study.

Table 6. Model Summary

Religious Philanthropy		Non-religious Philanthropy	
Cox & Snell Square	Nagelkerke R Square	Cox & Snell Square	Nagelkerke R Square
0.144	0.194	0.268	0.364

Source: Primary Data (processed), 2021

Table 7 shows that 38% of respondents prefer to donate online to religious philanthropic institutions, and 62% prefer to donate online to non-religious philanthropic institutions.

Table 7. Respondents' Preferences in Donating

Religious Philanthropy	Non-religious Philanthropy
40	65
38%	62%

Source: Primary Data (processed), 2021

Based on Table 8. the calculated Chi-Square value is 16.288 and 32.717, greater than the Chi-Square table of 14.860. The significant value is 0.000, smaller than 0.05. That means, simultaneously, the ease of use, convenience, innovation, and impact significantly positively affect online donation decisions in religious and non-religious philanthropy institutions.

Table 8. Omnibus Tests of Model Coefficients

Religious Philanthropy		Non-religious Philanthropy	
Chi-square	sig	Chi-square	Sig
16.288	0.003	32.717	0.000

Source: Primary Data (processed), 2021

Table 9 shows that the impact variable significantly affects online donation decisions to religious philanthropic institutions. Meanwhile, the variables ease of use, convenience, and innovation do not affect online donation decisions to religious philanthropic institutions. This finding implies that the donors in religious philanthropic institutions are more concerned about the impact of their donated funds. The productive management of zakat funds, which is often echoed by long-term impact of religious philanthropic institutions, such as distributing scholarships, providing business capital, empowering the people's economy, and building infrastructure for education and health facilities, is a factor that drives the donors' decisions to donate. The more significant the impact of raising donations will increase someone's decision to donate. When someone donates, they will see who will receive the donation and the impact on society (Mubarokah et al., 2018). This study supported the results of Fauzia (2010), who states that the tendency of Muslims to donate to religious institutions and organizations is relatively high. This aligns with the view of many Muslims that religious institutions seem to be the most suitable institutions to distribute their donation.

Table 9. Variables in the Equation (Religious Philanthropy)

	B	S.E.	Wald	df	Sig.	Exp(B)
Ease of use (X1)	-0.146	0.108	1.821	1	0.177	0.864
Convenience (X2)	0.103	0.267	0.15	1	0.699	1.109
Innovation (X3)	-0.136	0.106	1.639	1	0.200	0.873
Impact (X4)	0.331	0.1	10.867	1	0.001	1.392
Constant	-1.612	2.156	0.559	1	0.454	0.199

Source: Primary Data (processed), 2021

The donors do not pay attention to the ease of use and convenience of digital platforms owned by religious philanthropic institutions. Respondents who donate to religious philanthropic institutions are encouraged from within themselves and their ideology or beliefs. When they can fulfill their obligation to donate to religious philanthropic institutions, they feel they have been free themselves from their religious obligation. The deficiencies in the ease of use and convenience of donating can be overcome by their strong desire to fulfill their religious obligations by donating to religious philanthropic institutions. Neumayr & Handy (2017) states that religious attendance positively affects the number of donations. Religion also motivates giving because it enhances conviction (it shapes people's opinions about what is right and wrong, and hence people have a more significant concern for other people's wellbeing) and instills a sense of community and social context in which people are more aware of opportunities to give (Jamal et al., 2019). The results of this study are in line with the research of Rohmah et al. (2020), who stated that partially the ease of donating using fintech crowdfunding has no significant effect and has a negative relationship to interest in paying ZIS, and also Agustiningsih et al. (2021)'s study finding that ease of use does not affect users' intention to use fintech to pay donations. Likewise, Won-jun & Lee (2018) found that convenience did not significantly affect the intention to use financial technology.

In addition, matters of worship do not need much room for innovation. If innovation is carried out regarding the substance of worship, it can fall into heresy. This is based on the Islamic legal maxim of *Al-Asl fi Ibadah at-Tahrim, hatta yadullad dalil `alat tahliliha* (the origin of everything in worship is haram until there is evidence that justifies it). Innovations introduced by religious philanthropic institutions now are only at a technical level, such as strategies and methods for collecting and managing funds, not on matters of a substance nature, such as issues of nishab and haul of zakat. Donors are not too concerned with the innovation aspects of religious philanthropic institutions as long as they can fulfill their religious obligations to these institutions. Innovation would have an effect when a company innovates effectively and strategically. The innovation results can be positive or negative. The company's industry type significantly influences the company's innovation tendencies (Wijaya et al., 2019).

There is also a tendency to understand that worship must be accompanied by serious efforts, *jihad* (exerting tough efforts), because in worship, there are usually temptations that can distract from solemnity and the perfection of worship. This can be analogous to several other religious rituals, which indicate the need for *'jihad'* in fulfilling religious obligations, often accompanied by various obstacles and difficulties. Efforts to overcome deficiencies in the variables of ease of use, convenience, and innovation to donate online to religious philanthropic institutions are relatively simpler than *'jihad'* to face challenges in other worships, such as prayer (challenges to solemnity/*khusyu`*), fasting (challenges to control lust for eating, drinking, and other forbidden things), and hajj (challenges to perform hajj rituals within the crowded other pilgrims). Naturally, behind these various challenges of worship, many benefits and impact can be obtained. Praying can calm the heart; fasting can improve physical and spiritual health; hajj can erase sins and is

promised a reward in the form of going to heaven. Similarly, giving religious donation such as paying zakat, infaq, alms, and waqf, can provide assistance and benefits to fellow human beings, purify assets, provide blessings of sustenance, promote social sensitivity, empower vulnerable groups and even transform them from *mustahiq* (beneficiaries) into *muzaki* (donors), and contribute to develop the society and nation.

Table 10. Variables in the Equation (Non-Religious Philanthropy)

	B	S.E	Wald	Sig.	Exp(B)
Ease of use (X1)	0.016	0.077	0.044	0.833	1.016
Convenience (X2)	-0.463	0.216	4.599	0.032	0.63
Innovation (X3)	-0.155	0.075	4.279	0.039	0.856
Impact (X4)	-0.220	0.103	4.549	0.033	0.802
Constant	12.513	3.467	13.027	0.000	271967.76

Source: Primary Data (processed), 2021

Table 10 shows that the variables of convenience, innovation, and impact significantly affect online donation decisions to non-religious philanthropic institutions. Meanwhile, the variable ease of use does not affect online donation decisions to non-religious philanthropic institutions. This finding may be contributed by the fact that the donor profile is dominated by millennials. Respondents in this study were mostly aged 21 to 30 years. Millennials tend to be attracted to things that are instant and unique. Donating on digital platforms with a more attractive appearance and guaranteed speed in paying donations is deemed as more convenient. Most website designs or applications owned by non-religious philanthropic institutions are of good quality. This is supported by data from the GoPay Digital Donation Outlook, which concludes that one of the main reasons for donors to donate through crowdfunding platforms is the convenience factor supported by technology. This study also supports the results of research conducted by Kenang & Gosal (2021), which found that transaction convenience significantly affects the intention to donate to Kitabisa.com. Similarly, this study also confirms the results of research by Li et al. (2017), Chen et al. (2019), and Chen et al. (2021) state that convenience has a positive effect on the intention of donors to donate through crowdfunding in China.

Donation programs managed by non-religious philanthropic institutions tend to be short-term, such as helping victims of natural disasters, building infastructures struck by disasters, and treating life-threatening diseases. These donation programs are updated quite often. The renewal of managed donation programs requires non-religious philanthropic institutions to innovate continually, both in terms of the appearance of digital platforms and their advertising strategy. In contrast to the religious philanthropic institutions where innovation has no significant effect, innovation does have a significant effect on non-religious philanthropic institutions. This aligns with Hasna & Irwansyah (2019) research, which found that innovation was a determining factor influencing people to donate to crowdfunding, namely Kitabisa.com. The company's industry type significantly influences the company's innovation tendencies (Wijaya et al., 2019).

Donation programs in non-religious philanthropic institutions that are short-term in nature have an impact on people who receive donation assistance. The more donation programs, the more people will get help. Donations given can immediately benefit the beneficiaries. In addition, most donations in non-religious philanthropic institutions are needed quickly by people who need them, such as victims of natural disasters, infrastructures struck by disasters, and people who have life-threatening diseases. When someone donates, they will see who will receive the donation (Mubarokah et al., 2018). It is possible that this factor drives the decision to donate online at non-religious philanthropic institutions. In addition to religious and ideological factors, there are also human factors that inspire someone to donate.

Meanwhile, the variable ease of use does not affect online donation decisions in non-religious philanthropic institutions. It seems that the respondents, dominated by millennials, are quite familiar with digital platforms. They are relatively digital-savvy in nature. Even though the donation applications of non-religious philanthropic institutions may be not very user-friendly, donors can overcome it with their digital intelligence. This confirms the studies by Rohmah et al. (2020) finding that ease of donating using fintech crowdfunding has no significant effect on interest in paying ZIS, and that of Agustiningsih et al. (2021) indicating that ease of use does not affect users' intention to use fintech to pay donations.

CONCLUSION

This study found that impact significantly affects online donation decisions to religious philanthropic institutions. At the same time, ease of use, convenience, and innovation do not affect online donation decisions to religious, philanthropic institutions. In non-religious philanthropic institutions, the factors that have a significant effect are convenience, innovation, and impact. At the same time, the ease of use does not affect online donation decisions to religious philanthropic institutions. To increase donation collection, religious and philanthropic institutions should expand their impact by distributing donations through various productive and empowering programs that will bring positive social changes to the broader community. Meanwhile, non-religious philanthropic institutions can increase convenience by improving the quality of websites or applications used to communicate with donors, expanding the innovation such as program innovation and advertising innovation, and expanding the impact of the programs to increase their donors.

The philanthropy law will provide legal certainty and rules for philanthropy activities in Indonesia. This philanthropic law should protect actors involved in philanthropic activities, facilitate the licensing of philanthropic institutions, and provide space for the development of philanthropic institutions without eliminating the characteristics of each philanthropic institution. In the long run, there needs to be legal certainty regarding the role of religious and non-religious philanthropic institutions. The authors realize that this research has limitations. Future research can add other factors not studied in this

research and increase the number of respondents. Future research can also conduct in-depth interviews with religious and non-religious philanthropic institutions' representatives to analyze the challenges and obstacles they have faced in managing donations.

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Muslim Taxpayer's Preference: Paying Tax or Zakat

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Abstract

This research investigates the preferences of Muslim taxpayers between paying zakat or taxes. 119 Muslim taxpayers were recruited for online and offline survey studies. Factor analysis determines factors influencing Muslim taxpayer preferences between paying zakat or taxes. This study shows that Muslim taxpayers preferred to pay zakat rather than taxes. The faith factor has influenced Muslim taxpayers' preferences to pay zakat compared to paying taxes. Other factors include the level of compliance with obligations, the service quality factor for zakat management, the zakat knowledge level factor, the tax knowledge level factor, the religious practice factor, the Tax Services office service quality factor, and the tax benefit factor. From these results, it is expected that the government should evaluate tax policy that previously treated zakat only as deductible income to become a tax credit.

Keywords:

preference; zakat; tax; faith; muslim

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INTRODUCTION

Throughout the past decade, Indonesia has made significant strides in strengthening its tax system, both in terms of revenues collected, administrative efficacy, and adding other support-system in achieving government objectives such as poverty alleviation (Arnold, 2012). The government, in this case, the Directorate General of Taxes (DGT), continues to make various efforts to increase tax revenues. Developing a self-assessment system for tax collection is one of the measures now being taken by the government to improve tax income (Rizki, 2018).

Table 1. Percentage of Realized Tax Revenue

Year	2016	2017	2018	2019
Target	1.355.20	1.283.57	1.424.00	1.577.6
Realization	1.105.73	1.151.03	1.315.51	1.332.1
%	81.59%	89.67%	92.64%	84.4%

Source: LAKIN DJP 2018

Despite the government implementing a self-assessment system, Table 1 shows that the tax revenue has never met the target in the last four years (from 2016-2019); the realization that tax revenues do not reach a target which indicates that the potential for extracting taxes has yet to be optimal. Due to the lack of increased tax revenue, it is necessary to have other supporting instruments that can be used as a source of state revenue and efforts to increase tax revenue. One of these supporting instruments is zakat (Fajarudin, 2019). Zakat is one of the Islamic fiscal mechanisms and has played an essential part in Islamic economic development (Al Arif, 2013).

The social function of zakat lies in its main function of fulfilling basic human needs and supporting them (productive efforts) to the point of adequacy or social welfare (Abdullah & Suhaib, 2011; Saad & Al Foori, 2020). Apart from being an effort to empower people with low incomes, zakat also has an economic role and function, namely as an economic instrument (aggregate or overall) to stimulate or encourage economic activity. In the context of zakat as a stimulus, the distribution of zakat during a recession will encourage economic expansion. In addition, zakat is also an instrument that provides a significant multiplier effect on the economy (Al Arif, 2013).

The important role and function of zakat imply that Indonesia has the most significant number of Muslims in the world. Indonesia has great potential and opportunities in efforts to manage (collect and distribute) its zakat nationally. In these two contexts, the Government of Indonesia supports the management of zakat in Indonesia through Law Number 38 of 1999 concerning Zakat Management, which was updated to become Law No. 23 of 2011 concerning Management of Zakat. In this law, zakat is defined as property that must be issued by a Muslim or business entity to be given to those entitled to receive it according to Islamic law.

One thing that is underlined in the law is that it explicitly supports the management of zakat based on Islamic law. The law explains that zakat management is needed for two things, namely (i) increasing the effectiveness and efficiency of services in zakat management; and (ii) increasing the benefits of zakat to realize social welfare and reduce poverty. Even though, in the end, the management was handed over to an official body, namely the National Amil Zakat Agency or BAZNAS, the Indonesian Muslim community was also given the freedom to give zakat through zakat institutions outside BAZNAS or distribute it directly to the community.

Given the large Muslim population in Indonesia, the actual collection of zakat recorded in Indonesia is still far from its potential. The Indonesia's zakat potential could reach IDR 12 trillion (in 2009) to IDR 286 trillion (in 2015). Meanwhile, the realization of the zakat collection nationally by the official BAZ/LAZ, according to BAZNAS in 2015, amounted to IDR 3.7 trillion. The low realization of zakat from its potential and the consideration that Indonesia is a country with the largest Muslim population raised the issue of collecting national zakat values to the attention of the Government. With the existing conditions, Indonesia needs a holistic arrangement regarding the management of zakat to advance the management of national zakat and obtain optimal benefits from zakat as a socio-economic instrument. Meanwhile, regarding the existence of religious (zakat) and tax (legal) obligations, it creates a double burden on taxpayers, hindering the progress of zakat management.

On the other hand, faced with the issue of the existing zakat-tax double burden, the Government also resolved the issue through the existing taxation and zakat regulatory regime. This policy is represented at the law level through Law Number 36 of 2008 concerning Income Tax and Law Number 23 of 2011 concerning the Management of Zakat. In Law 36/2008, several sections explicitly mention zakat—namely, in article 4, paragraph (3). In this rule, zakat is equated as a religious donation, where zakat paid through the amil zakat institution (LAZ) or the amil zakat agency (BAZ) formed or authorized by the Government is an exempted item as a taxable object. Furthermore, the main thing is that this rule does not apply exclusively to the Indonesian Muslim community because basically, if there is a mandatory contribution for adherents of religions in Indonesia and it is paid through an official institution established or approved by the Government, then this is also excluded as a taxable object.

Meanwhile, in Law 23/2011, through articles 22 and 23, the Government seeks to address a policy that Muslim people who give tithes through official LAZ/BAZs formed or approved by the Government will receive incentives in the form of tax reductions. This means that zakat can be used as a deduction from gross income or taxable income (PKP), better known as a tax-deductible. Derivative regulations for this tax-deductible are Government Regulation of the Republic of Indonesia Number 60 of 2010 concerning Zakat or Religious Contributions that are Obligatory, which can be deducted from Gross Income, and Regulation of the DGT number PER-06/PJ/2011 concerning Implementation of Payments and Making Proof of Payment of Zakat. Furthermore, the implementation of the zakat policy as a tax-deductible by the Government is allegedly

less effective. BAZNAS, as an official institution appointed by the Government, 2019 reported the realization of zakat receipts of IDR 9.6 trillion with a total of around five million zakat payers. This zakat receipts have increased compared to the realization of zakat receipts in 2018, which only reached IDR 8.1 trillion (Direktorat Jenderal Pajak, 2020 at Kemenkeu, 2020b).

Meanwhile, it is suspected that the realization of actual zakat payments by the community is almost certain to be more significant. This is because not all people pay their zakat through official LAZ/BAZ appointed by the Government, such as BAZNAS. There are channels for channeling zakat besides the official LAZ/BAZ, namely mosque committees or directly to the nearest zakat recipient community (*mustahik*). On the other hand, according to the DGT, the value of zakat reported in the Tax Return or SPT, was only around IDR 685 billion in 2019, out of around 58 thousand taxpayers (Directorate General of Taxes, 2020 at the Ministry of Finance, 2020b). This figure increased significantly compared to the value in 2018, IDR 286 billion, with a total taxpayer of around 49 thousand.

The actual realization shows a large discrepancy between the realization of zakat from BAZNAS and the number of people who use zakat as a tax-deductible. This indicates problems in implementing the zakat policy as a deduction from gross income tax. The policy of zakat as a tax-deductible solution to the double burden of zakat and tax obligations and an effort to increase the realization of national zakat collection needs to be revised. This is reflected in the data gap (realization) that exists between the DGT and BAZNAS. In addition, the discrepancy between the achievements of the realization of zakat as a tax-deductible with the zakat collection data by BAZNAS also confirms that zakat collection in Indonesia is still not optimal and there is a high gap between zakat potential and the realization of zakat fund collection.

In contrast to the position of zakat in Indonesia, which is only used as a part of a cost component that can reduce net income, in Malaysia, zakat has been used as a direct deduction from income tax or as a tax credit. This policy minimizes and eliminates the double burden that Muslim taxpayers must bear. Interestingly, implementing zakat as a tax credit in Malaysia proves increasing zakat and tax revenues simultaneously after implementing the policy (Beik, 2008).

The third pillar of Islam, which must be adhered to by Muslims, consists of the institutions of zakat, the Islamic state, and the government (Nurhayati & Siswantoro, 2015). According to Wan Ahmed et al. (2008), the effect that customers' religiosity has on their decision-making, they discover that when the religiosity index is high, consumers are more likely to place the Islamic nature of the bank at the top of their list of criteria, regardless of whether or not any other considerations are involved. Based on Hasanah's research (2019) on saving preferences in Islamic banks, several factors behind customer preferences are divided into two: emotional and rational. Emotional factors are encouragement from within a person to decide something, in this case, to purchase a product based on subjective considerations such as feelings, pride, status, and self-esteem.

While the rational factor is a person's way of thinking decide something with common sense considerations.

Emotional factors are influenced by several things, namely, religiosity factors, psychological factors, and product attribute factors, while rational factors consist of several factors that allow a person to decide something reasonably, including the service factor, comfort, and satisfaction provided by the bank to customers (Mahdzan et al., 2022). In this case, to attract customers to save, there must be a good relationship between prospective customers and Islamic banking so that customers can assess the bank regarding rational and emotional factors (Puteri et al., 2022). Factors that may influence preferences are as follows: religiosity, Knowledge level, and service quality (Ancok & Suroso, 2011; Khasanah, 2014; Parasuraman et al., 1985).

According to Kotler (2000), consumer preferences show from the various choices of existing service products. Meanwhile, according to Mappiare (1994), preference is a mental device consisting of feelings, hopes, convictions, prejudices, fears, or other tendencies that direct individuals to a particular choice. So, preference is a person's tendency to choose something considered good and follow their principles and goals by considering certain factors and aspects. Furthermore, Amin (2017) introduced the theory-planned behavior in order to be able to anticipate the elements (such as religiosity and attitude) that affect customers' preferences in accordance with the Maqasid al-Shariah principles. Religiosity dimension influence the customers' preferences that need as based for evaluating regulation particularly in Muslim countries (Junaidi, 2021). Meanwhile, there are issue regarding zakat policies and their relationship with tax policies need attention which need public preferences. On the contrary, the implementation of zakat facilities as a deduction from taxable income or PKP (tax deductible) is not optimal which need to explore on the Muslim preferences in paying tax or zakat (Yusuf & Ismail, 2017).

Schiffman & Kanuk (2008) define *knowledge* as information stored in memory, and all information relevant to consumer needs in the market is called consumer knowledge. According to Kotler (2000), knowledge is a change in an individual's behavior from experience. Taxpayers have different levels of product knowledge, which can be used to interpret new information and make decision choices.

Based on the arguments above, this research examines the tendency of Muslim taxpayers to pay zakat and taxes. Thus, study result is also expected to reference the government's consideration making more appropriate policies to increase zakat and tax revenues and maximize the benefits of both zakat and taxes. Nowadays, the regulations for zakat and tax are considered not optimal and need to be adjusted, and synergy between taxes and zakat regulations. The results of this study are expected to complement the literature study on tax and zakat in Indonesia.

METHODS

This study analyzes the preferences of Muslim taxpayers between paying zakat or taxes. This study also measures factors that influence these preferences. In order to answer

the research questions, a statistical analysis of the respondents' responses to a questionnaire was partly inspired by Masood et al. (2009). Determination of the sample is done by using convenience sampling method. The questionnaire was given to 135 respondents in person or by email; the total number of returned and useable questionnaires was 119, which is a response rate of 88 percent, which is considered to be a high response rate. This study uses different test analyses and factor analyses. Different test analysis was carried out in order to find out whether there is a difference between the two samples tested, in this study is meant to see whether there is a difference between the preferences of people who choose zakat and the preferences of people who choose tax. While factor analysis is used to determine factors influencing Muslim taxpayer preferences between paying zakat or taxes, factor analysis is carried out. This factor analysis is done by analyzing the preexisting variables to become a new set of dimensions called factors.

The items used during measurement are stated in the Appendix. The respondents' demographics, including age, education, gender, income, and tax license, experience in paying tax, and zakat and religion, were also measured. The questionnaire encompasses a seven-point Likert scale anchored between 1 ("strongly disagree") and 5 ("strongly agree") for all scale items. Religiosity level adapted from Ancok & Suroso (2011), Knowledge level (Khasanah, 2014), service quality (Parasuraman et al., 1985), and taxpayer preference between paying taxes and paying zakat.

Table 2. Respondent Demographics

	Demographic Items	Frequency	Percentile (%)
Gender	Female	59	49.6
	Male	60	50.4
Age	< 25	66	55.5
	25 – 30	33	27.7
	31 – 35	10	8.4
	36 – 45	4	3.4
	46 – 50	4	3.4
	> 50	2	1.7
Job	Employee	73	61.3
	Entrepreneurs	20	16.8
	State Employee	6	5.0
	others	20	16.8
Income	3 – 5 million	60	50.4
	5 – 10 million	37	31.1
	> 10 million	7	5.9
	others	15	12.6
Tax identity	Have Tax Identity	119	100
	Do not have Tax Identity	0	0
Experience paying zakat	Have been paying zakat	119	100
	Have not been paying zakat	0	0

Source: Processed primary data

Table 2 shows respondent demographics, 59 respondents, or 49.6%, were male, and the remaining 60, or around 50.4%, were female. Most respondents were aged <25 years, namely 66 or 55.5%, of respondents aged 25-30 years, 33 respondents, or 27.7%. Respondents are aged 31-35 years, ten respondents or 8.4%. Respondents aged 36-45 and 46-50 were at the same number, four respondents or 3.4%, and respondents aged over 50 were two or 1.7%. Most respondents had jobs as private employees, namely 73 respondents or 61.3%. As many as 73 people, or 16.8%, have jobs as entrepreneurs, while as civil servants, as many as six people, or about 5%, and the remaining 20 people, or about 16.8%, choose other jobs. The majority of respondents have a total income of 3-5 million, namely as many as 60 respondents or around 50.4%, then 37 respondents, or 31.1%, have an income of 5-10 million, then respondents who have income above 10 million, seven respondents or around 5.9%, while 15 respondents the rest or 12.6% chose other amounts of income. All respondents are taxpayers and zakat payers.

RESULT AND DISCUSSION

The results of the observed variables with validity test, the variables used in this study are the level of religiosity (X1), level of knowledge (X2), service quality (X3), and taxpayer preferences (Y). The validity test results for all variable levels of religiosity, knowledge, service quality and taxpayer preferences have valid criteria for all question item. Furthermore, Cronbach's a and factor loading for all constructs were obtained to be greater than 0.70, demonstrating good reliability for all measurement items.

The results from the Pearson correlation analysis are shown in Table 3. It was carried out to determine its means to see whether there is a difference between the preferences of people who choose zakat and those who choose tax based on religiosity level, knowledge level, service quality, and taxpayer preference between paying taxes and paying zakat.

Table 3. Different test-Mann Whitney

	Preference
Mann-Whitney U	.000
Wilcoxon W	105.000
Z	-6.017
Asymp. Sig. (2-tailed)	.000

Source: Processed primary data

Based on the Mann-Whitney test, the result of the asymp. Sig. (2-tailed) of 0.000, it is smaller than the probability value of 0.05. This means there is a significant difference between the preferences of Muslim taxpayers who choose zakat and those who choose taxes (detail see Table 3).

Table 4. Preference Level

	Frequency	Percent	Valid Percent	Cumulative Percent
Agree	78	65.5%	65.5	65.5
Disagree	14	11.8%	11.8	77.3
Neutral	27	22.7%	22.7	100.0
Total	119	100.0%	100.0	

Source: Processed primary data

The result is shown in Table 4. Based on a cross-tabulation test to determine how many respondents agree that they prefer to choose zakat overtax. Muslim taxpayers preferences pay zakat compared to tax (78 respondents, or 65.5%. choose to pay zakat rather than tax). Meanwhile, 14 respondents, or around 11.8%, disagreed with prefer, prioritize, and prefer paying zakat over taxes. Furthermore, 27 other respondents, or 22.7%, chose neutral between paying zakat and taxes.

Table 4. Preference Level based on Gender

		Preference			Total	Cumulative Percent
		Agree	Disagree	Neutral		
Gender	Man	38	9	12	59	48,7%
	Women	40	5	15	60	51,3%
Total		78	14	27	119	100%

Source: Processed primary data

Based on gender, 40 women Muslim taxpayer prefer to choose paying zakat compared to man (38). This result in line with Croson & Gneezy (2009), women are more risk averse dan more responsive on social preferences than men, also found that women are more cooperative than men. The result also support by Miller & Hoffmann (1995) that Due to their social structural positioning and larger parental responsibilities, women tend to be more religious. These factors encourage women to participate in religion and strengthen their dedication to upholding religious requirements.

Table 5. Preference Level Based on Age

	Preference			Total	Cumulative percent
	Agree	Disagree	Neutral		
< 25	42	6	18	66	53,8%
25 – 30	20	6	7	33	25,6%
31 – 35	7	1	2	10	9,0%
36 – 45	4	0	0	4	5,1%
46 – 50	3	1	0	4	3,8%
> 50	2	0	0	2	2,6%
Total	78	14	27	119	100%

Source: Processed primary data

Based on the age of the respondent, the dominant age that chooses to agree to like, choose and prioritize paying zakat is in the age range <25 years, the percentage is 53.8%. Herzog & and Shier (2000) posit that building age and preference have a good relationship when building maintenance is controlled.

Table 5. Preference Level Based on Job

	Preference			Total	Cumulative percent
	Agree	Disagree	Neutral		
Private employee	42	11	20	75	53,8%
Entrepreneur	18	0	2	20	23,1%
State employee	6	0	0	6	7,7%
Other	12	3	5	20	15,4%
Total	78	14	27	119	100%

Source: Processed primary data

Based on the type of work, respondents with private types of work were more amenable to choosing to pay zakat, namely based on the percentage of private respondents around 53.8%. In preference studies in decision-making, gender has always been an important factor. Gender is one of the factors that have gained the attention of researchers. Many psychology and behavioral science studies have revealed that women were more cautious under ambiguity (Zhang et al., 2016). Regarding income, the younger group (those under 25 years old) was more adventurous than the other age groups. However, under loss, their level of adventure was lower than that of the other age groups (Zhang et al., 2016). Thus, young management personnel are more capable of learning and integrating all kinds of information. The results show interesting findings as the motivation for the regulator to evaluate tax and zakat togetherness that need to be considered based on the preference of Muslim taxpayers.

Tabel 6. Number of Extraction yield factors (PCA)

Total	% of Variance	Cumulative %
13.233	33.930	33.930
3.626	9.297	43.226
2.692	6.903	50.129
2.355	6.038	56.167
1.618	4.150	60.317
1.342	3.441	63.757
1.247	3.197	66.954
1.034	2.651	69.605

Source: Processed primary data

The result from factor analysis is the final result of the process carried out in factor analysis: sorting the factors from the most powerful influences in the preference of Muslim

taxpayers. The feasibility of factor analysis data is viewed by 3 values, which are KMO, MSA, and Bartlett Test. The value of KMO obtained is 0.818, which is more significant than 0.5, Bartlett's Test of Sphericity= 3294.204, and Bartlett's test sign= 0.000, so; it is said that the data is feasible.

Of the 39 extracted variables, 8 factors were formed, as shown in Table 6; of the 8 factors formed, it can be seen that all factors have an eigenvalue > 1, for example, in the total factor column 1 = 13,233 > 1. Of the 8 factors formed, they have a variant value of 69.605 percent. Furthermore, factor rotation will clarify the position of a variable by looking at the largest loading value without looking at (+) and (-). The result, through the rotated component matrix, is to sort the eight variables based on the factors that are the strongest in influencing the preferences of Muslim taxpayers to prefer zakat to taxes.

The faith factor ranks first in influencing a person to prefer paying zakat; the composite value of this factor is the largest among the other seven factors, equal to 4.61. These results show that the most substantial reason a person prefers to pay zakat is that his faith drives him, he realizes the importance of zakat for the life of the world and the hereafter, and he also realizes that Allah SWT will surely reward his good deeds (such as paying zakat). This result, in line with previous research, found a strong relationship between religion and consumer behaviour in a Muslim-dominated region, which affects consumers' preferences for and knowledge of items that adhere to Islamic law, such as zakat and Islamic banking (Bananuka et al., 2020; Junaidi, 2021; Kaakeh et al., 2019; Tabrani et al., 2018).

Table 7. Factors that Influencing Paying Zakat

No	Factors	Mean	Composit-value
1	Faith Factor	13.85	4.61
2	Compliance Level Factor with Obligations	27.62	4.60
3	Zakat Management Service Quality Factors	29.70	4.24
4	Zakat Knowledge Level Factor	16.88	4.22
5	Tax Knowledge Level Factor	25.18	4.19
6	Religious Practice Factors	16.68	4.17
7	Tax Services office Service Quality Factors	27.21	3.88
8	Tax Benefit Factor	3.82	3.82

Source: Processed primary data

The other factors that influence the preferences of Muslim taxpayers are: (i) the level of compliance with obligations. (ii) the factor of religious practice; (iii) the factor of quality of zakat management services; (iv) the quality factor of tax services office services, and; (v) the level of knowledge about zakat and taxes. The results of this study, it is known that some factors influence a person's preference for paying zakat or taxes; these factors are religious or religious factors such as faith, obedience, and religious practices,

then there are also other factors, such as quality of service and level of knowledge. This result also confirms that through customer awareness and attitudes, religion has a favorable impact on consumers' desire for Islamic banks (Junaidi, 2021). Sutomo et al also found that service quality had an impact on muzakki's satisfaction. Muktiyanto & Hendrian (2008) state that people preferred zakat as tax deductible rather than cost or expense deductible.

From the results, it was found that the preferences of Muslim taxpayers were to prefer zakat to choosing taxes. The reason was based on the analysis of the factors above that most influenced the preferences of Muslim taxpayers to prefer zakat because of the faith factor. Based on these results, it is hoped that there will be government considerations regarding the policy of the treatment of zakat on taxes which previously only served as a deduction from taxable income as contained in Law no. 23 of 2011, which reads "zakat paid by Muzakki to BAZNAS or LAZ is deducted from taxable income."

Another reason why the government should focus on paying attention to policies related to zakat and making zakat an instrument that can be compared with taxes is that currently, there are more than 229 million Muslim residents in Indonesia, which constitutes 87.2% of the total population in Indonesia and become the country in the world with the largest Muslim population. Moreover, based on joint research conducted by BAZNAS with various institutions, it is stated that the potential for zakat in 2020 will reach IDR 327.6 trillion. However, the realization has only reached IDR 71.4 trillion or around 21.7 percent.

With these various conditions, the government should maximize the potential revenue from the zakat sector. The current policy of treating zakat against taxes does not eliminate the dual obligations borne by Muslims but only reduces the tax burden owed. The Indonesian government can reflect on the State of Malaysia, which makes zakat a tax credit. The result is that this policy can simultaneously increase the income of both instruments (Beik, 2008). As mentioned in Purwatiningsih & Yahya's research (2020), in 2016, zakat collection in Malaysia almost reached RM 3 billion (Rp. 11.5 trillion) of the potential could be collected, namely Rp. 15 trillion. Malaysia managed to collect about 75% of its potential zakat funds. This is in contrast to Indonesia, which could only collect Rp. 5 trillion from the potential that should have been collected, namely Rp. 217 trillion. Indonesia can only collect ZIS funds of around 2.5% of the potential zakat that can be collected (Purwatiningsih & Yahya, 2020).

The government needs to consider with preferences of Muslims, which is easier to enhance the growth of products and services in financial and non-financial institutions. Early research also concluded that consumer attitudes are crucial in addressing the connection between religiosity, consumer preference and decision-making. Also, customers are loyal to goods that support Islamic principles (Amin et al., 2017; Kaakeh et al., 2019; Mortimer et al., 2020; Junaidi, 2020).

CONCLUSION

The results of Muslim taxpayer preferences between paying zakat and taxes show that more Muslim taxpayers agree to prioritize and prefer paying zakat rather than taxes. Through factor analysis, the following factors have been obtained that influence the preferences of Muslim taxpayers from those with the most significant influence, namely: Faith Factor, Obligation Compliance Level Factor, Zakat Manager Service Quality Factor, Zakat Knowledge Level Factor, Tax Knowledge Level Factor, Religious Practice Factors, Tax Services office Service Quality Factors, and Tax Benefit Factors.

This research can make a positive contribution to the government, namely related to making policies related to the payment of zakat and taxes so that revenue can be maximized and can reduce the burden of double payments burdened on Muslim taxpayers. From the preference results, it is known that Muslim taxpayers tend to choose zakat over taxes. For this reason, it is hoped that the government can renew its policy regarding the synergy of zakat and taxes from only a deduction from taxable income to a tax credit. It is hoped that it will increase zakat and tax revenues simultaneously, as has been done by the Malaysian government regarding its policy of making zakat a tax credit.

Several things that the government can do: (a) regulate the imposition of zakat on Muslims who meet the requirements (nishab); (b) regulation of the mechanism for the collection and collection of zakat by the zakat authority, accompanied by the ramification (type and expansion) of zakat collected; (c) setting the scope and cooperation of zakat distribution mechanisms that are integrated between BAZ or LAZ and the Government; and d) arrangements regarding the implementation of zakat on taxes are supported by a structured and clear coordination device that regulates the aspects required between the zakat authority and the tax authority.

Regarding tax governance, public preferences for literacy (understanding), faith (religiosity), collection methods, and sanctions that can encourage muzaki compliance in paying zakat and taxes must also be examined. Here there is a policy space on a certain scale in implementing the integration between zakat collection and taxes in a scheme that facilitates and, at the same time, becomes the basis of reference for the application of sanctions (both against taxes and zakat) in the process.

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Table 1. Quality of Life Index (Selected Countries)

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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