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Editorial Note

The New Capital and Urban Transformation in Indonesia

Bakti Setiawan

EDITOR

While various efforts to accelerate the development of the Indonesia New Capital/IKN in Kalimantan continue to be carried out, we must not forget the process and challenges of urban transformation faced by Indonesia. It is predicted that by 2045, around 75 percent of Indonesia's population will live in urban areas (BPS, 2019). This urban area includes more than 400 cities and will be the home to no less than 230 million people.

New approaches and strategies are needed to ensure that the urban transformation process in Indonesia produces a sustainable urban environment.

The Challenges of Urban Transformation in Indonesia

There are at least five challenges to sustainable urban transformation in Indonesia. First, as the World Bank (2019) already documented, in the previous decades, more urbanization processes are still concentrated in several metropolitan cities such as Jakarta, Bandung Raya, Semarang, and Surabaya. In the future, a more even flow of urbanization to medium and small cities both on the island of Java and outside the island of Java will further ensure the equality and fairness of development in Indonesia.

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Planning and managing sustainable medium and small cities are relatively easier to do than planning and managing a large city with all its complexity. Decentralization and quality regional autonomy will further ensure the development of cities that pay more attention to local aspirations and potentials. The development of IKN on the island of Kalimantan is expected to inspire the development of urban areas outside Java.

The second challenge and opportunity of urban transformation in Indonesia concern the issue of urban productivity. So far, every one percent increase in urbanization in Indonesia has only triggered 4 percent of per capita income – only half of what happens in several other countries, such as China and Malaysia (Setiawan, 2021).

In the future, the quality of urbanization in Indonesia must be improved to better guarantee and accelerate the process of transforming Indonesia into a prosperous and prosperous country. The urban informal sector must have the opportunity to improve the welfare of urban citizens in a broad sense. Cities will continue to be the engine of growth (economy) of one country. IKN is expected not only to be a vehicle for moving the capital of the government but also to provide inspiration for how to increase the productivity of an inclusive city.

Next, climate change and disasters have been and will be an important challenge to urban transformation in Indonesia. Data from the Ministry of Environment and Forestry (2017), shows that in Indonesia, there are at least 90 cities located in coastal areas that are vulnerable to climate change. The city will accommodate at least one hundred million people by 2045. Urban planning and management in Indonesia should be based on climate-friendly and low-carbon concepts.

Because all parts of Indonesia are in the 'ring of fire', almost all cities in Indonesia face various potential disasters. Increasing the resilience of cities in Indonesia is a must to ensure sustainability of cities. The development of low-carbon cities and the resilience standardized for IKN must be ensured to apply to all cities in Indonesia as well.

The fourth challenge of urban transformation in Indonesia is related to heritage and identity issues. Cities and urban areas have always been the main arena for globalization and capitalism so they are vulnerable to various changes and modernizations. Cities around the world tend to be uniform and incapable of representing their history and character. This process must be watched out for and resisted.

City cities in Indonesia have been able to respond and negotiate with various outside / global forces and produce attractive and distinctive hybrid cities. Many cities in Indonesia describe a dynamic dialectic of local-global power. Although many adopt the conception of the ideal conception of urban development from the west, IKN must inspire local wisdom and Indonesian identity in building cities.

Finally, effective and inclusive governance will be the key to success in overseeing the sustainability of urban transformation in Indonesia. Jane Jacobs (1985), a well-known urban thinker from America, has been reminding for a long time, that the success of urban development will be realized if and only if all citizens of the city are given the opportunity and opportunity to build their cities.

In Indonesia, the inclusiveness of urban development is also undermined by the processes of democratization, decentralization, and regional autonomy. Hundreds of regional leaders in Indonesia are expected to be more aware and strive to improve effective and inclusive urban development governance, as well as compete to realize the many aspirations of their citizens. IKN should be a moment of transformation of open and participatory urban governance.

In the midst of the great efforts to develop IKN, we must not forget the process of urban transformation in Indonesia. The idealism of IKN-Nusantara development will have greater meaning if it is associated with efforts to ensure sustainable urban transformation throughout the archipelago. As (Glaeser, 2012) views in his book Triumph of the City (2012), "city magnify humanity's strengths" – IKN and hundreds of cities in Indonesia must show the strength of humanity of the Indonesian nation.

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Research Paper

Spatial Spillover Impact of Sectoral Government Expenditure on Poverty Alleviation in South Kalimantan Province

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Abstract

Poverty is still one of the forefront issues in developing countries. It could hamper the achievement of sustainable development goals, thereby triggering a recurring call on the government's role in mitigating poverty. This paper contributed to the debate on the role of sectoral government spending under the fiscal decentralization policy to combat poverty. Using a case study in South Kalimantan Province, we employed a spatial panel data analysis covering 13 districts from 2010-2020. This study investigated the presence of spatial dependency on poverty and the spatial spillover impact of government expenditure—education, health, housing, public facilities, and social protection—on poverty. The research found the existence of spatial autocorrelation on poverty and the significant high-cluster poverty in the agriculture-based region. The direct estimation from the Spatial Durbin Model uncovered that government expenditure on education, health, and social protection significantly alleviated poverty, while housing and public facilities expenditure remained insignificant in reducing the poverty rate. Besides, education spending also has a significant indirect effect on poverty, indicating the spatial spillover impact of education spending by the neighbors on poverty in a region.

Keywords: poverty; sectoral government expenditure; spatial dependency; spatial spillover impact; Spatial Durbin Model (SDM)

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1. Introduction

Indonesia is a developing country that constantly fights against poverty, one of its major development challenges (Gibson & Olivia, 2020; Puspita, 2015; Suryahadi et al., 2020). Poverty eradication has become a concern of some policymakers and researchers as it can cause a number of problems in society, such as an increase in homicide rate (Dong B et al., 2020; Messner, 1982; Rogers & Pridemore, 2013) and malnutrition (Adeyeye et al., 2017; Siddiqui et al., 2020). Indonesia, which has implemented fiscal decentralization since 2001, was able to reduce the poverty rate from 19.14 percent in 2000 to 9.68 percent in 2020 (BPS, 2021). Some studies believed that fiscal decentralization was the primary factor behind this decrease (Abdillah & Mursanto, 2016; Nursini & Tawakkal, 2019; Syamsul, 2020). The theoretical literature on the role of fiscal decentralization in poverty reduction was originally proposed by Oates (1999), who argued that fiscal decentralization through the role of subnational public expenditure can improve the population's welfare. Subnational governments are considered to have a broader understanding of the potential and problems in their area; thus, they are believed to produce more effective and efficient policies. Recent research is now concentrated more on increasing sectoral government expenditure that benefits the poor, such as basic education and health, due to fiscal decentralization (Granado et al., 2005). Moreover, Martinez-Vazquez (2001) revealed that fiscal decentralization affects the increasing expenditure on education and health services that eventually improve the human development and welfare of poor families.

Several studies and empirical evidence showed that some sectoral government spending has an impact on poverty though the results are still inconclusive. Using a general equilibrium approach, Jung and Thorbecke (2003) uncovered that education expenditure targeting the poor household significantly reduces poverty. Employing the same approach, Balma et al. (2012) also found that public expenditure on education leads to a decrease in household poverty. Meanwhile, a study by Komarudin and Oak (2020) discovered the negative effect of health expenditure on poverty by employing a random effect model on panel data. Arma et al. (2018) revealed that education and health spending significantly reduce the poor while road infrastructure spending remains insignificant, as the government expenditure on road construction might benefit the rich more than the poor. Analyzing poverty in developing countries, the study by Slater (2011) and Kiendrebeoho et al. (2017) provided the same conclusion that social protection works better in alleviating poverty in a region. On the contrary, Anderson et al. (2018) studied the effect of government spending on poverty in low and middle-income countries using meta-regression analysis and found unclear conclusions. Government spending on social welfare has a better impact on lowering the poverty rate than education and health spending, though only through limited evidence. Government spending is more effective in lowering the poverty rate in Eastern Europe and Central Asia than in Sub-Saharan Africa. This result is in line with Omodero (2019), who discovered that government expenditure on education and health does not significantly combat poverty.

Apart from research conducted abroad, there is also some research related to the influence of government expenditure on poverty in Indonesia. Some found a negative effect on particular government spending on poverty alleviation (Mardiana et al., 2018; Nugroho, 2017; Suwardi, 2011), while others discovered an insignificant impact (Alamanda, 2020; Khairunnisa et al., 2021). However, almost all of the studies were conducted without spatial consideration. Some further studies on poverty in Indonesia attempted to explore the role of spatial analysis, even though it was still limited. Aklilu (2015) performed Spatial Lag Model (SLM) to investigate poverty and its determining factors in Java. Meanwhile, considering the spatial dependency on the independent and dependent variables, Alvitiani et al. (2019) performed Spatial Durbin Model (SDM) to analyze poverty in Central Java. In contrast, in analyzing farmers' poverty in Jambi, Nashwari et al. (2017) utilized Geographically Weighted Regression (GWR) that considers the spatial deference among observations. However, very few studies utilized government spending as one of the determinant factors in poverty.

Poverty in Indonesia has declined since 2000; however, the gap between provinces is still high, indicating a high regional imbalance (BPS, 2021). According to BPS (2021), Kalimantan island has the smallest percentage of poor people in Indonesia (6.16 percent), with the population below the poverty line reaching 1.02 million people. South Kalimantan, in particular, has the lowest poverty rate in the Kalimantan region, with 4.38 percent in 2020. The economy of South Kalimantan is also unique, where the mining sector dominates the economic structure. The share of the mining sector in 2010 reached 27.76 percent and gradually fell to 18.29 percent in 2020. Therefore, empirical evidence is needed to

analyze whether government policies, economic structure, and other macroeconomic variables have a role in reducing poverty in South Kalimantan Province.

Considering that Indonesia, including South Kalimantan Province, consists of some districts with unique geographical characteristics, it will be beneficial if the poverty analysis in Indonesia considers the spatial approach. As Myrdal (1957) argued that development in a growth center might result in a spillover effect and backwash effect in their neighbors; thus, the spatial dependency on some development indicators, including poverty, is unavoidable. Some studies found that poverty in a region might be affected by poverty in their neighboring areas (endogenous) or other poverty determinants of their neighbors (Adebanji et al., 2008; Miranti, 2021; Alvitiani et al., 2019; Qin & Zhang, 2022). Hence, this study attempted to fill the gap on two fronts. First, it uncovered the impacts of some sectoral government expenditure on poverty alleviation, especially on education, health, housing, and public facilities, and social protection. Second, this study employed spatial econometric analysis that considers the spatial spillover effect of poverty and some determinant variables in the neighboring regions.

2. Methodology

This study used balanced panel data covering 13 regencies in South Kalimantan Province from 2010 to 2020. The data used in this study were secondary data downloaded from the Directorate General of Finance, Ministry of Finance, and BPS-*Statistics Indonesia* website.

2.1 Variables

This study used the data on poverty rates published by BPS-*Statistics Indonesia* as the main dependent variable. This indicator is known as the Headcount index (*Po*). BPS calculates poverty using the basic need approach from *SUSENAS* (National Socio-Economic Survey) Consumption Module. The main independent variable in this study was the share of local government expenditure—education, health, housing, public facilities, and social protection—on the regional gross domestic product, following a study by Clifton et al. (2020). These data were obtained from the Directorate General of Fiscal Balance, Ministry of Finance Indonesia. This study also utilized some control variables, including economic growth, the human development index, and the share of agriculture in the economy. The detailed summary statistics of the data are described in Table 1.

Table 1: The Summary Statistics

Variable	Obs.	Mean	S.D.	Min.	Max.
Poverty Rate/The percentage of the Poor (%)	143	5.173427	1.164037	2.55	7.76
Local Government Expenditure:					
- Education Expenditure (% of GRDP)	143	3.930632	2.161055	0.5292268	9.924615
- Health Expenditure (% of GRDP)	143	1.967689	1.243929	0.293569	6.072569
- Housing and Public Facilities Expenditure (% of GRDP)	143	2.339943	1.369269	0.4019527	7.985943
- Social Protection Expenditure (% of GRDP)	143	0.2051695	0.1205996	0.0311213	0.5923171
Economic Growth (%)	143	4.630839	2.331955	-2.49	8.84
Human Development Index	143	67.78916	4.484352	58.5	79.22
Share of Agriculture Sector on Economy (%)	143	17.06279	8.263294	1.917293	32.96371

Source: Author Analysis (2022)

2.2 Analysis

In this study, the method used to analyze the role of sectoral government expenditure on poverty in South Kalimantan was the spatial panel model. Elhorst (2014) argued that spatial analysis can reduce the estimation bias caused by the exclusion of spatial dependency on the fixed effect model. The use of spatial models can also control the spatial-specific effects caused by observations in spatial units. Myrdal (1957), with his Cumulative Causation theory, also argued that the development of a region, especially a growth center, can cause spillover impacts and backwash impacts to the neighboring areas. It was supported by Tobler's statement that adjacent areas are more strongly interconnected than far-apart areas due to the ease of population migration, technology diffusion, and sharing endowments. Thus, by considering the spatial autocorrelation among observations, it may have more plausible and accurate estimates. Specifically, Elhorst (2014) found that spatial autocorrelation in the spatial econometrics model can occur through three channels: endogenous factor (spatial dependency on dependent variables), exogenous factor (spatial dependency on explanatory variables), and spatial dependency on error terms (some unobserved variables). The four most common spatial econometric models are the Spatial Lag Model (SLM), which considers spatial dependency on dependent variables; Spatial Error Model (SEM), which considers spatial dependency on error terms; Spatial Autoregressive Combine (SAC), which considers spatial dependency on dependent variables and error terms; and Spatial Durbin Model (SDM), which considers spatial dependency on dependent variables and explanatory variables. Nevertheless, this study applied the Spatial Durbin Model following LeSage and Pace's (2009) strategy in the spatial econometric model. Considering the presence of spatial lag on both dependent and explanatory variables is plausible, the Spatial Durbin Model we developed as follows:

$$POV_{it} = \rho \sum_{j=1}^{n} \quad w_{ij} POV_{jt} + EXP_{it}\alpha + X_{it}\beta + \gamma \sum_{j=1}^{n} \quad w_{ij} EXP_{jt} + \theta \sum_{j=1}^{n} \quad w_{ij} X_{jt} + \eta_i + \varepsilon_{it}$$

where:

POV_{it} is the poverty in region i and year t
EXP_{it} is local government sectoral expenditure in region i and year t
X_{it} is the vector of control variables
$\gamma \sum_{j=1}^{n} \quad w_{ij} EXP_{jt}$ and $\theta \sum_{j=1}^{n} \quad w_{ij} X_{jt}$ are the spatial lag of the exploratory variables
w_{ij} is the element of spatial weight matrix W that describes the degree of spatial linkage between two observations i and j
η_i is region-specific effects
$\varepsilon_{i,t}$ is the error terms

To choose the best spatial econometric model to investigate the relationship between explanatory variables and dependent variables, LeSage & Pace (2009) developed a Wald test to check the assumption. There are two Wald's tests:

1. The test of the hypothesis $H_0: \theta = 0$ to see whether the model can be simplified to the spatial autoregressive model (SAR)

2. The test of the hypothesis $H_0: \theta = -\beta\rho$ to check whether the model can be reduced to the spatial error model (SEM)

If the two Wald tests are rejected Ho (significance level is less than α=5%), we can conclude that Spatial Durbin Model is the most appropriate spatial panel model.

As seen in the model above, it is necessary to identify the weight matrix in the spatial econometric model because it is the fundamental element of spatial analysis (Florax & Folmer, 1992). This study used an inverse distance matrix following some studies on spatial econometrics in Indonesia (Vidyattama, 2014; Miranti, 2021; Santos-Marquez et al., 2021). The centroid is defined based on the pure physical distance based on the coordinates data of the centroid of each region.

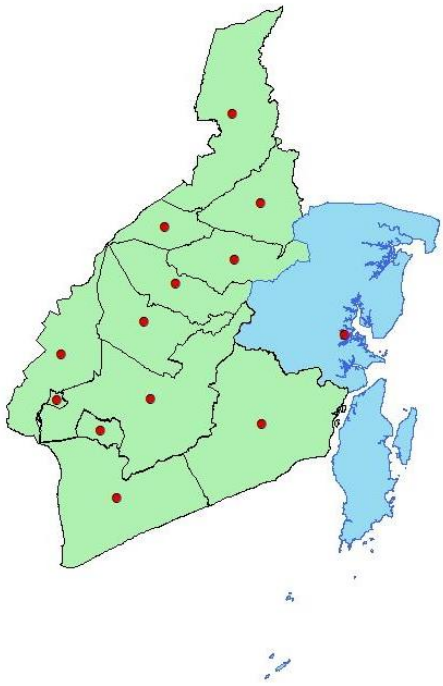

Figure 1. Location of the Centroid of Each District South Kalimantan Province

Source: Author's analysis

This study also employed Exploratory Spatial Data Analysis (ESDA) to identify whether clustering occurred and in which areas the clustering occurred in the spread of poverty in South Kalimantan. ESDA is the spatial analysis to measure global spatial autocorrelation and local spatial autocorrelation (Anselin, 1994, 1995; Anselin et al., 2007). Global Moran's I statistics and Local Indicator of Spatial Autocorrelation are indexes developed by Anselin (1995) to answer these questions. The formulas are as follows:

1. Global Moran's I

$$I = \frac{n}{\sum_{i=1}^{n} \quad \sum_{j=1}^{n} \quad w_{ij}} \frac{n \sum_{i=1}^{n} \quad \sum_{j=1}^{n} \quad w_{ij}(x_i - \underline{x})(x_j - \underline{x})}{\sum_{i=1}^{n} \quad (x_i - \underline{x})^2}$$

Where:
n is the number of regions
x_i is the value of variable x taken in region i
x_j is the value of variable x taken in region j
$\underline{x}$ is the average value of variable x
w_{ij} is the ijth element of the row-standardized spatial weight matrix W^{std}
I is the global spatial autocorrelation across areas

2. Local Indicators of Spatial Autocorrelation (LISA)

$$I_i = \frac{(x_i - \underline{x})}{m_2} \sum_{j=1}^{n} \quad w_{ij}(x_j - \underline{x})$$

$$m_2 = \sum_{i=1}^{n} \quad n^{-1}(x_i - \underline{x})^2$$

Where:

I_i is the similarity between the deviation of its value from the mean and the deviation from the mean of the observed neighbor's values

3. Results and Discussions

3.1 Poverty in South Kalimantan

South Kalimantan, whose economic share reached 14.03 percent in 2020, had the lowest poverty rate in the Kalimantan region (BPS, 2021). Figure 1 shows the poverty rate in 2020 declined, although it increased slightly in 2019. The poor population in South Kalimantan in 2020 was 4.38 percent, which decreased significantly compared to 2010 at 5.21 percent. The number of poor people in 2020 was approximately 187,000 people, decreasing by around 4600 people compared to 2019. This poverty rate reduction in 2020 was the best achievement in the last ten years. This is an encouraging achievement during the slowing economy of South Kalimantan's economy due to the COVID-19 pandemic.

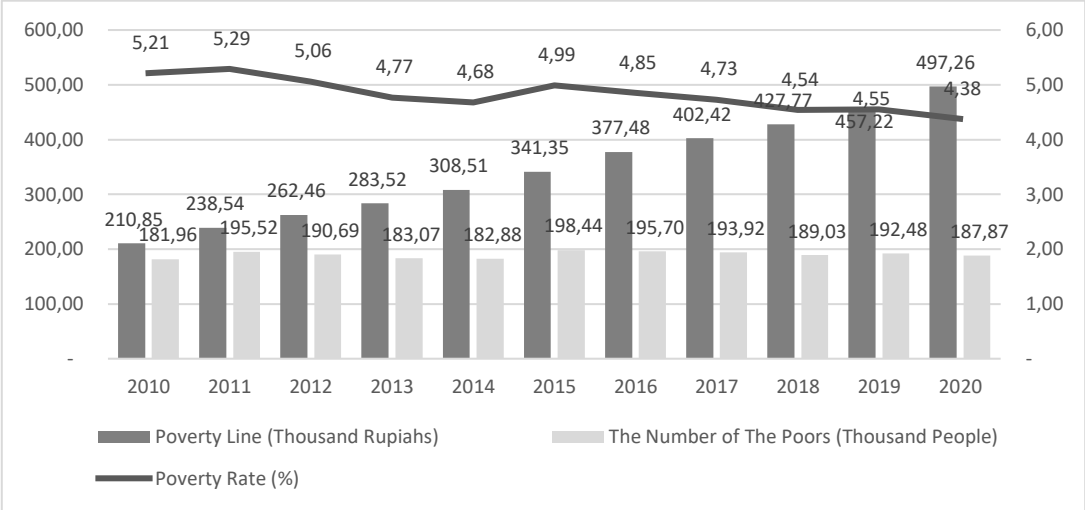

Figure 2. Poverty Indicators of South Kalimantan Province, 2010—2020

Source: BPS-Statistics Indonesia (Author edited)

In addition to investigating the development, it is important to identify where the concentration of poverty occurred, which would allow the local governments to take more apparent actions to overcome the poverty problems. Figure 2 below slightly indicates that the distribution of poverty in the South Kalimantan Province district shows a clustering. Districts with high poverty are located near other districts with high poverty, and vice versa. Overall, the poverty distribution of South Kalimantan districts from 2010, 2016, and 2020 does not show a significant difference. The district in the north has the highest poverty rate compared to other areas. The region is an area whose economy is based on agriculture. For example, in 2020, the highest poverty occurred in Hulu Sungai Utara (6.14 percent), whose economy was dominated by agriculture at 16.87 percent. In contrast, Banjar—one of the most urbanized regions in South Kalimantan—became a district with the lowest poverty in 2020 at 2.55 percent. In addition, the areas which have the highest poverty problem in South Kalimantan are also located farthest from the capital, Banjarbaru. Meanwhile, the coastal areas in South Kalimantan—Tanah Laut, Tanah Bumbu, and Kota Baru—have a moderate poverty rate.

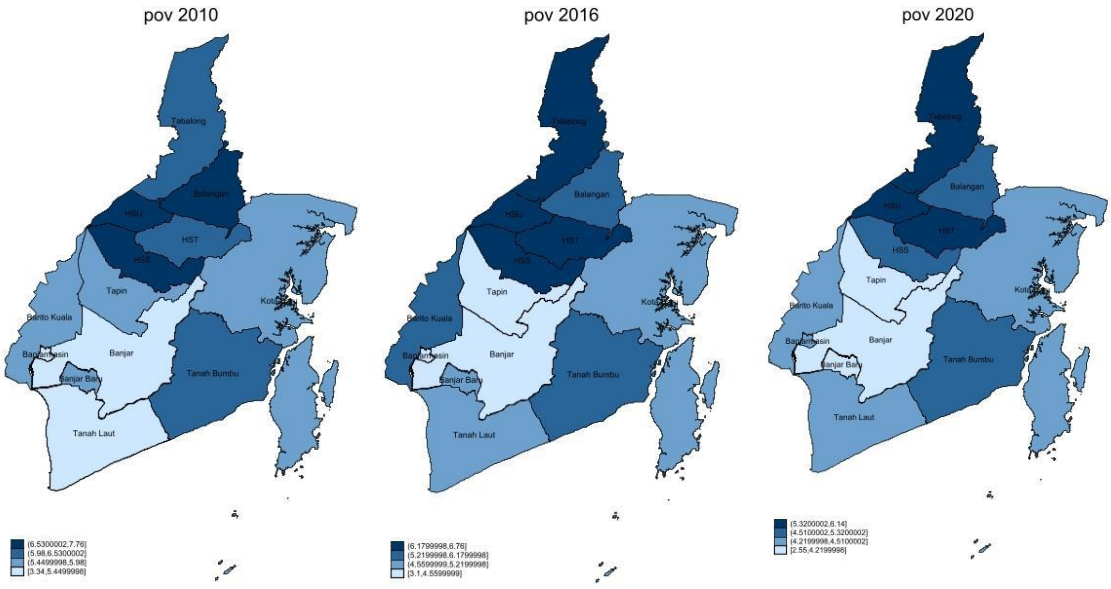

Figure 3. Poverty in South Kalimantan Province, 2010, 2015, 2020

Source: BPS-*Statistics Indonesia* (Author edited)

Table 2: The Global Spatial Autocorrelation on Poverty in South Kalimantan, 2010—2020

Year	Moran's I	sd (I)
2020	0.087***	0.055
2019	0.106***	0.055
2018	0.131***	0.055
2017	0.086***	0.056
2016	0.086***	0.057
2015	0.067***	0.056
2014	0.102***	0.057
2013	0.084***	0.056
2012	0.091***	0.054
2011	0.069***	0.054
2010	0.07***	0.054

Note : * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Author's Analysis (2022)

Table 2 shows that the spatial autocorrelation of poverty in South Kalimantan was positive and significant at a 1 percent significance level in all analysis periods. Since the null hypothesis of spatial autocorrelation was rejected, the results indicated that there was a significant spatial autocorrelation for poverty across districts in South Kalimantan. The positive estimation of Moran's I statistics shows that similar poverty values tended to be clustered. Districts with high poverty are located near other districts with high poverty, and vice versa. However, Global Moran's I can only show the overall similarity regardless of the districts in which the clustering occurred in. The districts significantly performing spatial clusters or spatial outliers can be seen from the results of Local Indicators of Spatial Analysis in Figure 4 below.

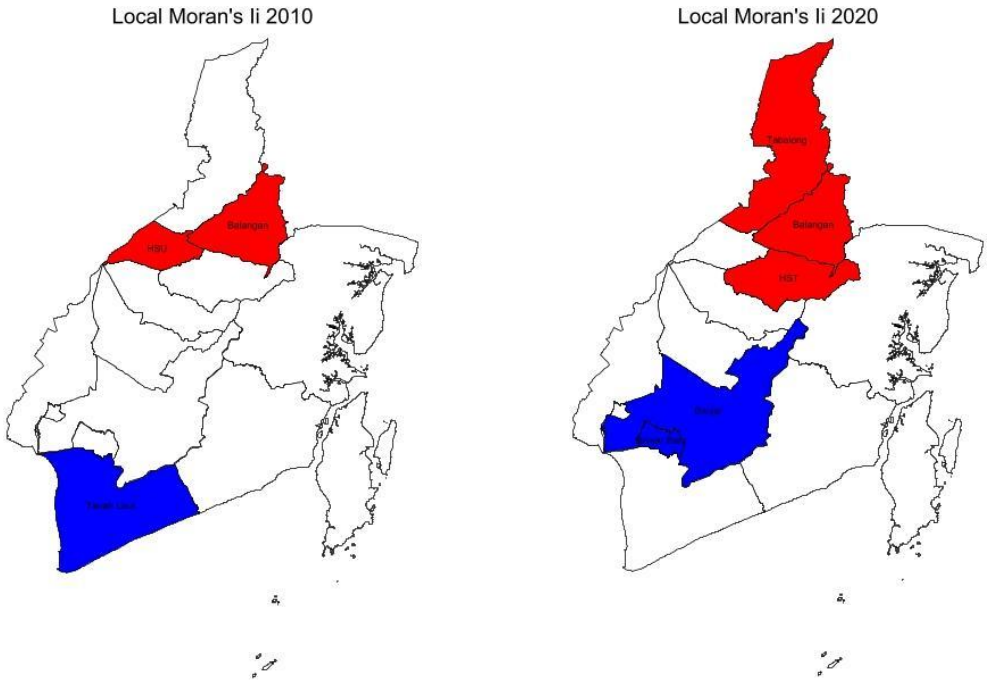

Figure 3. LISA on Poverty in South Kalimantan Province, 2010 and 2020

Source: Author's Anaysis (2022)

Figure 3 shows that in 2010 Hulu Sungai Utara and Balangan performed hotspot clustered, while the coldspot cluster was located in Tanah Laut. Slightly different, in 2020, 3 (three) districts—Hulu Sungai Tengah, Balangan, and Tabalong—were the hotspot areas of poverty, while coldspot ones were located in Banjarbaru and Banjar. The result revealed that the hotspot cluster – the cluster with high poverty – was located in a district far from the capital. Meanwhile, clusters of districts with low poverty—coldspots—were in areas close to the capital city. Thus, it indicates that most poverty problems occur in areas quite far from urban centers.

The LISA results can provide an overview of the local government in dealing with the problems of poverty in South Kalimantan Province. By knowing the locations where high poverty occurs, the government is expected to be able to produce more targeted policies. The government can carry out spatial action planning by considering the areas with the highest poverty clusters. The provision of special assistance for poverty alleviation programs can be focused on these areas, such as sanitation and agricultural assistance for low-income families in Hulu Sungai Utara.

3.2 Spatial Panel Analysis of Poverty in South Kalimantan

We employed Spatial Durbin Model to analyze the impacts of some sectoral government expenditures on poverty. Our model controlled the region and time-specific effect to accommodate the influence of region-specific effects, such as distance from the capital or district type, and time-specific effects, such as the COVID-19 shock, that can affect the estimation results. The detailed result is presented in Table 3 below.

Table 3: The Spatial Durbin Model (SDM) Regression on Poverty in South Kalimantan

Variables	**Poverty (1)**	**Poverty (2)**	**Poverty (3)**	**Poverty (4)**
Local government expenditure on:				
- Education	0.013			
	(0.0379)			
- Health		-0.177***		
		(0.0589)		
- Housing and Public Facilities			-0.0307	
			(0.0375)	
- Social Protection				-1.544***
				(0.513)
Economic Growth	0.0164	0.0232	0.0295	0.0238
	(0.0215)	(0.0214)	(0.0224)	(0.0211)
Human Development Index	-0.0196	-0.0153	-0.0564	-0.0978**
	(0.0471)	(0.0509)	(0.0478)	(0.049)
The Share of Agriculture in the Economy	0.0929**	0.0647**	0.109***	0.117***
	(0.0362)	(0.0317)	(0.0305)	(0.0288)
w. education	0.743***			
	(0.266)			
w.health		-0.644		
		(0.421)		
w.housing			0.003	
			(0.241)	
w.social				-3.941
				(2.978)
Observations	143	143	143	143
Spatial Rho (ρ)	-2.199***	-2.296***	-2.205***	-2.206***
	(0.257)	(0.256)	(0.261)	(0.259)
Year dummies	Yes	Yes	Yes	Yes
Wald test (Ho : θ = 0)	0.0000	0.0000	0.0000	0.0000
Wald test (Ho : θ = - βρ)	0.0000	0.0011	0.0000	0.0000

Notes: standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Author's Analysis (2022)

Table 3 shows that the Wald test is significant in all four sectoral government expenditures at a 1 percent significance level. Thus, we can conclude that our Spatial Durbin Model (SDM) is the best model to describe the influence of the four functions of government expenditure to reduce poverty in South Kalimantan rather than using the Spatial Lag Model (SLM) or Spatial Error Model (SEM).

The sign in our estimation indicates that almost all four sectoral government expenditures have significant performance in reducing poverty in South Kalimantan. Our model also applied a set of control variables, including economic growth, the human development index, and the share of agriculture sectors in the economy. Among the three, the agriculture sector's share of the economy seems to worsen poverty significantly. These results confirmed our first LISA finding that poverty is higher in the agriculture-based regions. However, the interpretation of the Spatial Durbin Model cannot be analyzed directly by looking at the coefficients on the model. It needs to derive direct effect, indirect effect, and total effect following LeSage and Pace's (2009) arguments. The detailed effect is described in Table 4 below.

Table 4. The Estimated Effect of Sectoral Government Expenditure on Poverty in South Kalimantan

Variables	Direct Effect	Indirect /Spillover Effect	Total Effect
Local government expenditure on:			
- Education	-0.0850*	0.330***	0.245***
	(0.046)	(0.109)	(0.095)
- Health	-0.138*	-0.115	-0.253*
	(0.0726)	(0.165)	(0.138)
- Housing and Public Facilities	-0.0394	0.0334	-0.00596
	(0.0365)	(0.0909)	(0.0882)
- Social Protection	-1.461***	-0.208	-1.669
	(0.417)	(1.007)	(1.117)

Notes: standard errors in parentheses. All the estimations include a full set of control variables.
* p < 0.1, ** p < 0.05, *** p < 0.01

Source: Author's Analysis (2022)

Table 4 reports that the effects of the government expenditure on four sectors—education, health, housing and public facilities, and social protection—were different. Local government expenditure on social protection significantly alleviated poverty in its region at a 5 percent significant level, while that on education and health sector significantly reduced poverty in its region at a 10 percent confidence level. In stark contrast, expenditure on housing and public facilities remained insignificant in reducing its own region's poverty. The precise direct effect estimation on education indicates that when the local government in a region increases its expenditure on education by 1 percent to regional GDP, the poverty level in its region can reduce by 0.085 percent point; while a one percentage point increase in the share of health expenditure to regional GDP is followed by the 0.138 reductions of poverty in its region. Meanwhile, the direct effect of social protection on poverty reduction seemed to be more pronoun than the other sectors. The estimation of -1.461 percent shows that a 1 percent increase in local government spending on social protection significantly ameliorated poverty in its region by 1.461 percent at a 1 percent significance level. However, the means of social protection expenditure's share of regional GDP in South Kalimantan only reached 0.2 percent. Thus, if the local government wants to reduce poverty by 1.461 percent, it needs to increase its social protection spending fivefold. However, it is difficult to achieve this considering the limitation of the local government's budget.

Moreover, the coefficient of spatial lags on explanatory variables, as presented in Table 3, was only significant on education expenditure. It means that only local government expenditure on education had a spatial spillover impact, implying that poverty in a region was not only affected by government expenditure on the education sector in its region but also in neighboring regions. The magnitude of the effect was presented in indirect or spillover impact in Table 4. The positive and significant indirect effect of education expenditure implies that a 1 percent increase in the local government's expenditure on the education sector to regional GDP in a region leads to a 0.33 percent increase in the poverty level in its neighbors. Nevertheless, the indirect or spillover effect was found to be higher than the direct effect. We considered this finding as one of the limitations of the study using a spatial approach, and we left it for further studies to analyze why and how this outcome happened.

3.3 Discussion

The influence of each government's spending on poverty varies. However, looking at the details, we can see that health expenditure had a significant influence on poverty reduction in South Kalimantan. Compared to the average poverty rate in South Kalimantan over the last ten years, which reached 5.17 percent, the increase in the share of health expenditure had an economic significance of 2.6 percent in reducing poverty in its region. This effect was significantly higher than the other expenditures, considering the average share of health expenditure on regional GDP was 1.96 percent. This result confirmed the

negative impact of health expenditure on poverty (Arma et al., 2018; Komarudin & Oak, 2020). Moreover, according to the financial report in South Kalimantan (2022), more than half of the local government's health expenditure was allocated for direct spending to improve health quality, for example, local health insurance (Jamkesda). This innovation was believed to improve the quality of life of the poor, which could eventually improve their welfare. This finding supported Grossman's (1972) argument that the government's spending on health is associated with increased human capital accumulation, eventually improving productivity. Moreover, a study by Martínez-Vázquez et al. (2012) revealed that when government spending can directly affect the poor, it could contribute to enriching the poor's welfare and lifting them from endemic poverty. Therefore, the government must continue to strive to increase the coverage of Jamkesda because BPS (2021) noted that only 52.81 percent of the 40 percent bottom society (the poor) utilized health insurance for treatment, while nearly 60 percent of the rich already took advantage of health insurance.

Education is also the most important dimension in improving the welfare of a region. Although the human capital theory by Becker (1962) proposed that education and training can increase the productivity of each worker, many experts stated that the effect of education on the welfare of the population at reducing poverty and inequality cannot be felt directly (Balma et al., 2012 ; Jung & Thorbecke, 2003). This argument is also reflected in our result, where the effect of education expenditure on poverty remained lower than the other expenditures. However, our result also confirmed that education expenditure in a region had a spillover impact on the worsening poverty of its neighbors. This shows that when a local government increases education spending, it worsens poverty in neighboring areas. This result slightly confirmed that there is a backwash effect greater than the positive spillover effect from the development of a region conveyed by Myrdal (1957) with his Cumulative Causation Theory. Education expenditure in an area can improve the quality of education in that area, but when people have already had a better quality of education, they tend to migrate to the neighboring areas to improve their lives. However, when they cannot compete with other residents, they worsen the poverty conditions in the area. Therefore, the government must pay close attention to the quality of education, especially in border areas that tend to have the opportunity to get a spillover impact from their neighbors. According to BPS (2021), the percentage of poor people aged 15 years and over in South Kalimantan in 2020 whose education below elementary school was still 30.38 percent. It shows that the quality of education for the poor was still relatively low. Thus, it would be beneficial if the government could allocate its education expenditure on education for the poor so that the poor could compete with other residents in finding jobs.

Social protection expenditure seems to have a significant impact on alleviating poverty in South Kalimantan. This result is in line with the main objective of social protection expenditure which naturally targets the poor to increase their welfare (Danziger et al., 1981). This result also corroborates studies by Slater (2011) and Kiendrebeoho et al. (2017), who found the significant and efficient impact of social protection on poverty reduction. However, the average social protection expenditure on regional GDP was quite small and only around 0.2 percent; thus, if the local government can increase the share of social protection on expenditure by 0.2 percent, poverty in its region can reduce by 0.29 percentage points. However, the local government will have difficulty if they have to increase the spending in the social protection field twofold because of their budget limitation. Therefore, what the local government can do is to innovate and evaluate the provision of government program assistance for the poor in the South Kalimantan region. According to BPS (2021), only 31.40 percent of poor households in South Kalimantan received Program Benefits in 2020. Indeed, if viewed based on the distribution by district/city, there were still districts where only one-tenth of the poor households became Program Beneficiaries, namely Hulu Sungai Utara.

Finally, with respect to housing and public facility expenditure, we found an insignificant effect of this expenditure on reducing poverty in South Kalimantan. This might be due to less than a fifth of this expenditure being allocated for improving the quality of poor's housing, while more than 80 percent of the remainder was allocated for big infrastructures, such as bridges, roads, irrigation, dams, and others. These arguments align with Arma et al.'s (2018) finding, which revealed that government expenditure on road construction has no significant impact on poverty reduction since it might benefit the rich more than the poor. Moreover, Chatterjee and Turnovsky (2012) found that when infrastructure spending is allocated for large infrastructure spending, which is expected to increase access, the rich enjoy it more than the poor. This finding was quite unfortunate, considering that only 53.59 percent of poor households in South Kalimantan province had access to safe water, and 11.04 percent of poor households still did not

have latrines/toilet facilities alone or with other households BPS (2021). Therefore, it is highly expected that the government's allocation of housing and public facilities can be maximized and provide decent housing for the poor. Thus, the government is expected not only to concentrate on how much money is spent but also to whom the money is spent and utilized.

Conclusions

This paper's main objective was to analyze and evaluate the spatial spillover impact of sectoral government expenditure to reduce poverty in 13 districts in South Kalimantan Province from 2010-2020 using spatial panel econometrics. The Exploratory Spatial Data Analysis (ESDA) revealed that the global Moran's I statistics were positive and significant at a 1 percent significant level in all periods, indicating there was a spatial clustering on the percentage of the poor in South Kalimantan province. The Local Indicators of Spatial Autocorrelation (LISA) confirmed that high cluster poverty was located in the district far from the capital, characterized by agriculture sectors such as Hulu Sungai Utara, Hulu Sungai Tengah, and Balangan. The sign of the Spatial Durbin Model (SDM) estimation result for each expenditure was generally corroborated with the theoretical prediction. As the share of local government expenditure on education, health, and social protection increased, there was a reduction in the percentage of the poor in South Kalimantan. However, the local government expenditure on housing and public facilities could not perform well in alleviating poverty in South Kalimantan. The results also found that education expenditure by a region significantly worsened poverty in its neighbor due to spatial spillover impact and backwash effect of the development in a region.

This study had policy implications concerning the implementation of fiscal decentralization policy. The government should increase its budget to improve the poor's welfare and lift them from endemic poverty. However, the government should not only focus on increasing its budget but also on choosing the most effective and efficient public spending that specifically targets the poor. The existence of a spatial spillover impact from local government expenditure, especially on education, encourages local governments to improve coordination and collaboration by exchanging information and technology. The result of this study also suggested that the local government should boost the provision of proper infrastructure for poor households, such as drinking water facilities and latrines for the poor.

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Research Paper

How to Cope With Strategic Infrastructure Disparities in West Java?

A Post-Pandemic Economic Recovery Analysis

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Abstract

The availability of energy and telecommunication facilities has been claimed as two strategic infrastructures supporting the West Java economy during and the post-pandemic. This paper aims to identify the recent electrical energy access of households and the existing condition of telecommunication infrastructure; to configure the investment data in the last five years, and to analyze the opportunities and challenges of investment, development of electricity and telecommunication network in the future. This research uses the Desk Study method by collecting primary data from bureaucrats and secondary data from relevant Government agencies. The results show that electricity and telecommunications infrastructure conditions in West Java are still unequal between the Northern and Southern regions, particularly in terms of electrification ratio, cellular phone signal strength, and internet signal quality. Furthermore, investment in West Java was very unequal, with about two-thirds of foreign and domestic investment were in Bekasi and Karawang districts in the last-five-years. This study formulates recommendations for policy in the investment, electricity, and telecommunication sectors in dealing with interregional infrastructure development disparities as well as economic challenges during and after the pandemic.

Keywords: Electricity Access; Telecommunication; Regional Investment.

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1. Introduction

The Covid-19 Pandemic is still overshadowing the Indonesian economy. The increasing number of Covid-19 new variant infection cases in July 2022 (Wamad, 2022) indicated that the transformation of the pandemic to endemic has not been achieved yet (Aditama, 2022; Putra & Wayoi, 2022). Travel restriction policy, especially for passengers of long-distance transportation modes like airplanes and trains, is predicted to retard the economy again as it was in 2020 (Al Faqir, 2020).

Moreover, the global economic recession due to war, and rising commodity prices, especially food and energy prices, also affected the Indonesian national and regional economy (Agustin & Edhie, 2022). This condition requires crisis-sensitive public policies and regional development planning focused on strategic sectors. (Anbumozhi et al., 2022) emphasized the importance of enhancing the link between global dynamics and the multifaceted local reality, improving policy coherence, and providing a strategic option to strengthen regional's bargaining power internationally.

The regional development planning in the (post) pandemic stage consequently adjusts the new normal consumer behavior in fulfilling their daily needs. In the West Java context, (Laksana, 2021) has claimed that electricity infrastructure and telecommunications network development are strategic in regional development during and after the pandemic. The availability of energy (especially electricity) and telecommunication facilities are two of the main pillars of the economy in the new-normal era (less contact economy) onward the development of a virtual (Internet of Things/ IoT) lifestyle. (Mulyaman & Rahmani, 2021) concluded that internet access is becoming a new trait of citizens' welfare.

However, researchers found that the electricity and telecommunication infrastructure development in West Java is inequitable, especially between the Northern and the Southern areas and between rural and urban areas. Local policymakers' awareness of opportunities and challenges for infrastructure investment in the energy and telecommunication sector is urgently needed (Maqin, 2014). In the post-pandemic era, Infrastructure constraints in remote areas in Indonesia encourage more people to migrate to urban areas (Nurwaesari et al., 2022).

On the other hand, research examining investor interest in developing the West Java energy and telecommunication infrastructure has been rare. In addition, the regional investment policy and the electricity and telecommunication development plan still need to be Figured out to complete the puzzle pieces of the big picture question: How to Cope with Strategic Infrastructure Disparities in West Java?

Based on the background, this paper aims to: 1) identify the electrical energy access of households and the existing condition of telecommunication infrastructure; 2) conFigure the investment data in the last five years, and 3) analyze the opportunities and challenges of investment, development of electricity, and development of telecommunication network in the future. It formulates policy recommendations to the West Java Provincial Government and Regencies / Municipalities in West Java on the orientation of electric power and telecommunications network development to face economic challenges in the (post) pandemic era as well as to cope with interregional development disparities.

2. Methodology

This paper is qualitative research that uses the Desk Study method. It analyzes primary data collected from competent bureaucrats and secondary as open datasets, laws, and regulations downloaded from Governments' official websites, as well as papers downloaded from scientific journal publications and news from the mass media.

Primary data collection was carried out at the end of July 2022 by semi-structured interviews with twelve competent bureaucrats in the Regional Offices: the Energy and Mineral Resources Office (*Dinas ESDM*), the Investment and One-Stop Integrated Service Office (*Dinas PMPTSP*), the Community Empowerment Service, and Villages Office (*Dinas PemDes*), as well as the Communication and Information Office (*Dinas KomInfo*). It was followed by a Focus Group Discussion (FGD) online through the Zoom meeting media at the end of August 2022 involving twenty participants.

Secondary data collection was conducted from July to August 2022 by downloading datasets and references from: https://opendata.jabarprov.go.id/ https://bps.go.id and https://jdih.jabarprov.go.id/.

In addition, this research also collected papers downloaded from scientific journal publisher websites and news from online mass media.

Furthermore, primary data from interviews and FGD were processed descriptively to produce policy recommendations. Meanwhile, the secondary data from official websites were processed using descriptive statistics to provide informative Tables and graphs. The results were presented in a deductive narrative to answer the research questions.

3. Results and Discussions

Energy is an essential factor in daily life. One of which is electricity as a primary type of energy that supports human activities, including activities on the internet and telecommunications networks. A total blackout that occurred on August 4, 2019, then almost repeated at the end of October 2020 (Akhir, 2020), gave a lesson about how highly dependent human life is on electrical energy.

The first total blackout, on August 4, 2019, was due to the disruption of the 500kV transmission in Ungaran. The State Electricity Company (PLN) cut off the electricity for several hours in the DKI Jakarta, West Java, and Banten areas affecting 21 million customers. It caused the paralysis of public transportation, telecommunications, water supply, and traffic. Hence, the sustainability of the electric power supply is vital for life today and in the future.

The indicator of electrical energy access of households in an area is the Electrification Ratio. The Indonesian Electrification Ratio in the third quarter of 2021 was 99.4%. The percentage spatially varies across regions, where only nine provinces have a ratio above 99.7%, one of which was West Java.

The Electrification Ratio of West Java was 99.72 percent in 2021 (Dinas ESDM, 2022). It means that there were still 28 of ten thousand households in remote areas (approximately 260,000 Households) who could not access the electrical power supply, either from PLN or others. Figure 1 shows the distribution of the electrification ratio of Regencies/Municipalities in West Java. The darker-colored indicates a lower Electrification Ratio than the lighter-colored region.

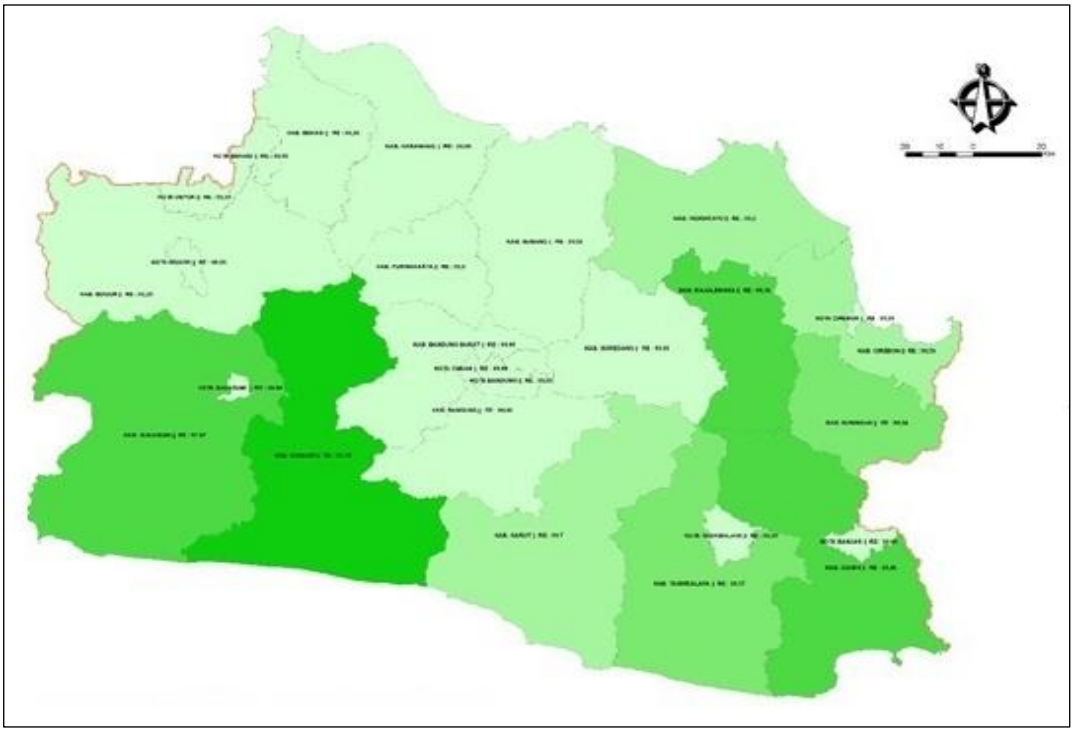

Figure 1. The West Java Electrification Ratio, 2021 (Dinas ESDM, 2022)

The Electrification Ratio in an area is closely related to the development of electricity infrastructure in that area. (Maqin, 2014) concluded that electricity infrastructure is a significant factor in economic development in the sub-Provincial administration of West Java. His study concluded that although the condition of West Java's electricity infrastructure looks better than in previous years, the available electricity supply has not been able to keep up with the electricity demand, especially for productive electricity consumption and electricity needs in remote areas.

The electric power supply is a substantial production factor for the industry which is the prominent contributors to the West Java Gross Domestic Product (GDP). However, it tends to be scattered in the Northern region, indicating the economic disparity between North and South of the West Java economy.

Apart from the electricity infrastructure, factors influencing the inequality of the Electrification Ratio in Indonesia are income and geographic location of residence (spatial) (Dwi Cahyani et al., 2020). Differences between rural and urban areas and the differences between areas close to the center of economic growth and conservation areas also determine the electrification ratio.

3.1 Household Electricity Access

The official data from the West Java Provincial Government in 2020 confirmed the spatial inequality of access to electrical energy. Figure 2 depicts the number of households in rural areas that have not yet enjoyed electricity covering 19 administrative authorities.

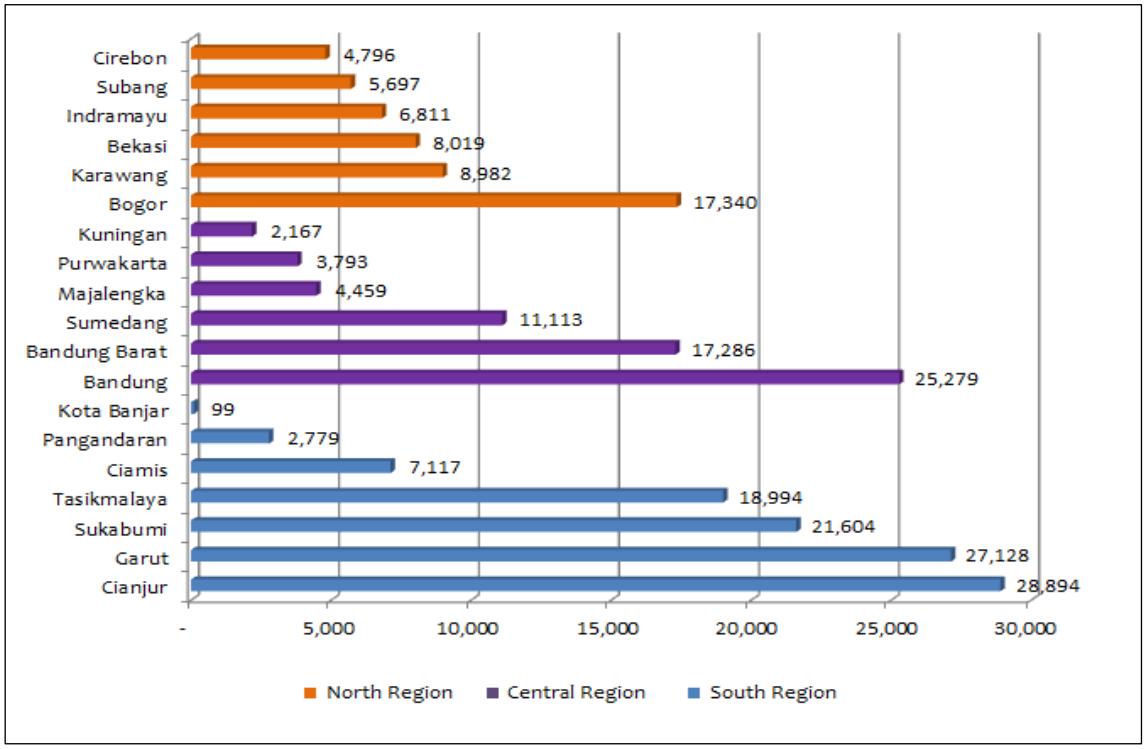

Figure 2. The number of Households without electrical power access in West Java, 2020

Source: https://opendata.jabarprov.go.id/

Figure 2 indicates that the Southern region was the worst in terms of households' electricity access compared to the Central region as the buffer zone of the Provincial capital and the North as the buffer zone of the national capital. Generally, houses in forest outskirts and plantation areas are without an electric power supply. In contrast to the other eight municipalities having a one hundred percent Electrification Ratio, Banjar does not have it, as it is located in the South and has Batulawang Plantation Area administered by the PTPN VIII.

The electricity supply in Indonesia mainly provides by PLN. In 2017, 93% of household electricity was from PLN (on-grid), and only 2.3% was off-grid. For housing costumer, electricity supply from PLN is classified into several power groups, ranging from 450VA to above 6600VA. Low-income customers enjoy Government subsidies by consuming 450VA or 900VA power (Dwi Cahyani et al., 2020).

However, the National Team for the Acceleration of Poverty Reduction (TNP2K) reported that 40% of low-income households receive only 26% of the electricity subsidies. At the same time, 30% of high-income enjoy 40% of that (TNP2K, 2016). Following up on the report, in 2017, the Government revoked subsidies from non-poor households and determined 23.2 million households with 450 VA and 4.1 million households with 900VA as subsidy recipients.

In 2020, 1.4 percent of households in rural areas of West Java (approximately 152,437 Households) utilized electricity power from non-PLN suppliers. Assuming that in West Java 100 percent of municipal electricity is from PLN, Figure 3 shows the proportion of rural households using PLN and Non-PLN electricity sources in 19 administrative areas.

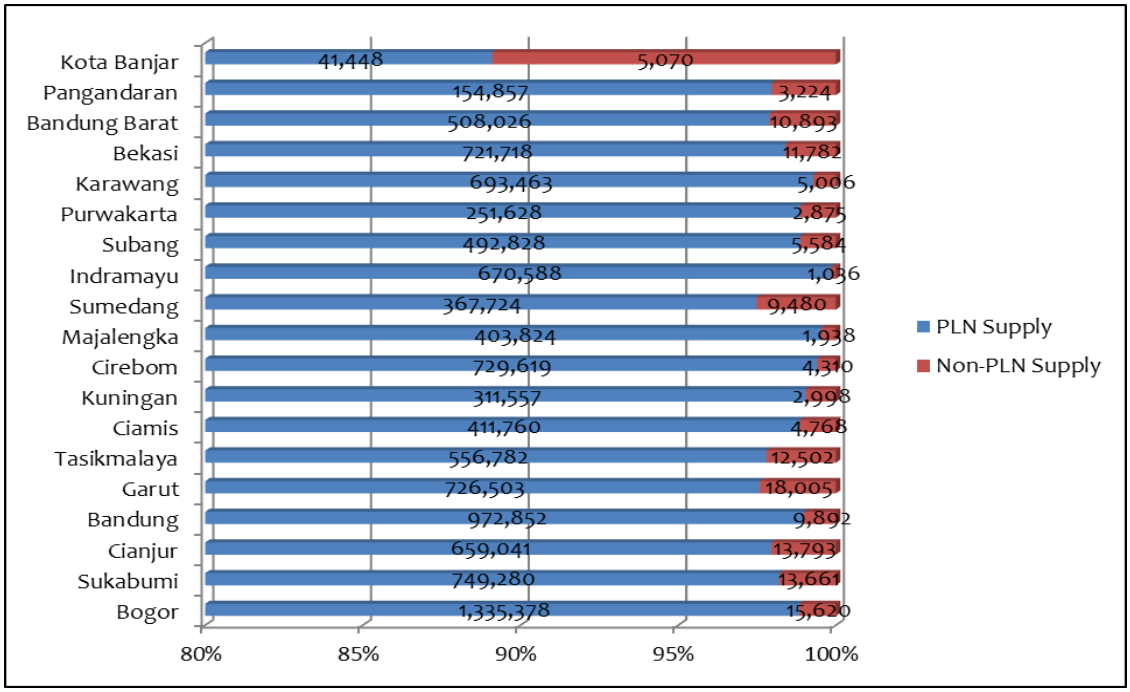

Figure 3. The number of Households based on the electricity suppliers in West Java, 2020

Source: https://opendata.jabarprov.go.id/

Another subject of energy consumption patterns is alternative energy use. Official data shows that apart from conventional energy commonly used, households in rural areas also utilize alternative energy sources. Table 1 details the number of families in 19 administrations in West Java that utilize various alternative energies, namely liquid biofuels, wind power, biomass energy, and solar energy.

Table 1: The Number of Households in West Java Utilizing Alternative Energy, 2020

No	Regency / Municipality	Alternative Energy Source			
		Liquid Biofuels	Wind Power	Biomass Energy	Solar Energy
1	Bogor	56	10,228	1	10,737
2	Sukabumi	382	3	6	4,369
3	Cianjur	387	4	-	18,962
4	Bandung	85	2,215	35	2,222
5	Garut	-	-	0	4
6	Tasikmalaya	587	2,897	3,003	2,956
7	Ciamis	1,477	6,812	-	22,045
8	Kuningan	120	-	-	2,857
9	Cirebon	50	-	-	6,009
10	Majalengka	800	-	1671	2,538
11	Sumedang	-	-	1	2,168
12	Indramayu	10	3,246	-	9,368
13	Subang	2,003	17	59	49
14	Purwakarta	198	607	2	7,039
15	Karawang	2,754	4,204	-	18,832
16	Bekasi	-	12,000	-	12,023
17	Bandung Barat	215	1,891	85	1,943
18	Pangandaran	389	-	10	1,345
19	Kota Banjar	-	-	-	-

Source: https://opendata.jabarprov.go.id/

Apart from electricity, strategic infrastructure to support the economy during the pandemic is telecommunications facilities. The session on the condition of the existing telecommunications infrastructure in West Java is in the following subsection.

3.2 The Existing Condition of Telecommunication Infrastructure

Telecommunications infrastructure development in West Java indicates positive trends in recent years. Figure 4 shows that in one year (2020-2021), the number of villages with strong cellular signal conditions increased by 80, while those with weak cellular signals decreased by 75. However, in 2021 there were still 23 villages without cellular phone signals, which were distributed larger in the South: Garut (7 villages), Cianjur, and Sukabumi (3 villages each).

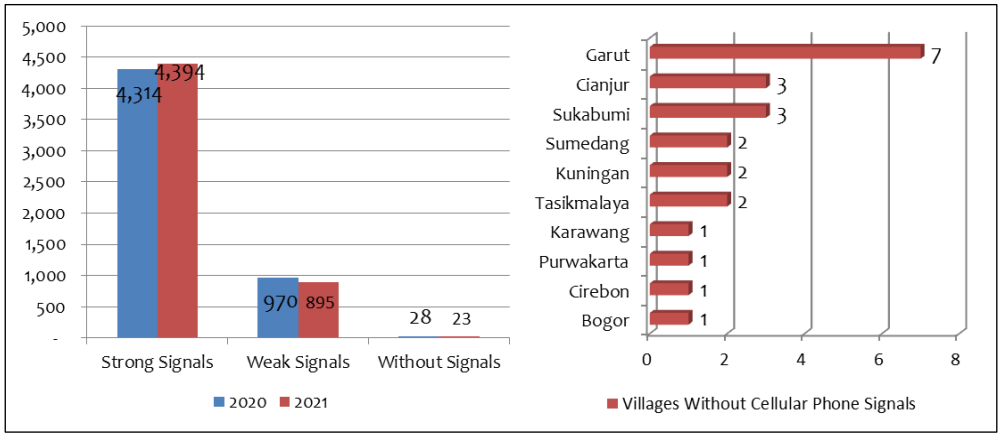

Figure 4. The Number of Villages Based on Cellular Phone Signals Strength, 2020-201, and The Distribution of Villages Without Cellular Phone Signals, 2021

Source: https://opendata.jabarprov.go.id/

Cellular telecommunications services are from several provider companies shown in Table 2. The Table resumes that yet 100 percent of villages in West Java are covered by cellular signals. In 2020, Telkomsel was the leader covering 98.26% of the total villages, followed by Indosat (94.22%), XL (92.25%), and other operators (77.98%).

Table 2: The Number of Villages in West Java Covered by Cellular Phone Signals, 2020

No	Regency / Municipality	Telkomsel		Indosat		XL		Others	
		Village	%	Village	%	Village	%	Village	%
1	Bogor	402	96.63%	406	97.60%	374	89.90%	339	81.49%
2	Sukabumi	359	94.23%	375	98.43%	340	89.24%	237	62.20%
3	Cianjur	341	96.33%	338	95.48%	323	91.24%	254	71.75%
4	Bandung	270	100.00%	263	97.41%	263	97.41%	246	91.11%
5	Garut	413	98.10%	371	88.12%	360	85.51%	265	62.95%
6	Tasikmalaya	344	98.01%	298	84.90%	278	79.20%	197	56.13%
7	Ciamis	257	99.61%	235	91.09%	237	91.86%	194	75.19%
8	Kuningan	351	97.23%	330	91.41%	323	89.47%	245	67.87%
9	Cirebon	410	99.51%	393	95.39%	404	98.06%	317	76.94%
10	Majalengka	324	98.18%	314	95.15%	301	91.21%	263	79.70%
11	Sumedang	265	98.15%	254	94.07%	254	94.07%	233	86.30%
12	Indramayu	309	100.00%	302	97.73%	306	99.03%	276	89.32%
13	Subang	243	99.18%	228	93.06%	236	96.33%	201	82.04%
14	Purwakarta	179	97.81%	174	95.08%	180	98.36%	164	89.62%
15	Karawang	292	98.32%	293	98.65%	285	95.96%	248	83.50%
16	Bekasi	174	96.67%	180	100.00%	174	96.67%	157	87.22%
17	Bandung Barat	165	100.00%	160	96.97%	162	98.18%	151	91.52%
18	Pangendaran	92	98.92%	74	79.57%	66	70.97%	54	58.06%
19	Kota Banjar	16	100.00%	16	100.00%	16	100.00%	14	87.50%
	Sum and % Average	5,206	98.26%	5,004	94.22%	4,882	92.25%	4,055	77.92%

Source: https://opendata.jabarprov.go.id/

One of the factors influencing cellular phone service quality is the availability of a Base Transceiver Station (BTS). The prime function of BTS is sending and receiving radio signals from and to a telecommunication device such as a personal computer, wired and cellular phone, and other types of gadgets. Figure 5 depicts the proportion of villages with and without a BTS tower in West Java based on sub-province administration.

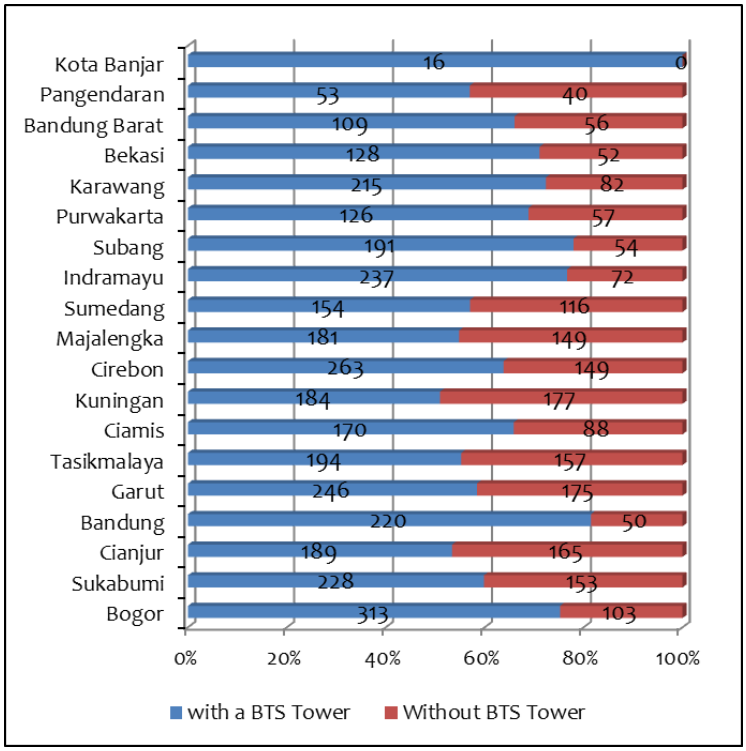

Figure 5. The Number of Villages with and without a BTS Tower in West Java, 2021

Source: https://opendata.jabarprov.go.id/

Nevertheless, a BTS operates without recognizing the administrative area of the village. A BTS services depend on its spatial position on the earth's surface. (Virgana, 2016) conducted a spatial analysis using triangulation techniques to map telecommunication services from BTS towers in West Java in Figure 6.

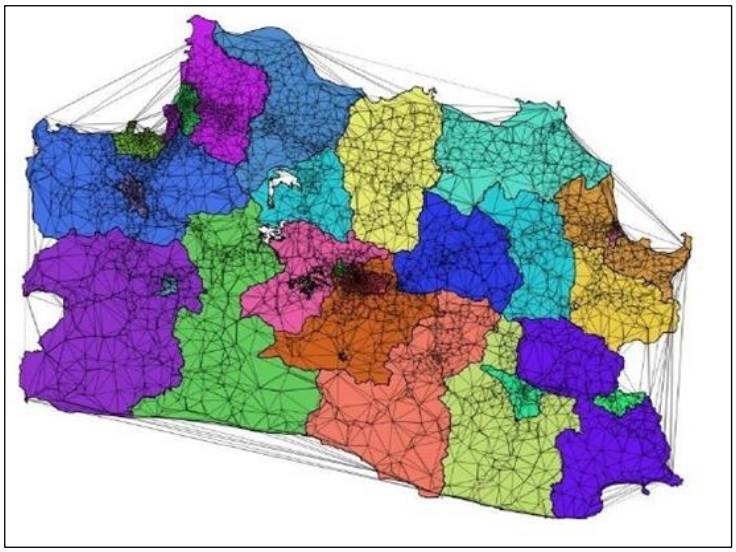

Figure 6. The Triangulation Analysis of BTS Towers Services in West Java, 2018

Source: Virgana, 2018

The triangulation analysis in Figure 6 illustrates that if the nets on the map are sparse or not as dense, the signal coverage transmitted by BTS tends to be weak. Such areas are the potential to be blank spots. The map shows the tendency that the cities and the Northern areas to have better signal coverage than the Southern.

BTS towers also transmit internet signals. Figure 7 illustrates the quality of internet services that reach villages in West Java. In 2018, half of the villagers enjoyed 4G networks, and the others accessed 3G and 2G networks. There was still one percent (66 villages) without internet signals or blank spots distributed in 18 Regencies majority in Tasikmalaya District (14 Villages).

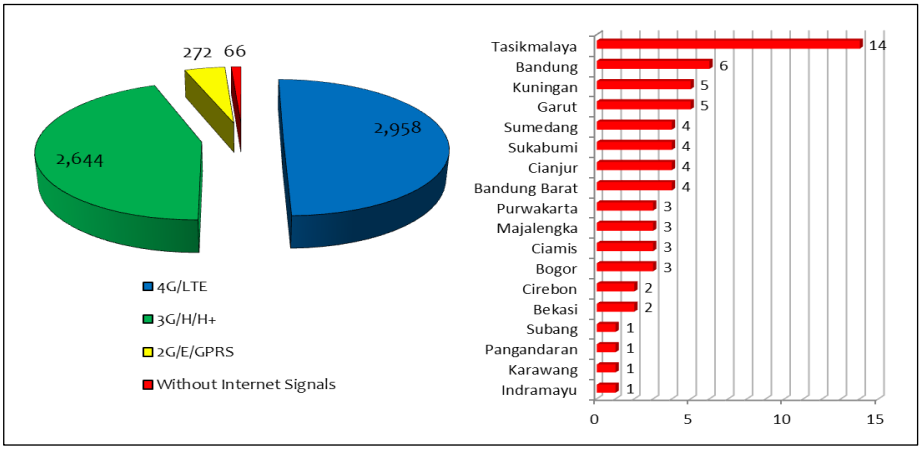

Figure 7. The Number of Villages Based on Internet Signals Strength and the Distribution of Blank Spots Villages in West Java, 2018

Source: https://opendata.jabarprov.go.id/

To provide internet access to villagers, the Government sets up internet facilities at the village offices. Figure 8 describes the proportion of the availability of internet facilities in village offices in 19 administrations.

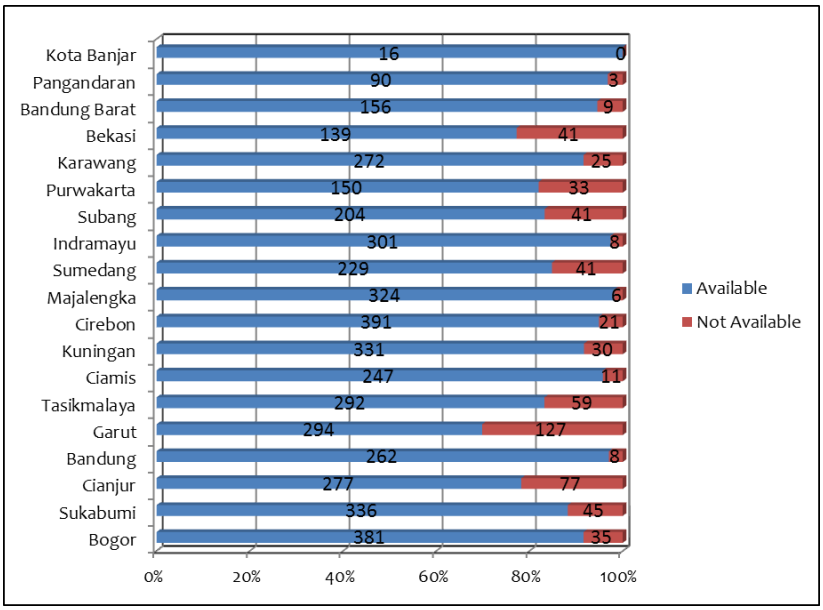

Figure 8. The Availability of Internet Facilities in Villages Offices in West Java, 2021

Source: https://opendata.jabarprov.go.id/

The indicator of the telecommunication sector development in a country or region is the Information, Communication, and Telecommunication (ICT) Development Index. The Index consists of three sub-indices: 1) Access and Infrastructure, 2) the Use of ICT, and 3) Expertise.

Based on Indonesian Central Statistics Bureau (BPS) data, the West Java ICT Development Index increased from 5.38 in 2017 to 6.00 in 2020, indicating a moderate grade stagnantly (Figure 8). Relating to this research, Figure 8 also depicts the sub Index of ICT Access and Infrastructure of West Java still in the moderate index, despite its progress from 6.02 to 6.65 in the period.

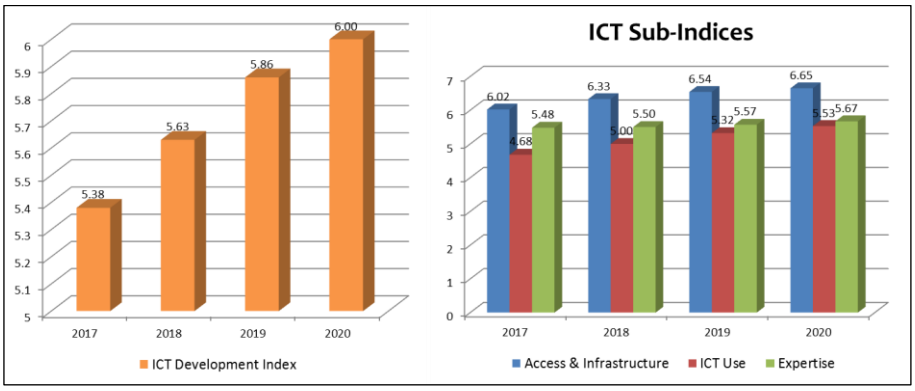

Figure 9. The West Java ICT Development Index, 2017-2020

Source: https://bps.go.id/

In 2020, there were only two provinces with high indexes In terms of Sub-index Access and Infrastructure of ICT, namely DKI Jakarta and DI Yogyakarta. While others, still had a moderate and low index, one of which was West Java. The Top Ten Access and Infrastructure of the ICT Development sub-index are: 1) DKI Jakarta, 2) DI Yogyakarta, 3) Bali, 4) Riau Islands, 5) East Kalimantan, 6) West Java, 7) Banten, 8) Central Java, 9) East Java, 10) North Kalimantan.

To improve ICT Development Index and electrical facilities in West Java, the Government needs to seek adequate investment. The next session discusses the investment profile in West Java, starting with foreign and ending with domestic investment.

3.3 Foreign Investment Profile

The foreign investment data in 2016-2021 based on administrative area is in Table 3, with highlights in the highest investment location and the Provincial capital as a comparison. The Table also reveals that in those years, more than half of foreign investment was in Bekasi and Karawang. Meanwhile, other Regencies and Municipalities in the South, like Banjar, Tasikmalaya, and Ciamis, had almost zero foreign investment.

The aggregate data in Table 3, represented by Figure 10, shows the foreign Investment info-graphic in West Java. The Graphic reveals that from 2016 to 2020, Bekasi was the foreign investors' favorite, followed by Karawang as the second. Meanwhile, in other regions, even in Bandung as the Provincial capital, the proportion of foreign investment is below ten percent.

Figure 10 illustrates that the total foreign investment fluctuated from IDR 74.99 trillion in 2016 to IDR 88.22 trillion in 2019. In 2020 it decreased to IDR 69.03 trillion, supposedly due to the pandemic, although higher than those in 2017, signaling that the pandemic has an insignificant effect on foreign investment in West Java.

Table 3: Total (in trillion IDR) and Percentage of Foreign Direct Investment in West Java Based on Spatial Distribution, 2016—2020

No	Regency / Municaplity	2016		2017		2018		2019		2020	
		Rp	%	Rp	%	Rp	%	Rp	%	Rp	%
1	Bogor	5.12	6.83%	4.26	6.20%	4.95	6.63%	4.77	5.40%	2.86	4.14%
2	Sukabumi	0.97	1.29%	0.42	0.61%	0.61	0.82%	0.37	0.42%	0.21	0.31%
3	Cianjur	0.73	0.97%	0.43	0.63%	0.04	0.05%	0.28	0.32%	0.09	0.12%
4	Bandung	0.44	0.58%	0.60	0.87%	0.38	0.51%	3.18	3.61%	2.85	4.13%
5	Garut	0.18	0.24%	0.14	0.20%	0.17	0.23%	0.15	0.17%	0.40	0.58%
6	Tasikmalaya	0.01	0.01%	0.05	0.07%	0.07	0.10%	0.00	0.00%	0.00	0.00%
7	Ciamis	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
8	Kuningan	0.06	0.08%	0.10	0.14%	0.07	0.09%	0.00	0.00%	0.04	0.06%
9	Cirebon	1.27	1.69%	4.58	6.66%	3.84	5.14%	8.94	10.14%	4.68	6.77%
10	Majalengka	0.13	0.18%	0.95	1.38%	1.22	1.63%	0.40	0.46%	0.20	0.29%
11	Sumedang	0.24	0.32%	0.24	0.35%	0.11	0.14%	0.00	0.00%	0.04	0.05%
12	Indramayu	0.02	0.02%	0.32	0.46%	0.12	0.15%	1.47	1.66%	0.19	0.27%
13	Subang	0.84	1.12%	1.01	1.48%	1.03	1.37%	0.93	1.05%	4.17	6.04%
14	Purwakarta	2.22	2.96%	2.11	3.07%	5.83	7.80%	5.24	5.94%	3.69	5.35%
15	Karawang	17.77	23.69%	20.63	30.05%	11.64	15.58%	21.32	24.17%	14.24	20.63%
16	Bekasi	41.37	55.16%	26.44	38.51%	39.06	52.30%	27.15	30.78%	25.91	37.54%
17	Bandung Barat	0.14	0.18%	0.82	1.20%	0.77	1.03%	4.08	4.63%	2.94	4.26%
18	Pangandaran	0.00	0.00%	0.00	0.00%	0.01	0.02%	0.00	0.00%	0.00	0.00%
19	Kota Bogor	0.46	0.61%	0.25	0.36%	0.27	0.36%	0.03	0.03%	0.08	0.12%
20	Kota Sukabumi	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.01	0.01%	0.00	0.01%
21	Kota Bandung	0.78	1.04%	1.08	1.58%	0.27	0.36%	3.79	4.30%	2.00	2.90%
22	Kota Cirebon	0.19	0.26%	0.26	0.38%	0.04	0.05%	0.01	0.01%	0.01	0.01%
23	Kota Bekasi	1.47	1.96%	2.64	3.85%	3.70	4.95%	3.15	3.58%	2.87	4.16%
24	Kota Depok	0.48	0.64%	1.02	1.48%	0.46	0.62%	1.69	1.92%	0.71	1.03%
25	Kota Cimahi	0.07	0.10%	0.31	0.46%	0.03	0.04%	1.23	1.40%	0.83	1.20%
26	Kota Tasikmalaya	0.04	0.06%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.00	0.01%
27	Kota Banjar	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
	Total	74.99	100.00%	68.67	100.00%	74.69	100.00%	88.22	100.00%	69.03	100.00%

Source: https://opendata.jabarprov.go.id/

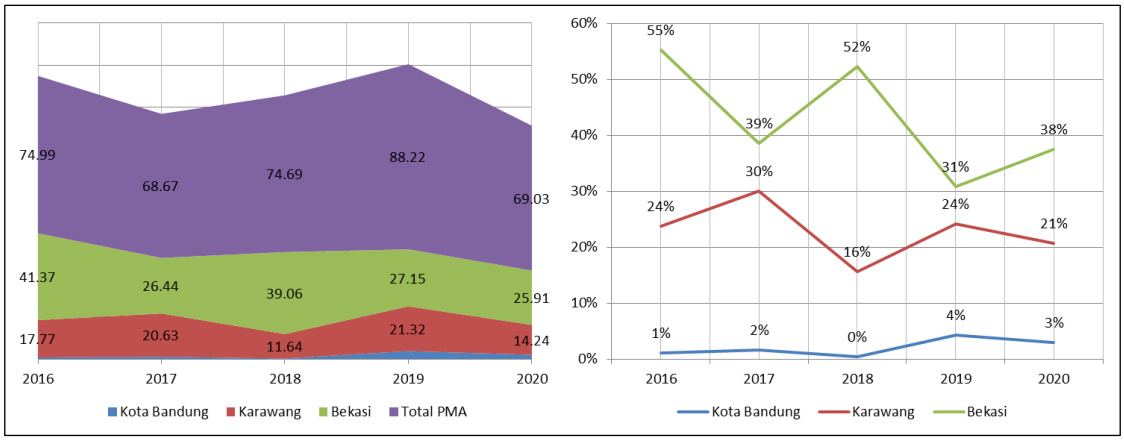

Figure 10. The Info-graphic of Foreign Direct Investment in West Java Based on Spatial Distribution, 2016—2020

Source: https://opendata.jabarprov.go.id/

Although foreign investment in West Java tends to be insensitive to the pandemic spatially, the correlation between the pandemic effect and foreign investment appeared from a business-sector point of view. Table 4 details the foreign investment time series data based on the business sector from 2016 to 2021. The Table highlights the dominant business sector each year.

Table 4: Total (in trillion IDR) and Percentage of Foreign Direct Investment in West Java Based on Business-Sector Distribution, 2016—2020

No	Business Sector	2016		2017		2018		2019		2020	
		Rp	%	Rp	%	Rp	%	Rp	%	Rp	%
1	Hotel & Restaurant	1.13	1.51%	1.46	2.13%	0.17	0.22%	0.22	0.25%	0.24	0.34%
2	Leather & Footwear Industry	0.41	0.55%	0.68	1.00%	0.94	1.25%	0.75	0.85%	0.76	1.10%
3	Medical Instrument, Optic, Clock, & Precision Industry	0.01	0.01%	0.00	0.00%	0.03	0.04%	-	0.00%	-	0.00%
4	Rubber & Plastic Industry	5.32	7.09%	4.00	5.82%	2.60	3.49%	2.38	2.70%	0.76	1.11%
5	Wood Industry	0.04	0.05%	0.02	0.02%	0.12	0.16%	0.16	0.18%	0.15	0.22%
6	Motor Vehicle and Other Transportation Equipment Industry	29.97	39.97%	15.27	22.24%	11.56	15.48%	9.65	10.94%	11.30	16.37%
7	Paper & Printing Industry	0.84	1.12%	1.81	2.63%	2.80	3.75%	1.55	1.75%	0.55	0.80%
8	Chemical and Pharmaceutical Industry	3.11	4.14%	4.41	6.42%	4.26	5.71%	5.25	5.95%	2.19	3.18%
9	Other Industries	0.22	0.29%	0.67	0.97%	0.93	1.25%	2.66	3.01%	3.15	4.57%
10	Metal, Machinery and Electronics Industry	8.04	10.72%	10.54	15.35%	13.81	18.50%	1.33	1.51%	2.69	3.89%
11	Food Industry	8.01	10.68%	2.45	3.57%	2.72	3.64%	2.56	2.90%	3.30	4.79%
12	Minerals and Metals Industry	1.97	2.63%	3.10	4.51%	3.02	4.04%	1.53	1.74%	0.36	0.52%
13	Textile Industry	1.72	2.30%	2.13	3.10%	1.88	2.52%	2.09	2.37%	1.12	1.63%
14	Other Services	1.02	1.36%	5.35	7.79%	1.49	1.99%	0.48	0.55%	2.94	4.26%
15	Forestry	0.05	0.06%	0.00	0.00%	0.00	0.00%	0.01	0.01%	0.00	0.00%
16	Construction	0.16	0.21%	1.08	1.57%	0.09	0.12%	0.54	0.61%	1.44	2.09%
17	Electricity, Gas & Water	1.00	1.33%	4.11	5.98%	4.71	6.31%	17.58	19.93%	10.32	14.94%
18	Trading & Reparation	1.45	1.93%	1.37	2.00%	0.94	1.26%	1.10	1.25%	0.58	0.84%
19	Fishery	-	0.00%	0.07	0.11%	0.02	0.02%	0.01	0.02%	0.00	0.00%
20	Mining	0.58	0.77%	0.06	0.09%	0.02	0.03%	0.04	0.05%	0.01	0.02%
21	Housing, Industrial Estate and Offices	8.32	11.10%	6.36	9.26%	16.67	22.32%	14.00	15.87%	9.39	13.61%
22	Husbandry	0.17	0.23%	0.50	0.73%	0.47	0.63%	0.22	0.25%	0.00	0.00%
23	Food Crops & Plantation	0.03	0.04%	0.10	0.14%	0.05	0.07%	0.28	0.32%	0.30	0.43%
24	Transportation, Warehouse & Communication	1.44	1.92%	3.13	4.57%	5.37	7.19%	23.81	26.99%	17.46	25.30%
	Total Foreign Investment	74.99	100%	68.67	100.00%	74.69	100.00%	88.22	100.00%	69.03	100.00%

Source: https://opendata.jabarprov.go.id/

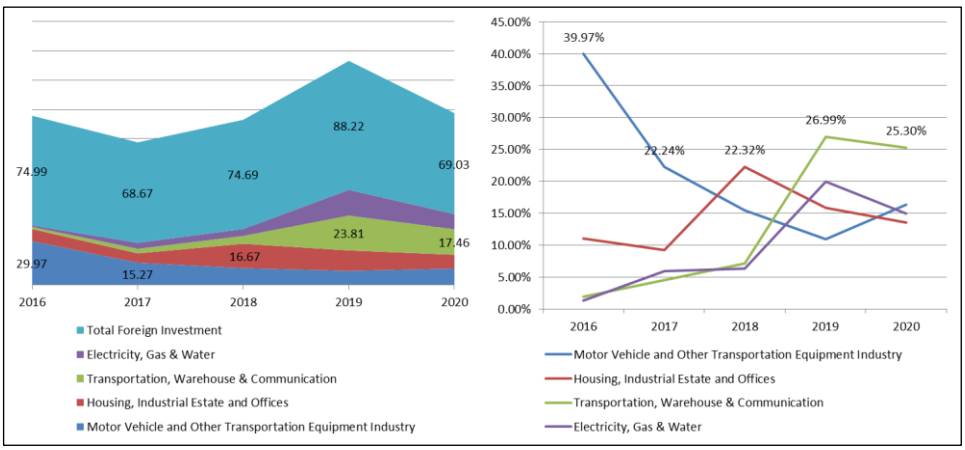

Figure 11. The Info-graphic of Foreign Direct Investment in West Java Based on Business-Sector Distribution, 2016—2020

Source: *https://opendata.jabarprov.go.id/*

Historical data shows that in 2016-2017 foreign investors were more interested in the motor-vehicle and transportation equipment sectors. Next, in 2017, they shifted to housing, industrial estates, and offices. Furthermore, in 2019-2020, when the covid-19 pandemic hit the world economy, they invested in transportation, warehouse, and communication.

Figure 11 reveals the most attractive business sector for foreign investors showing their trend in 2016-2020. The Electricity, Gas, and Water sector was also included in the graph to support the research topic discussion. The next session discusses the Domestic Investment Profile.

3.4 Domestic Investment Profile

Table 5 details domestic investment in West Java based on spatial distribution during 2016-2020. From a spatial point of view, the domestic investment profile in West Java indicates a similar trend to foreign investment where it were majority in Bekasi and Karawang. However, from a total investment-trend point of view, domestic and foreign investments were different. As illustrated in Figure 12 comparing Figure 10, the trend of total foreign investment fluctuated while the domestic dramatically increased even during the pandemic period.

Table 5: Total (in billion IDR) and Percentage of Domestic Direct Investment in West Java Based on Spatial Distribution, 2016—2020

No	Regency / Municipality	2016		2017		2018		2019		2020	
		Rp	%	Rp	%	Rp	%	Rp	%	Rp	%
1	Bogor	2,706.52	8.91%	2,137.30	5.57%	3,733.24	8.83%	4,414.69	8.96%	6,300.89	12.26%
2	Sukabumi	97.97	0.32%	79.12	0.21%	351.70	0.83%	218.17	0.44%	1,490.13	2.90%
3	Cianjur	862.35	2.84%	246.66	0.64%	143.34	0.34%	704.48	1.43%	508.73	0.99%
4	Bandung	425.22	1.40%	2,561.49	6.67%	2,757.56	6.52%	2,078.08	4.22%	1,096.96	2.13%
5	Garut	150.62	0.50%	1,937.78	5.05%	116.48	0.28%	625.12	1.27%	322.55	0.63%
6	Tasikmalaya	0.01	0.00%	-	0.00%	-	0.00%	-	0.00%	141.22	0.27%
7	Ciamis	-	0.00%	52.40	0.14%	0.07	0.00%	-	0.00%	0.25	0.00%
8	Kuningan	-	0.00%	59.51	0.16%	34.74	0.08%	5.01	0.01%	1.93	0.00%
9	Cirebon	349.61	1.15%	323.24	0.84%	971.68	2.30%	34.59	0.07%	278.96	0.54%
10	Majalengka	-	0.00%	2,645.00	6.89%	4,326.83	10.23%	637.80	1.29%	793.74	1.54%
11	Sumedang	340.64	1.12%	3,999.44	10.42%	998.33	2.36%	1,226.61	2.49%	1,142.82	2.22%
12	Indramayu	1.61	0.01%	68.00	0.18%	110.87	0.26%	33.73	0.07%	355.30	0.69%
13	Subang	66.68	0.22%	178.30	0.46%	519.04	1.23%	1,534.88	3.11%	78.27	0.15%
14	Purwakarta	1,748.58	5.76%	1,967.38	5.12%	344.24	0.81%	990.51	2.01%	3,291.09	6.40%
15	Karawang	5,651.66	18.62%	8,361.86	21.78%	3,199.80	7.57%	2,972.15	6.03%	2,500.16	4.86%
16	Bekasi	7,435.01	24.49%	6,183.34	16.11%	15,000.98	35.48%	20,206.86	41.00%	11,411.42	22.20%
17	Bandung Barat	835.59	2.75%	201.50	0.52%	43.74	0.10%	41.70	0.08%	174.95	0.34%
18	Pangandaran	-	0.00%	-	0.00%	15.50	0.04%	-	0.00%	11.21	0.02%
19	Kota Bogor	259.96	0.86%	4,938.41	12.86%	2,830.91	6.70%	2,353.14	4.77%	1,521.40	2.96%
20	Kota Sukabumi	-	0.00%	1.69	0.00%	-	0.00%	35.88	0.07%	77.71	0.15%
21	Kota Bandung	6,389.00	21.04%	994.31	2.59%	2,128.59	5.03%	2,517.68	5.11%	8,623.64	16.78%
22	Kota Cirebon	-	0.00%	30.73	0.08%	523.08	1.24%	2.66	0.01%	30.73	0.06%
23	Kota Bekasi	1,794.23	5.91%	1,192.41	3.11%	2,674.86	6.33%	4,086.28	8.29%	3,788.75	7.37%
24	Kota Depok	230.41	0.76%	62.85	0.16%	1,264.32	2.99%	4,470.03	9.07%	7,175.44	13.96%
25	Kota Cimahi	1,012.75	3.34%	52.62	0.14%	144.72	0.34%	91.88	0.19%	261.51	0.51%
26	Kota Tasikmalaya	1.80	0.01%	115.31	0.30%	43.59	0.10%	2.22	0.00%	15.40	0.03%
27	Kota Banjar	-	0.00%	-	0.00%	-	0.00%	-	0.00%	5.39	0.01%
	Total Domestic Investment	30,360.21	100.00%	38,390.65	100.00%	42,278.21	100.00%	49,284.16	100.00%	51,400.55	100.00%

Source: https://opendata.jabarprov.go.id/

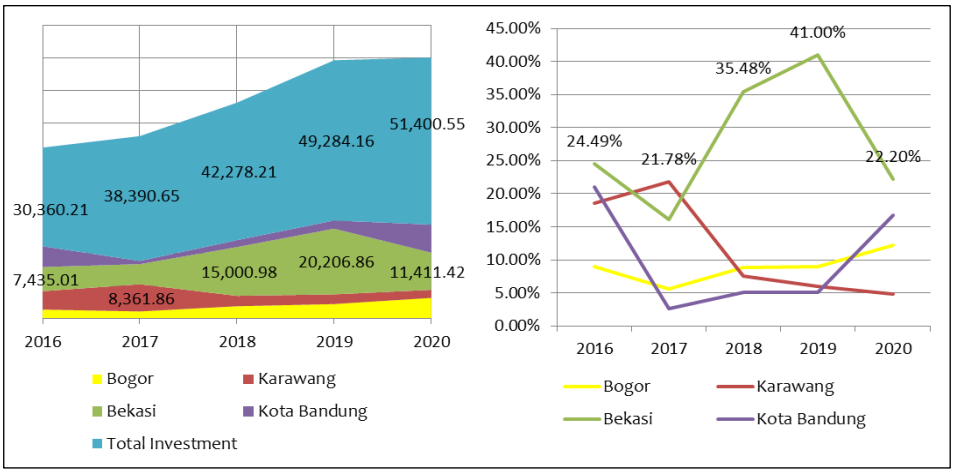

Figure 12. The Info-graphic of Domestic Direct Investment in West Java Based on Spatial Distribution, 2016—2020

Source: https://opendata.jabarprov.go.id/

From a business-sector distribution point of view, domestic investors had different interests than foreigners'. The majority of them invested in the Construction and Food Industry sectors. Table 6 shows the Domestic Investment Profile of West Java in 2016-2020 based on business-sector distribution. The aggregate data is then illustrated in Figure 13 to see the investment trend.

Table 6: Total (in billion IDR) and Percentage of Domestic Direct Investment in West Java Based on Business Sector Distribution, 2016-2020

No	Business Sector	2016		2017		2018		2019		2020	
		Rp	%	Rp	%	Rp	%	Rp	%	Rp	%
1	Hotel & Restaurant	147.96	0.49%	1,293.12	3.37%	260.99	0.62%	1,600.89	3.25%	1781.0147	3.46%
2	Leather & Footwear Industry	-	0.00%	34.72	0.09%	47.49	0.11%	4.92	0.01%	50.075	0.10%
3	Medical Instrument, Optic, Clock, & Precision Industry	-	0.00%	-	0.00%	1.12	0.00%	-	0.00%	0	0.00%
4	Rubber & Plastic Industry	1,033.97	3.41%	2,301.55	6.00%	489.75	1.16%	643.56	1.31%	1603.9456	3.12%
5	Wood Industry	1.76	0.01%	131.10	0.34%	27.74	0.07%	3.72	0.01%	6.0646	0.01%
6	Motor Vehicle and Other Transportation Equipment Industry	732.00	2.41%	395.56	1.03%	237.44	0.56%	69.00	0.14%	423.8854	0.82%
7	Paper & Printing Industry	2,051.58	6.76%	5,512.93	14.36%	252.85	0.60%	81.39	0.17%	475.7163	0.93%
8	Chemical and Pharmaceutical Industry	2,681.67	8.83%	2,767.90	7.21%	3,820.37	9.04%	1,421.95	2.89%	2473.9828	4.81%
9	Other Industries	336.66	1.11%	79.33	0.21%	164.15	0.39%	268.64	0.55%	124.3703	0.24%
10	Metal, Machinery and Electronics Industry	4,334.47	14.28%	2,555.94	6.66%	2,501.97	5.92%	3,665.33	7.44%	1486.3191	2.89%
11	Food Industry	3,673.04	12.10%	6,755.10	17.60%	4,573.68	10.82%	2,287.34	4.64%	1536.804	2.99%
12	Minerals and Metals Industry	1,051.48	3.46%	935.70	2.44%	613.48	1.45%	795.58	1.61%	713.0269	1.39%
13	Textile Industry	1,193.77	3.93%	3,613.07	9.41%	866.56	2.05%	382.79	0.78%	1234.9345	2.40%
14	Other Services	404.60	1.33%	432.76	1.13%	744.63	1.76%	1,562.17	3.17%	748.4092	1.46%
15	Forestry	0.37	0.00%	-	0.00%	-	0.00%	-	0.00%	4	0.01%
16	Construction	6,246.26	20.57%	894.07	2.33%	10,191.01	24.10%	16,655.32	33.79%	25232.92	49.09%
17	Electricity, Gas & Water	1,985.33	6.54%	2,484.49	6.47%	5,139.29	12.16%	3,670.65	7.45%	2254.989	4.39%
18	Trading & Reparation	368.91	1.22%	409.55	1.07%	496.10	1.17%	761.55	1.55%	416.8859	0.81%
19	Fishery	-	0.00%	3.56	0.01%	5.19	0.01%	0.04	0.00%	9.5168	0.02%
20	Mining	6.27	0.02%	1.02	0.00%	146.91	0.35%	95.06	0.19%	128.9004	0.25%
21	Housing, Industrial Estate and Offices	2,595.16	8.55%	3,411.61	8.89%	3,763.14	8.90%	7,886.20	16.00%	7648.3064	14.88%
22	Husbandry	143.75	0.47%	55.07	0.14%	145.20	0.34%	146.86	0.30%	0	0.00%
23	Food Crops & Plantation	26.95	0.09%	17.00	0.04%	3.30	0.01%	698.88	1.42%	53.0206	0.10%
24	Transportation, Warehouse & Communication	1,344.24	4.43%	4,305.48	11.21%	7,785.85	18.42%	6,582.33	13.36%	2993.4581	5.82%
	Total Domestic Investment	30,360.21	100.00%	38,390.65	100.00%	42,278.21	100.00%	49,284.16	100.00%	51,400.55	100.00%

Source: https://opendata.jabarprov.go.id/

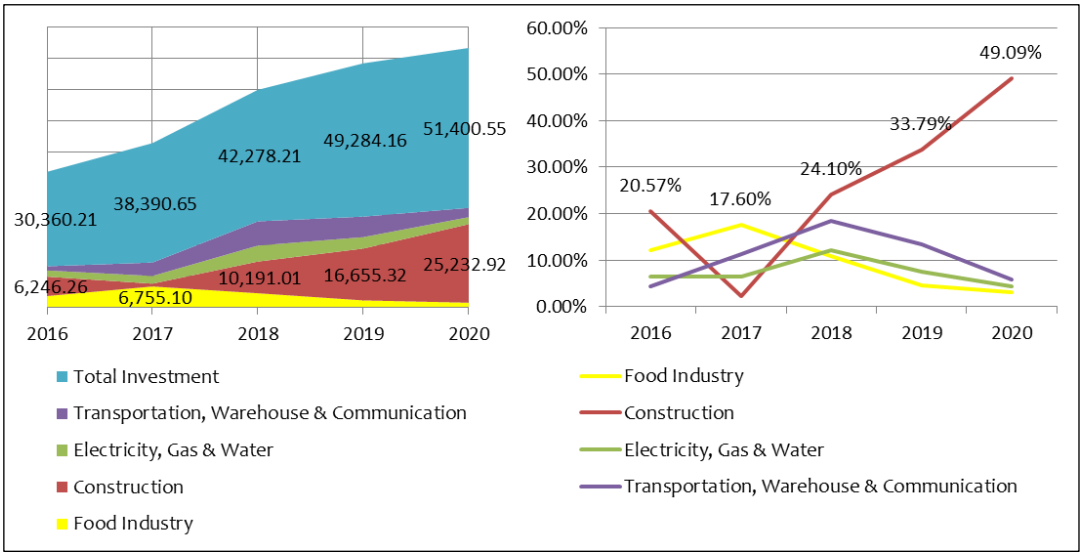

Figure 13. The Info-graphic of Domestic Direct Investment in West Java Based on Business-Sector Distribution, 2016—2020

Source: https://opendata.jabarprov.go.id/

Based on the Figure 13 configuration, the highest proportion of domestic investment in 2016 was for the Construction sector or 20.57%. Even though it turned to the Food Industry sector (17,60%) in 2017, It return to construction sector in the following years with a significant increase in the proportion from 24,10% to 33.79 % in 2018 and 2019, respectively. In 2020 almost half of domestic investment was in the Construction sector, indicating the domestic investment climate in West Java insensitive to the pandemic situation.

The elaboration of electricity, telecommunication infrastructure, and regional investment in the previous section, then the subjects for confirmation to interviewees privately. The results of the interviews were a resume of points, and the long list of opportunities and challenges of each sector development. The all together, then discussed on the FGD to formulate policy recommendations which analyzed in the following section. The analysis is started with the issues on investment, followed by issues on electricity, and ends with issues on telecommunication.

3.5 The Opportunities and Challenges Analyses of the Regional Investment

The interviews discussed the function of the West Java Provincial Government in the investment sector on conceptual and managerial aspects. The local Government policies in the investment sector conceptually are contained in the General Investment Plan (RUPM) document. The RUPM of West Java Province ratified in Governor Regulation 13 of 2013 concerning the General Plan of Investment of West Java Province (Peraturan Gubernur Jawa Barat Nomor 13, 2013).

Managerially, the local executive institution (OPD) of RUPM is the Regional Investment Coordinating Board (BKPMD). In addition, following the development of laws and regulations regarding Regional Government, in 2016, a restructuring took place. The OPD handling investment is the One Stop Integrated Licensing and Investment Office (DPMPTSP).

Based on the Governor's Regulation (Pergub) Number 26 of 2016 concerning Main Duties, Functions, Details of Unit Tasks, and Work Procedures of the DPMPTSP, the OPD function is more likely to be an investor service executive than a coordinating function (Peraturan Gubernur Jawa Barat Nomor 26, 2016). Thus, the Local Governments focus on providing excellent service to investors, especially in terms of ease of investment, business licensing services, and other permits.

In 2021, the investment coordination function is then carried out by the BUMD, Investment, and Development Administration Bureau under the Provincial Secretariat based on Governor Regulation

Number 4 of 2021 concerning Main Duties, Functions, Details of Duties, and Work Procedures for the Regional Secretariat of West Java Province (Peraturan Gubernur Jawa Barat Nomor 4, 2021).

Interviews and FGDs reveal that the vision of West Java Development, namely "***Jabar Juara Lahir Batin dengan Sinergi dan Kolaborasi,"*** is very relevant to developing investment in West Java. With such development vision, West Java Province enjoys synergy with central Government programs (through Ministry/Agency programs), with neighboring Provincial Governments, and with local Governments in foreign countries through Sister Province programs. In addition, the development of West Java does not only rely on the Government budget, but also collaborates with investment from the private sector.

Among the forms of development synergy (between Government agencies) is the issuance of Presidential Regulation 87 of 2021 concerning the Acceleration of Development of the Rebana and Southern of West Java Regions (Peraturan Presiden Republik Indonesia Nomor 87, 2021). With the priority program activities of Ministries/Institutions (K/L) and optimization of the Specific Purpose Allocation Fund (DAK), both physical and non-physical, Regional Incentive Funds (DID) and Co-administration Tasks (TP) from Ministries/Agencies can be a solution to budget constraints of local Governments in developing.

In addition, development synergies are also through cooperation between local Governments. Not only with bordering provinces, such as DKI Jakarta, Banten, and Central Java, but also with provinces that are geographically far apart, such as the Province of West Sumatra for the 50-hectare corn planting program. Furthermore, in the West Java Tourism, Trade and Investment Partnership (WJ-TRIP), the Governor of West Java, M. Ridwan Kamil, opened up opportunities for cooperation with 33 provinces in Indonesia. He said: "The economy does not need to be limited to political areas. There is supply and demand, there is prosperity. So the important thing is optimizing interregional trade and cooperation" (Nugraha, 2021).

The development of West Java is not only in synergy with local governments in Indonesia, but also with several local Governments in foreign countries. Among them are 1) South Australia; 2) South Chungcheong Province, South Korea; 3) prefecture Shizuoka, Japan; and 4) four provinces in the People's Republic of China (PRC), namely Guangxi Zhuang, Chongqing, Sichuan, and Heilongjiang.

Furthermore, the West Java Provincial Government conducted development Collaboration with the private sector through Public Private Partnerships (PPP) mechanism. The public can monitor the progress by accessing the website http://kpbu.jabarprov.go.id/ page containing comprehensive information about PPPs in West Java, including eight forthcoming strategic projects.

One of the eight strategic projects relevant to this research is the construction of a Solar Power Plant (PLTS) to reduce dependence on fossil fuels. By installing solar panels in Regional Government buildings, schools, sports buildings, and health facilities, the Provincial Government will cooperate with private companies which resell the power to PLN. When this paper written, the project was still in the preliminary study stage.

Based on interviews and FGD, the summary of investment development opportunities in West Java are:

1. The West Java Development Vision, which relies on synergy and Collaboration, can be a solution to limited local budgets in development investment.
2. The existence of the Presidential Regulation 87/2021 on the Acceleration of Development of the Rebana and Southern West Java Areas can trigger the emergence of a new center of economic growth in West Java Province.
3. Foreign investors are interested in the telecommunication sector, especially during the pandemic.

In addition, to identifying opportunities, the interviews and FGDs also identified challenges faced by the West Java Provincial Government in investment. Summary the challenges facing the investment sector in West Java include:

1. The interregional investment inequality may increase the economic and development gap across regions in West Java.
2. Sectorial Investment Gap: Foreign Investors were interested in Transportation Sector, while Domestic Investors were interested in Construction Sector.

3. DPMPTSP roles are still limited to investment permit administration, while electricity and the telecommunication infrastructure development administer by each technical OPD.

The above opportunities and challenges are then analyzed to produce policy recommendations as tabulated in Table 7.

Table 7: Policy Recommendations on Investment in West Java

Challenges \ Opportunities	West Java Development Vision achieved by Synergy and Collaboration	Presidetial Regulation 87/2001 on Rebana and Southern of West Java Region Development Acceleration	FDI tends to be interested in electricity and telecommunication sector in West Java
interregional investment gap: majority in Bekasi and Karawang	Synergy of development in the Rebana and Southern areas of West Java	Interregional Equitable Development	Promoting investment in the electricity and telecommunications sectors in South West Java to foreign investors
Sectorial Investment Gap: Foreign Investors were interested in Transportation Industry, Domestic Investors were interested in Construction Sector	Collaboration between the business interests and regional development priorities	Promotion of investment in the Rebana and the Southrn West Java Regions	Mainstreaming the electricity sub-sector and telecommunications sector
Local Government Roles still limited on investment permit administration	Optimization of DAK and DID and TP of K/L in areas with minimal investment	Optimization of DAK and DID and TP of K/L in areas with minimal investment	Ease of Investment, especially in the Electricity and Telecommunication sector

Source: FGD

Investment policy recommendations in West Java presented in Table 7 which is regarded as expert justification (professional judgment). The analysis of opportunities and challenges for developing the electrical energy sub-sector reviewed in the next sub-section.

3.6 The Opportunities and Challenges Analyses of Electricity Development

Based on the explanation of the interviewees, the national electricity policy is juridical based on Law Number 30 of 2009 concerning Electricity (Undang-Undang Republik Indonesia Nomor 30, 2009). In West Java, the implementation of the regulations translated into Regional Regulation Number 4 of 2019 concerning Amendments to Regional Regulation Number 21 of 2001 concerning the Implementation of Electricity (Peraturan Daerah Nomor 4, 2019). The technical planning, namely the Regional General Electricity Plan (RUKD), comprehensively ruled in the West Java Provincial Regulation Number 2 of 2019 concerning the General Regional Energy Plan / RUED (Peraturan Daerah Provinsi Jawa Barat Nomor 2, 2019).

Based on regulatory references provided by informants, the RUED contains long-term modeling of energy needs based on the energy mix, including Electricity, Gas, Fuel Oil (BBM), and Bioenergy. Energy demand modeling includes five sector categories, namely: 1) Transportation Sector, 2) Industrial Sector, 3) Household Sector, 4) Commercial Sector, and 5) Other Sectors. Energy Demand Modeling in the household sector in West Java in units of Million Ton Oil Equivalent (MTOE) detailed in Table 8.

Table 8: Final Energy Demand Modeling Results in the Household Sector per Energy Type 2015 – 2025 (MTOE Unit)

Energy Type	2015	2016	2017	2017	2018	2020	2025	2030	2040	2050
Electric	1.4	1.6	1.9	2.1	2.3	2.6	4.1	5.9	10.6	16.2
	46.0%	48.7%	51.3%	53.6%	55.8%	57.9%	66.4%	72.5%	80.5%	85.2%
Gas	1.69	1.72	1.75	1.79	1.82	1.85	2.01	2.17	2.47	2.74
	53.8%	51.0%	48.4%	45.9%	43.6%	41.5%	32.8%	26.6%	18.8%	14.4%
Fuel (BBM)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.16%	0.15%	0.14%	0.13%	0.12%	0.11%	0.07%	0.05%	0.02%	0.00%
Bionergy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.04%	0.15%	0.16%	0.37%	0.48%	0.49%	0.73%	0.85%	0.68%	0.40%
Total	3.1	3.4	3.6	3.9	4.2	4.5	6.1	8.1	13.1	19.0

Source: Proceed from Perda No. 2/2019 concerning the General Regional Energy Plan (RUED)

Table 8 indicates that the proportion of household energy needs in 2015 was mainly gas (53.8%), then electricity (46.0%). From year to year, it projected that starting in 2017, the main household energy will switch from gas to electricity. In the future, by 2025, 66.4% of household energy needs will be electrical energy; furthermore, in 2050, electrical energy needs will reach 85.2% of the various total types of energy consumed.

The discussion then continued to the scope of the Provincial Government authority in the electrical energy sub-sector based on regulations. The article 6 of the West Java Provincial Regulation 4/2019 concerning Electricity Management details 11 (eleven) authorities of the West Java Provincial Government. The eleven points of authority position the Provincial Government as the electricity regulator in its administrative area. The operation of providing electricity for the public interest, as mentioned in Article 16, carried out by the electricity provider.

Operators of electricity providers carry out business activities based on the Electricity Supply Business Plan (RUPTL). Until this paper was written, the Governor's Regulation on RUPTL has not been published. Thus, the RUPTL in West Java refers to Government Regulation (PP) Number 23 of 2014 concerning Amendments to Government Regulation number 14 of 2012 concerning Business Plans for the Provision of Electricity (Peraturan Pemerintah Republik Indonesia Nomor 23, 2014).

In the explanation of PP number 23/2014, it is written:

"...***the development of electricity infrastructure is capital-intensive and technology-intensive, while the availability of the State Revenue and Expenditure Budget (BUMN) for the development of electricity infrastructure has not been able to meet the total increase in electricity demand, so it is necessary to provide wider opportunities for private sectors to participate in the provision of electricity***.

In order to accelerate the fulfillment of electricity needs more efficiently, it is necessary to provide opportunities for private sectors and developers who are already operating to expand the supply of electricity to the local electric power system through direct appointment or direct selection mechanisms."

Because it is capital-intensive and technology-intensive, the business of providing electricity is massive and beyond administrative boundaries to meet economies of scale and be feasible in business calculations. For example, the scope of work of one of the power and grid units (PIKITRING) belonging to the State Electricity Company (PLN) covers Java, Bali, and Nusa Tenggara (JBN). This condition may be one of the reasons why the RUPTL has been sufficiently regulated by the PP so that the Governor's Regulation on RUPTL has not yet urgently issued.

Nevertheless, West Java has a Regional State Owned Enterprise (BUMD), which engaged in the electricity sector, namely PT. Tirta Gemah Ripah. This BUMD operates a Micro Hydro Power Plant (PLTM) in Cirompang, Garut Regency. The business prospect of this BUMD considered bright due to the potential

of river water resources with high water discharge and steep topography, as well as the electrification ratio, which not yet one hundred percent in the South West Java region.

Although the BUMD business in the electricity sector has promising prospects in the future, the regional budget (APBD) for BUMD capital participation as an effort to expand business in the electricity sector still needs political support from the DPRD. Meanwhile, the strategy to anticipate the threat of a national and global economic recession, as recommended by the Regional Economic Recovery Committee (KPED) of West Java, prioritizes the food sector and its supply chain (Humas Jabar, 2022).

The resume of the interview with the informants, accompanied by the literature submitted, is as follows. The West Java opportunities in the electricity sector include:

1. The pattern of needs, along with strategic steps to fulfill the need for electrical energy (comprehensively with other types of energy) in the long term (until 2050), has been taken into account by the Government and stipulated in the West Java Provincial regulation Number 2 of 2019 concerning the General Plan of Regional Energy.
2. The Regional Regulation 4 of 2019 concerning the Implementation of Electricity took place.
3. West Java has the PT. Tirta Gemah Ripah, a BUMD which operates a Micro Hydro Power Plant (PLTM) located in Cirompang, Garut Regency. The electrification ratio in South West Java and the presence of rivers with high water discharge and steep topography are opportunities for BUMD's business expansion in providing electricity in remote areas.

The challenges for West Java electricity development are:

1. Future energy needs (2050 projections) in the household sector mostly (85.2% of total energy demand) are electrical energy with a volume of 16.2 Million Ton Oil Equivalent (MTOE)
2. Electricity supply business is Capital-Intensive and technology-intensive, so the feasibility of the business requires a large production scale and a wide range of services (beyond administrative limits). Thus, the role of local Governments in the field of electrical energy is still limited.
3. BUMD's business expansion in the electricity sector requires political will. At the same time, the Regional Economic Recovery Strategy recommended by KPED focus on the food sector and its supply chain.

The identified opportunities and challenges discussed in the FGD were then processed to formulate policy recommendations as described in Table 9.

Table 9: Policy Recommendations on Investment in West Java

Challenges \ Opportunities	The existence of Electricity Technical Plan Regulation	The existence of electricity governance regulations	The Exisence of Regional SOE PT. Tirta Gemah Ripah operating Microhydro Power Plan
Household energy needs in the future (2050) are projected to be highly dependent (85.6%) on electricity	Public Private Partnership (PPP) in developing electricity Infrastructure	Ease of Investment in Electricity Sector	Regional SOE Revitalitazion
The role of the Local Government in the electricity sector is still limited	Supplying the "niche market" of household electrical energy in remote areas	Supplying the "niche market" of household electrical energy in remote areas	Regional SOE Revitalitazion
Local Governments focus on the food sector and its supply chain, not yet on the energy sector	Mainstreaming of the electrical energy sub-sector	Mainstreaming of the electrical energy sub-sector	B to B collaboration between Regional SOE and other Business Entities

Source: FGD

Electrical power supply sustainability can guarantee the economic activities sustainability of various sectors, including the telecommunication sector. The analysis of opportunities and challenges development of the telecommunications sector in West Java discussed in the next subsection.

3.7 The Opportunities and Challenges Analyses of Telecommunication Facilities Development

Interviewees revealed that the development of the telecommunications sector in West Java is based on Regional Regulation (Perda) Number 4 of 2021 concerning the Implementation of Communication, Informatics, Statistics, and Encryption (Peraturan Daerah Provinsi Jawa Barat Nomor 4, 2021). Technically, the implementation carried out by the Telecommunications and Information Office regarding to the Governor's Regulation 60 of 2017 concerning Duties, Functions, Details of Unit Tasks, and Work Procedures for the Office of Communication and Information (Peraturan Gubernur Jawa Barat Nomor 60, 2017). Based on the discussion, it identified the relevant mandates of Perda Number 4/2021 with this research are: 1) the implementation of Electronic-Based Government System Services (SPBE) and 2) the development of a digital province.

In line with this research, on 27-28 July 2022, the West Java Provincial Government, in Collaboration with ITB and BAKTI Kominfo held a Hybrid-Webinar with two discussion agendas: 1) Discussion on digital transformation in the economic, social and environmental fields after the Covid-19 pandemic, and 2) Discussion on the impact and potential of digital development Collaboration for economic, social, and environmental recovery. The event enriched the information, sharpened issues, and expanded the perspective of the research discussions, as well as confirmed that the research theme is relevant to strategic issues in West Java.

The Covid-19 pandemic considered as the trigger for the acceleration of digitalization in almost all sectors. The digital transformation occurs in business, education, and bureaucracy. The Government (both national and regional) believe that public service digitalization support the national economy, financial governance, and inclusive finance. Furthermore, digitalization may increase the efficiency and effectiveness of public services, supporting transparency in the Government system, as well as optimizing regional revenues and fiscal health. The strategy by promote digital Government transactions for regional expenditure and income transactions, and digital-based or cashless payments to the public.

Public service digitalization was then supported by Presidential Decree no. 3 of 2021 concerning the Task Force for the Acceleration and Expansion of Regional Digitization (Keputusan Presiden Republik Indonesia Nomor 3, 2021). The Task Force aims to 1) encourage the implementation of Regional Government Digital Transactions (ETPD) in order to increase the transparency of regional financial transactions, support governance, and integrate regional financial management systems to optimize regional revenues; and 2) support the development of public digital payment transactions, realize financial inclusion, and increase economic integration and national digital finance.

In West Java, public service digitalization accelerates by collaborating with local Governments in foreign countries through the Sister Province program. One of them is cooperation with Chungcheongnam-do, South Korea. According to Governor M. Ridwan Kamil, the Sister Province program has seven new economic opportunities, namely: 1) seizing investment opportunities for companies moving from China, 2) achieving food self-sufficiency, 3) accelerating technology self-sufficiency, 4) encouraging business opportunities in the health sector, 5) adapting digital economy, 6) Implementing a sustainable economy, and 7) promoting local tourism.

In local scope, the West Java Provincial Government develops digital villages. The progress of the Digital Village development can be accessed by the public at https://desadigital.jabarprov.go.id/. To realize a self-sustaining village in West Java, the Provincial Government encourages academics, business, and communities, especially in rural areas, to participate on mainstreaming Internet of Things (IoT) activities, and training digital literacy for villagers. With the Penta-helix concept, until now 2,205 villages have become program beneficiaries and 22 partners have been collaborating.

Nevertheless, empirical facts disclose blank spots area of cell phone and internet signals in rural areas in West Java. It may the reason why the Access and Infrastructure Sub-index in West Java ICT Development Index was at 6.65 or still in the moderate category. Nationally, the ranking of West Java is still stagnant at ranking 6 in the last two years, even though one of the expectations of West Java's development is to become a Cyber Province.

The FGD then opened up potential solutions for the blank spot village. The Village Fund and Village authority in determining development priorities through the Village Medium-Term Development Plan (RPJMDes), may encourage the acceleration of digital village development even in remote areas. The

Village Fund Budget may use to provide free WIFI in rural areas. In addition, the business Collaboration between Village Owned Enterprises (BUMDes) and internet service providers (B to B cooperation) in providing paid internet access for villagers were some of the alternative solutions elaborated in the FGD.

Based on the results of the FGD and the relevant seminar resumes, it can conclude that the opportunities for telecommunications development in West Java are as follows:

1. The Covid-19 pandemic has triggered a digital transformation in almost all aspects of human life.
2. The existence of Digital Economy cooperation with foreign Provincial Governments (Sister Province)
3. Village Governments have budgetary capacity and flexibility in determining village development priorities, so they may fulfill the needs of electricity, telecommunications, and internet access infrastructure based on their capacity.

The challenges faced in a resume are:

1. There are still 23 villages with blank spots for cell phone signals and 66 villages for internet signal blanks.
2. West Java is determined to become a Cyber Province, but West Java's IP-TIK is still in the medium category, and the Access and Infrastructure sub-index were ranked six nationally in 2020.
3. The role and capacity of the Provincial, Regency/Municipal Governments in the Telecommunication sector are limited

The FGD then formulated the telecommunication sector policy recommendations, which detailed in Table 10.

Table 9: Policy Recommendations on Telecommunication Sector in West Java

Challenges \ Opportunities	The Covid-19 pandemic has triggered digital transformation in almost all sectors of life	G to G cooperation with foreign provincial governments (Sister Province) on Digital Economy took place	The village government has budgetary capacity and flexibility in determining village development priorities
There are still a number of blank spot areas for cell phone and internet signals	Optimization of DAK and DID and TP of K/L	G to G cooperation to increase infrastructure capacity in the digital economy	Utilization of the Village Fund for the provision of free WIFI for education and village tourism
ICT Development Index of West Java is still in the medium category; Access and Infrastructure sub-Index rank 6	Optimization of DAK and DID and TP of K/L	G to G cooperation to increase infrastructure capacity in the digital economy	Facilitation of B to B PKS between BUMDES and ISP Companies for the provision of paid internet networks
The role and capacity of local governments in the telecommunications sector is still limited	Optimization of DAK and DID and TP of K/L	G to G cooperation to increase infrastructure capacity in the digital economy	Facilitation of B to B PKS between BUMDES and ISP Companies for the provision of paid internet networks

Source: FGD

This study formulates recommendations for policy directions (quo Vadis) in the investment, electricity, and telecommunications sectors to face West Java's economic challenges during and after the pandemic. However, the limited respondents/research informants, namely bureaucrats, make the perspective of discussing the topics, and conclusions of this study potentially biased (bureaucrat bias).

In addition, the research just focused on households' users, while users of electrical energy include the industrial, commercial (business), and transportation sectors. Recent issues regarding Government policies that reduce fuel subsidies and encourage the conversion of LPG gas into electricity in the household sector, and the conversion of fossil fuel vehicles (BBM) into electric-powered vehicles in the transportation sector, have discussed yet in this paper.

Another limitation is the time of the study, making the implications of the recommended policies potentially out of context when the situation and conditions change rapidly. Therefore, further research are needed by involving non-Government respondents such as energy and telecommunications experts, business actors, and social media users or citizens of cyberspace (Netizens), as well as other parties. The further research may recommend policies to **Recover Together and Recover Stronger from the Covid-19 Pandemic**.

Conclusions

Based on the discussion, the conclusions of this study are: firstly, household electricity access and telecommunication infrastructure conditions in West Java were unequal between the Northern and Southern regions, particularly in terms of: electrification ratio, cellular phone signal strength, and internet signal quality. Although the Access and Infrastructure Sub-index in the West Java Information and Communication Technology Development Index (IP-TIK) increased from 6.54 in 2019 to 6.65 in 2020, West Java's ranking is stagnant ranked 6th nationally.

Secondly, the value of FDI investment in West Java had fluctuated in the last five years, while PMDN investment had a positive trend, and even tends to be unaffected by the pandemic situation. However, spatial analysis shows that investment in West Java was very unequal, with about two-thirds of investment annually in Bekasi and Karawang districts. Meanwhile, a number of areas in the South West Java Region had almost zero FDI investment. In terms of the business sector, domestic investors are more interested in the construction sector, while foreign investors tend to be attracted to the motor vehicle and transportation equipment industry.

And finally, infrastructure investment in electricity and telecommunications in West Java has not become a major concern for local Governments. The characteristics of the electricity supply business and telecommunications services are capital-intensive and technology-intensive, so that it is feasible in business calculations on a broad business scale (across administrative boundaries). Thus, until now the electricity sub-sector and the telecommunications sector are dominantly operated by BUMN. While investment in the regions tends to follow the business logic of investors (private sector), it has not been integrated with the interests (priorities) of regional development (public sector).

Suggestions that are recommended based on the conclusions of the study are: (1). Interregional inequality of electricity and telecommunications infrastructure in West Java is recommended to be adjusted by: 1) Optimizing DID, DAK and K/L Assistance Tasks, 2) G to G cooperation in the Digital Economy through the Sister Province program with local Governments in abroad, and 3) synergy with village Government. This effort is recommended so that the West Java ICT Access and Infrastructure Development Sub-index, which nationally remains at rank 6 (in 2019 and 2020), increases in the future. Equitable development of electricity and telecommunications infrastructure are recommended so that the vision of "*Jabar Juara Lahir Batin*" can be achieved, one of which is by making West Java a Cyber Province. (2). Local Governments are recommended to maintain a positive trend of Domestic Direct Investment which according to empirical data continues to increase even during the pandemic by integrating the attractiveness of return on investment for investors (business interests) to regional development priorities (public interests) through Public Private Partnership (PPP) Mechanism. Furthermore, equitable-oriented development is recommended to adjust spatial inequality of investment in West Java. Therefore, Presidential Regulation No. 87/2021 concerning the acceleration of development in the Rebana and Southern West Java areas is recommended to be implemented seriously and consistently in regional development. (3). Local Governments are recommended to be sensitive in recognizing the niches / gaps in the development of electricity and telecommunications infrastructure that have not been develpoped by the Government and BUMN based on their capacity. For example, revitalizing the BUMD PT Tirta Gemah Ripah which operates a Micro-hydro Power Plant (PLTM) in Cirompang Garut to make it more reliable in providing electrical energy in remote areas. Another example is that Local Governments can be a mediator of B to B agreement between ISP and BUMDes in providing paid internet access in rural areas. In addition, the Village Fund is encouraged to provide free WIFI for the benefit of education and village tourism in order to improve the quality of education and to accelerate village economic activity.

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Research Paper

Association of Development Disparity, Economic Growth on Poverty in South Sulawesi Province

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Abstract

The problem of regional development disparity, economic growth, and poverty has always been a strategic issue in regional development. Although the direction of the association differs in each region depending on trends in regional development disparity, economic growth, and poverty. The purpose of this research is to analyze the association of development disparity between regions, and the rate of economic growth to poverty in South Sulawesi Province, in the period 2004 – 2019. This study used simple linear regression analysis. The resulting study is the level of regional development disparity is significant and positively associated with the poverty rate in South Sulawesi. The rate of economic growth has a significant negative association with the poverty rate in South Sulawesi. The variable that has the greatest association with the poverty rate in South Sulawesi Province is the variable of development disparity.

Keywords: Regional development disparity, Economic growth, Williamson index

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1. Introduction

Economic development is a process of improving the quality of life to raise the level of life, self-esteem, and freedom (Sumiyarti, 2019). The economic development strategy that is considered the most appropriate is the acceleration of economic growth (Kuncoro, 2010). Most developing countries can achieve high economic growth but are accompanied by the emergence of problems of poverty and development disparity. This is what underlies the idea that economic growth is believed to be a necessary condition, but not sufficient for the development process. Therefore, the focus of development is not only on economic growth, the government must also focus on the problem of poverty and development disparity between regions.

Growth, disparity, and poverty are challenges in the economic development of a region. Economic development is said to be successful if there is an acceleration of economic growth, small inter-regional disparity, and low poverty rates (Todaro & Smith, 2012). These three challenges are goals in the National and Regional Development Plans in Indonesia, as well as sustainable development goals at the international level (Kuncoro, 2010). Regional development disparity is a condition of uneven development process caused by differences in the resources owned by each region, reach to developed regions and relatively underdeveloped regions. Or it can be said that the results of development are not to distribute to all groups. In Indonesia, the problem of development disparity between regions continues to this day.

In addition to the disparity between provinces and islands in Indonesia, regional disparities also occur between districts/cities within one province. In South Sulawesi Province, there is a disparity between Makassar city and regencies/cities outside Makassar City, and this tends to widen every year.

Table 1: Data on the contribution of district/city GRDP to the total GRDP of South Sulawesi

	2012	2020
Makassar City	34,06%	35,25%
Outside Makassar City	65,94%	64,77%

Source: Central Statistics Agency (2020)

The province of South Sulawesi is interesting to object to the research because from 2012 to 2020, South Sulawesi's economic growth rate has always been above the national economic growth rate. In 2012 the South Sulawesi economy grew by 8.87% while the national economic growth was only 6.03%. In 2020, economic growth experienced a very significant decline due to the COVID-19 pandemic. South Sulawesi's economic growth of -1.08% is still above the average national economic growth of -3.49%. And the percentage of poor people in South Sulawesi is always below the National and experiencing a downward trend. In 2012 the percentage of poor people in South Sulawesi was 10.11% while the percentage of poor people in the National was 11.96%. In 2020, the percentage of poor people in South Sulawesi decreased to 8.72%, while the percentage of the nation's poor is in the range of 9.78%. On the other hand, in the period 2002 – 2016 the level of disparity in South Sulawesi as measured by the Williamson Index has increased. The Williamson South Sulawesi index in 2002 was 0.53 and then rose to 0.68 in 2016 (Aswar, 2018). This condition becomes an irony at a time when economic growth and poverty in South Sulawesi continue to improve but regional development disparity does not improve.

The relationship between economic growth and progress among the poor does not necessarily indicate a causal relationship. Part of that progress may come from increasing incomes, education, and health of the poor, accelerating overall growth. Poverty reduction can be done without rapid economic growth. Regardless of the causal relationship, increasing economic growth and reducing poverty are goals that are in line (Todaro & Smith, 2012). The extent to which economic growth can reduce poverty depends on the distribution of income (Nguyen & Pham, 2018). Poverty reduction will be more effective if the resulting growth is balanced with a more equitable distribution of income. The problem that occurs is not only how to grow the economy, but also how to maximize the quality of the resulting growth

(Bourguignon, 2004). This is in line with the findings (Škare & Družeta, 2016) that income growth is one of the main drivers for reducing poverty in a region.

Research related to regional development disparity, economic growth and poverty has been carried out by many previous researchers, however there are some differences and similarities between the previous research and this research. Research conducted by (Sumarto & de Silva, 2014) entitled Poverty Growth Inequality Triangle: The case of Indonesia 2002-2012 found that there is a trickle-down effect in which the poor receive proportionally less benefits from growth than the rich. All pro-poor measures show that economic growth in Indonesia is especially beneficial for people with above-average incomes. The panel regression results show that the variation in spending according to educational characteristics persists after being influenced by other factors, accounting for about two-fifths of the total household expenditure inequality in Indonesia. If poverty alleviation is one of the main goals of the Indonesian government, it is important that policies designed to spur growth also take into account the possible impact of growth on inequality. This finding demonstrates the importance of a set of policies that are strongly pro-poor. Namely, policies that increase school participation and achievement, the effectiveness of family planning programs to reduce birth rates and the burden of dependence on poor households, facilitate urban-rural migration and labor mobility, connect leading and disadvantaged areas, and give priority to certain groups (such as children), elderly, illiterate, informal workers and agricultural households) in targeted interventions that will serve to simultaneously stem rising inequality and accelerate the pace of economic growth and poverty reduction.

Economic growth and regional development disparity have a close relationship with the national development goal, namely improving people's welfare. The generally accepted hypothesis is that the higher the economic growth and the more equitable the regional development, the more prosperous the community will be. Increased welfare can be interpreted as reducing poverty.

Based on the description above, the problem of regional development disparity, economic growth, and poverty has always been a strategic issue in regional development. And regional development disparity, economic growth, and poverty always have an association with each other based on the results of the prior research. Although the direction of the association differs in each region depending on trends in regional development disparity, economic growth, and poverty. Therefore, the author examines the association of these three problems in South Sulawesi Province with different analysis method.

2. Methodology

This is a quantitative study, applying secondary data analysis using data published by BPS-Statistics of Sulawesi Selatan Province. The method of analysis was using the Linear Regression. The variables used in this study are the rate of economic growth, regional development disparity and poverty in South Sulawesi 2004 – 2019.

The data used starts from 2004 because starting in 2004 the GDP and economic growth data in South Sulawesi, complete with a fixed number of regencies/cities until 2019. Meanwhile, only until 2019 because 2020 was hit by the COVID-19 pandemic so that economic growth, poverty and development disparity experienced shocks.

2.1 Analysis

The data analysis technique used is the Williamson Index using Microsoft Excel to calculate regional development disparity, then Simple Linear Regression analysis using the OLS method using the help of E-views 10 software.

1. Williamson Index

The measure of regional development disparity which was first discovered was the Williamson Index used in his study in 1966. In statistical science, this index is actually a coefficient of variation which is commonly used to measure a difference. Although this index has several weaknesses, namely it is sensitive to the definition of the area used in the calculation, however, this index is quite commonly used in measuring regional development disparity.

In contrast to the Gini Ratio which is commonly used to measure income distribution, the Williamson Index uses the Gross Regional Domestic Product (GRDP) per capita as the basic data. The reason is clear because what is being compared is the level of development between regions and not the level of prosperity between groups. The Williamson Index formulation is as follows (Sjafrizal, 2008).

$$V_w = \frac{\sqrt{\sum_{i=1}^{n}(y_i - y)^2 \left(f_i/n\right)}}{y}, \qquad 0 < V_w < 1$$

where y_i = Regional GDP per capita of the area i

y = GRDP per capita on average for all regions

f_i = total population of the area i

n = total population of the whole area

If V_w is close to 1, it means that it is very unequal and if V_w is close to zero, it means that it is very even.

To answer the research objectives of the association of development inequality, economic growth and poverty rates in South Sulawesi, the following data analysis techniques were used.

2. Simple Linear Regression

Regression analysis can use to see the association between the variable not only to see the influence of the independent variable on the dependent variable. Analysis using regression must have a strong theoretical basis considering that the construction of the model made will have meaning if it has an economic understanding (Ekananda, 2015).

The simple regression model is as follows (Gujarati, 2004):

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

Y = dependent variable

X_1 = Independent variable

β_0, β_1 = parameter or regression coefficient

ε = error

Estimation in regression analysis means to estimate the population regression function based on the sample regression function as accurately as possible. In an effort to obtain the most suitable regression function, parameters are needed that can map the association between the independent variable and the dependent variable in such a way that the error or deviation is the smallest. For this reason, a good estimation method is needed to minimize errors, one of which is most often used is the Ordinary Least Square (OLS) or Least Square Method. This study using simple linear regression because only this method can analyze 3 hypotesis model the association of Regional Development Disparity on Poverty Rates. This paper only using one dependent variable and one independent variable.

In this study, using 3 simple linear regression models with research variables as follows:

1. The Association of Regional Development Disparity on Poverty Rates, the research variables are
   - Dependent variable (Y) = Percentage of poor population (P_0) representing poverty rate
   - The independent variable (X) = Williamson index represents the level of regional development disparity
2. The Association of Economic Growth on Poverty Rates the research variables are
   - Dependent variable (Y) = Percentage of poor population (P_0) representing Poverty Rate
   - Independent variable (X) = Economic Growth Rate represents economic growth

3. The Association of Economic Growth Rate on Regional Development Disparity, the research variables are
   - The dependent variable (Y) = Williamson index represents the level of regional development disparity
   - Independent variable (X) = Economic Growth Rate represents economic growth

3. Results and Discussions

By using the Williamson Index method, the regional development disparity in South Sulawesi Province from 2004 to 2019, is as follows:

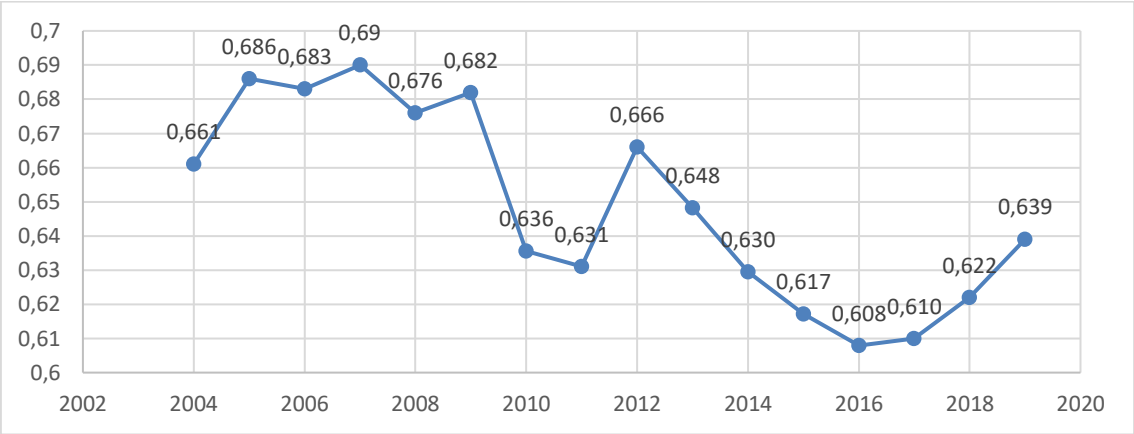

Figure 1. Williamson Index of South Sulawesi 2004 – 2019

Source: Processed data (2021)

In 2011 – 2012 disparity increased then in 2012 to 2016 the disparity showed a significant decrease. However, the trend of disparity increased again in 2016 to 2019. Even though it had decreased and then increased again, the development disparity between districts/cities in South Sulawesi Province was large (IW > 0.50). This finding is in line with the explanations (Agussalim, 2020) and (A. Yumna, 2020) that from 2016 to 2018 there has been an increase in development disparity in South Sulawesi.

As explained in Barro (2000), Kuznets' ideas are based on the idea of the movement of workers, from the agricultural sector to the industrial sector. In this model, the agricultural and rural sectors initially make up the bulk of all economic activity. This sector is characterized by low per capita incomes with only a few disparities within the sector. Meanwhile, the industrial sector and the urban sector started from a small sector, had a high per capita income, with high inequality within the sector. Economic growth resulted in the shift of workers and resources from the agricultural sector to the industrial sector. Migrant workers experience an increase in per capita income, and this change increases inequality in the economy in general. As a consequence, in the early stages of growth, the relationship between per capita income and inequality tends to be positive (Athia Yumna et al., 2014).

Association of Regional Development Disparity, Economic Growth Rate and Poverty Rate in South Sulawesi

The results of simple linear regression analysis using E-views 10 software obtained the associations between variables as follows:

Table 2: Association of Development Inequality, Economic Growth Rate and Poverty Rate in South Sulawesi Province

	Association of Regional Development Disparity on Poverty Rate	**Association of Economic Growth Rate on Poverty Rate**	**Association of Economic Growth Rate on Regional Development Disparity**
Linear regression model	$Y = -31{,}21 + 65{,}53X + \varepsilon$ where, Y = Poverty Rate X = Regional development disparity	$Y = 22{,}2 - 1{,}53X + \varepsilon$ where, Y = Poverty Rate X = Economic Growth Rate	$Y = 0{,}732 - 0{,}012X + \varepsilon$ where, Y = Regional development disparity X = Economic Growth Rate
Individual Test (T Test)	• Hypothesis $H_0: \beta_1 = 0$ (Level of regional development disparity has not significant association with the rate of poverty) $H_1: \beta_1 \neq 0$ (Level of regional development disparity has a significant association with the rate of poverty) H_0 is rejected because the value of Prob = 0.0001 < α. Thus, it can be concluded that the level of regional development disparity has a significant association with the rate of poverty.	• Hypothesis $H_0: \beta_1 = 0$ (Economic growth has not significant association with the rate of poverty) $H_1: \beta_1 \neq 0$ (Economic growth has a significant association with the rate of poverty) H_0 is rejected because the value of Prob = 0.0181< α . Thus it can be concluded that the rate of economic growth has a significant association with the rate of poverty.	• Hypothesis $H_0: \beta_1 = 0$ (Economic growth has not significant association with the level of regional development disparity) $H_1: \beta_1 \neq 0$ (Economic growth has a significant association with the level of regional development disparity) H_0 is not rejected because the value of Prob = 0.1760 >α = 0.05. Thus, it can be concluded that the rate of economic growth has not association on the level of regional development disparity.
R-Squared Value	0,664	0,338	0,127

Source: Processed data (2021)

The trend of poverty rates and the rate of economic growth in South Sulawesi Province since 2004 – 2019, continues to improve. However, this is different from the trend in the level of development disparity which has been increase (see Graph 2). In 2012 – 2014, the relationship between the poverty rate and the rate of economic growth is in accordance with the existing theory, when the poverty rate decreases, the rate of economic growth increases. But in 2015 – 2019, there was a change in trend, when the poverty rate decreased, the trend of the economic growth rate also decreased. This shows that since 2015 – 2019 the rate of economic growth is no longer the main factor in reducing poverty in South Sulawesi Province.

In 2011 – 2016 the trend of regional development disparity in South Sulawesi Province is in line with the Kuznets U-inverted hypothesis, with economic growth continuing to increase and development disparity slowly shrinking (see Graph 2). This shows that the Kuznets hypothesis is almost valid in South Sulawesi Province in line with research conducted by (Iskandar & Saragih, 2018) which states that the inverted "U" hypothesis of Kuznet tends to apply to districts/cities in South Sulawesi Province in 2011 – 2016. The main factor that reason behind the tendency of the Kuznet Hypothesis to apply is that economic growth tends to increase in the following years, accompanied by the level of disparity which also tends to decrease. However, there has been a change in the trend of regional development disparity in South Sulawesi Province from 2012 – 2019 which contradicts the Kuznets hypothesis. This shows that the Kuznets hypothesis does not happen in South Sulawesi Province in line with research conducted by (Syamsir & Rahman, 2018) and (Parkissing et al., 2020) which states that the results of the calculation of the Williamson Index and Theil Entropy Index with the GRDP growth of South Sulawesi Province then The results show that the Kuznet Hypothesis does not happen in South Sulawesi Province in the 2015–2019 period.

Miranti (2010) conducted research on Poverty in Indonesia 1984–2002: the impact of growth and changes in inequality. The results show that reducing inequality has a significant impact on growth. Changes in economic growth had an impact on poverty only during the first liberalization period (1984-1990). In the next two periods (1990-2002), the increasingly severe inequality tends to offset the decline in poverty due to growth (Miranti, 2010)

The World Bank (2018) conducted research on the relationship between growth, inequality and poverty. The findings of this study indicate that the correlation between growth and poverty is always negative by assuming constant inequality. On the other hand, if the poverty trend is constant, the correlation between growth and inequality can be positive or negative depending on the empirical model

and the econometric approach that is built. Another finding is that poverty tends to hamper growth and widen inequality within a region (Marrero & Serven, 2018).

The results of the study (Khemili & Belloumi, 2018) support the hypothesis proposed by (Bourguignon, 2004) regarding the growth-inequality-poverty triangle. There is a causal relationship between economic growth and inequality, while poverty reduction depends on strong economic growth. Inequality that continues to increase in an area results in increased poverty as well. The impact of economic growth and income inequality on poverty shows that increasing inequality will increase poverty while high economic growth will reduce poverty (McKnight, 2019).

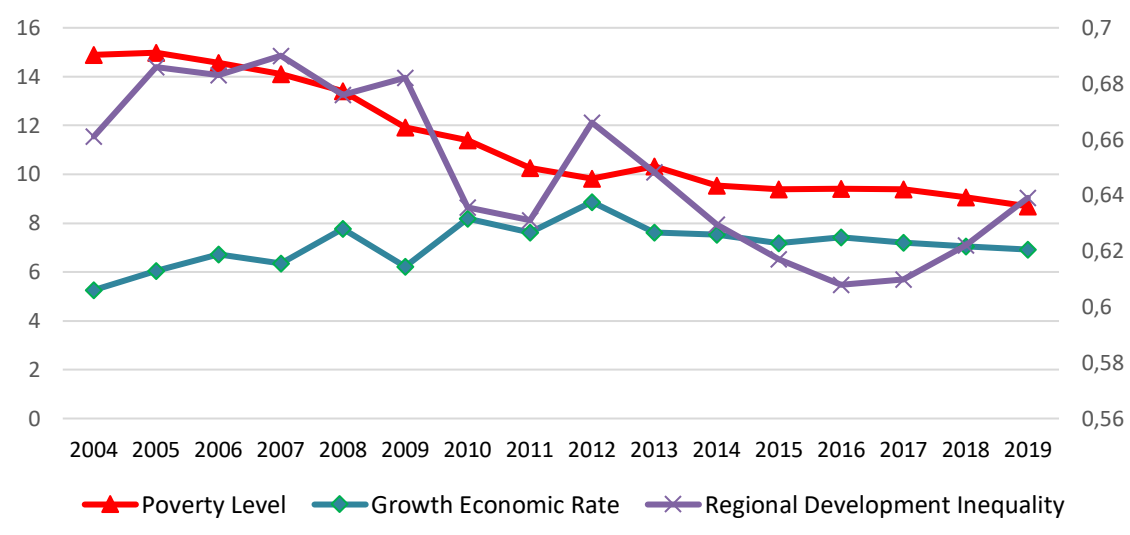

Figure 2. Trends in the level of development inequality, the rate of economic growth and the poverty rate in South Sulawesi Province in 2004–2019

Source: Central Statistics Agency

Based on the results of the regression analysis (Table 1), it is obtained as follows:

1. Based on the regression model in table 1, it shows that for every 1 percent increase in regional development disparity, the poverty rate in South Sulawesi Province will increase by 65.53%. The R-squared value of the regression model of regional development disparity and poverty is 0.663714, which means that the poverty rate in South Sulawesi Province is influenced by the level of regional development disparity of 66.4%. While the rest is influenced by other factors that have not been included in the model.

   The level of regional development disparity is significantly positively associated with the poverty rate in South Sulawesi Province. This shows that when disparity increases, the poverty rate in South Sulawesi Province also increases. Vice versa, when regional development disparity decreases, the poverty rate in the province of South Sulawesi will also decrease. The results of this study are in line with previous research conducted by (Ginting, 2015) with a research scope of 33 provinces in Indonesia in 2004 – 2013, it was found that the decline in the poverty rate in Indonesia was in line with the decrease in regional development disparity. In the same period from 2004 to 2013 there was a decrease in regional development disparity for both western and eastern Indonesia. This is also in line with the results of a review from sources (McKnight, 2019) which found an increase in the number of disparity, it will also increase the poverty rate in a region.

2. Based on the regression model in table 1, it shows that for every 1 percent increase in the rate of economic growth, the poverty rate in the region will decrease by 1.53%. The rate of economic growth has a significant negative association with the poverty rate in South Sulawesi Province. This means that if the rate of economic growth increases, the poverty rate in South Sulawesi Province will decrease. On the other hand, if the rate of economic growth decreases, the poverty

rate in South Sulawesi Province will increase. The R-squared value of the regression model between economic growth and poverty is 0.338439, which means that the poverty rate in South Sulawesi Province is influenced by the economic growth rate of 33.8%. While the rest is influenced by other factors that have not been included in the model. This shows that the reduction in poverty in South Sulawesi Province is not only influenced by economic growth factors, as stated by (Škare & Družeta, 2016) that the association of economic growth and poverty may be different in some regions. Differences in poverty rates support the view that growth may be necessary but not sufficient for maximum poverty reduction.

The results of this regression analysis, in line with what was stated by (Todaro & Smith, 2012), high economic growth will reduce poverty in a region. The fact is that poverty in Indonesia decreased rapidly between 1999 and 2002 because Indonesia's economic growth increased by 3.66% (Suryadarma, 2005).

3. Based on the regression model in table 1, the rate of economic growth is negatively associated with development disparity between regions. According to the statistical model, the rate of economic growth is not significantly associated with development disparity between regions in South Sulawesi Province. The meaning of the negative association between the rate of economic growth and development disparity between regions is that if the rate of economic growth increases, the level of disparity between regions in South Sulawesi Province will be decrease. Otherwise, if the rate of economic growth decreases, the development gap between regions in South Sulawesi Province will increase. There is no significant effect between the rate of economic growth on regional development disparity because the rate of economic growth is measured in the aggregate within the province, while the regional development disparity calculated by the Williamson Index is measured by considering the development between districts and cities within the province. It can be said that a high rate of economic growth at the provincial level is not always associated with a low level of disparity in each district and city in South Sulawesi Province.

The R-squared value is 0.126696, meaning that the level of regional development disparity in South Sulawesi Province is influenced by the economic growth rate of 12.67%. While the rest is influenced by other factors that have not been included in the model.

This finding is in line with Kuznet's hypothesis, as development progresses, economic growth will increase then development inequality between regions will decrease(McKnight, 2019). According to this hypothesis, the shift of labor and resources from agriculture to manufacturing during the early stages of economic development creates inequality between urban manufacturing and the rural agricultural sector. After this initial increase in inequality, it is hypothesized that inequality will decrease as the economy grows along the development path. In line with the findings (Sumiyarti, 2019) in Banten Province, the rate of economic growth has a negative effect on development inequality between regions.

However, the results of this regression analysis contradict the findings (Nugroho, 2014) in Banyumas Regency, where economic growth and development inequality have a positive relationship. Where when economic growth in Banyumas increases, development inequality will also increase, and vice versa.

Based on the results of the analysis of the three regression models, it was found that the variable of development inequality has the greatest influence on the level of poverty in South Sulawesi Province. This shows that if the government wants to solve the problem of poverty in South Sulawesi, then the development problem that must be resolved first is the problem of development inequality or the distribution of development throughout the South Sulawesi region.

Conclusions

The problem of regional development disparity, economic growth, and poverty has always been a strategic issue in regional development. Although the direction of the association differs in each region depending on trends in regional development disparity, economic growth, and poverty. The purpose of this research is to analyze the association of development disparity between regions, and the rate of economic growth to poverty in South Sulawesi Province, in the period 2004 – 2019. This study used simple linear regression analysis. The result of the study shows that the level of regional development disparity

is significantly positively associated with the poverty rate in South Sulawesi Province. The rate of economic growth has a significant negative association with the poverty rate in South Sulawesi Province. The rate of economic growth has a negative association with development disparity between regions. According to the statistical model, the rate of economic growth is not significantly associated with development disparity between regions in South Sulawesi. The variable that has the greatest association with the poverty rate in South Sulawesi Province is the variable of development inequality.To alleviate the problem of poverty in South Sulawesi Province, the local government needs to equalize the distribution of development to all districts/cities in South Sulawesi Province so that the development disparity will be smaller. and the government needs to encourage the economic structure in some areas to move to a secondary economic structure so that the center of economic growth is not concentrated in certain areas. For future researchers, it is suggested to add other variables in analyzing the factors that cause inequality of development and poverty in South Sulawesi.

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Research Paper

How Different Geographical Areas React to Covid19 Shock

Regional Resilience and Structural Transformation

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Abstract

In the last 10 years, Covid19 has emerged as an important recent shock that has had an effect on the global economy. Regional resilience may have an effect on how different regions are affected. This study intends to look at how regional resilience is affected by structural change both before and after Covid19. We identify two different situations (prior to and during the Covid19 shock) that affect whether structural reform increases regional resilience. The findings show that Covid19 has a number of negative effects on regional resilience. Additionally, raising a sector's productivity has a significant positive effect on resilience under typical conditions (prior to Covid19). A sector's increased productivity and contemporaneous workforce transfer to other sectors with higher productivity during the COVID19 shock, however, have a significant beneficial effect on regional resilience. Therefore, when the circumstance is stable, productivity becomes more crucial. However, amid a shock, the industry and its employees' flexibility and agility are more crucial.

Keywords: Structural Change, Regional Resilience, Covid19, Shock, Transformation

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1. Introduction

Covid19 recently caused a huge blow to the world economy. Depending on the degree of regional resilience, what happened before and during the crisis may have had various economic repercussions on different areas within the same nation. Scholarly attention has been brought to the idea of resilience because of its widespread drawbacks, and the resiliency of the regional economy may be observed in an economy's capacity to rebound swiftly from shocks.

This study's findings will further reveal the structural restructuring enhanced regional resilience before and after the Covid19 shock in Indonesia, as the country with the fourth-largest population in the world and Southeast Asia's largest economy. The findings would be of major importance in assessing the correlation between structural change and regional economic resilience can be a tool in improving the regional economy performance in different geographical area.

According to this study, resilience in a stable situation is highly correlated with rising sectoral production (i.e., before Covid19). Nevertheless, during the Covid19 shock, rising productivity and concurrently rising labor migration into other industries positively affected resilience. Therefore, while the economy is stable, increasing productivity is highly correlated with regional resilience. However, the important factor positively connected to resilience during the Covid19 shock is improving sectoral productivity while concurrently boosting employees' flexibility to shift toward new sectors.

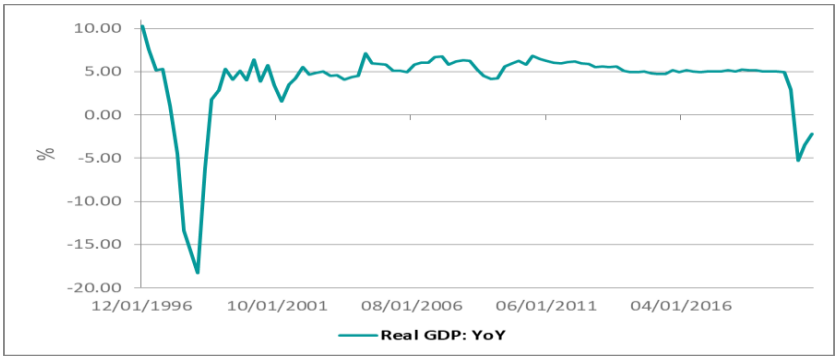

Chart 1. Indonesia's GDP for 25 years

Source: Author's calculation

Chart 1 demonstrates that, compared to other years, Indonesia's economy contracted at the greatest rate during the 1997 Asian financial crisis. The intensity of its crisis was unexpected due to its enormous and unanticipated economic collapse, which matched the regional economic effects following the financial crisis. It was the most badly affected economy in the Asian crisis (Iriana & Sjöholm, 2002). Due to reliance on short-term loans and the contribution of 175 percent of foreign exchange reserves, the economy contracts by -13% (Tambunan, 2010). As a result, it hurts big businesses, especially those with substantial international debt commitments. In addition, the banking industry has been the most negatively affected sector due to corporate defaults.

The Indonesian economy was far more stable throughout the 2008 crisis than during the previous crisis (1997). At the time, reliance on foreign debt had significantly decreased, reaching only 35% in 2008. (Tambunan, 2010). During that time, Indonesia's economy grew by 4.6% as a result of it. But even so, this number was the lowest level in the previous eight years (Tambunan, 2010). Chart 2 demonstrates how the global financial crisis has influenced Indonesia. However, along with China and India, it was just three Asian countries to have positive progress. In contrast to several of its neighbours, especially Malaysia, Singapore, and Thailand, whose economies saw major declines, its GDP grew by 4% in June 2009.

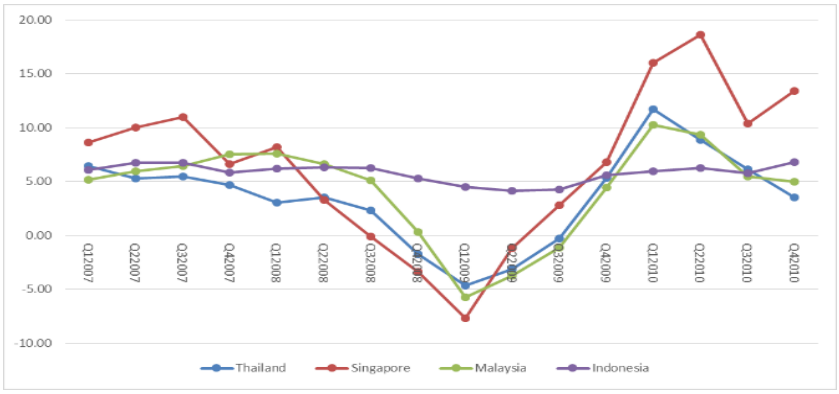

Chart 2. Indonesia's GDP compare with other ASEAN Countries

Source: Author's calculation

With 1,904,569 square kilometers in size, Indonesia ranks as the largest archipelagic state (UNCLOS). With over 275 million inhabitants, Indonesia is the fourth most populous country in the world, with more than half of its citizens living on Java Island, which is also the most populated island in the world. In the years after the Asian financial crisis, Indonesia has seen economic development that is unparalleled (in the 1990s). However, Indonesia saw the most Covid19 cases during the Covid19 shock in 2020 compared to other Southeast Asian countries (World Health Organization, 2020). Indonesia's economy shrank by 2.1 percent in 2020 after the GDP increased by 3 percent in the first quarter of 2020 (Badan Pusat Statistik, 2021). This is undoubtedly something to be grateful for, given that Indonesia's GDP fell by 13.3 percent in 1998. The development and fiscal policy plan ultimately shift due to this circumstance. The state was forced by the effects of this situation to reevaluate all its 2020 development goals and drastically cut its 2020 state budget to divert cash to Covid-19 countermeasures (Muhyiddin, 2020).

Demand and supply shocks have been caused by Covid19's abrupt economic upheavals, which have rippling effects on society and have affected nearly all human endeavors. (Malahayati et al., 2021) also mentioned how the epidemic terribly affects underdeveloped countries. One of the Asian countries that has had a substantial economic effect is Indonesia. Regional incomes fell, unemployment rates increased, and people's purchasing power declined (Malahayati et al., 2021). As a result, Indonesia was downgraded from higher middle income to lower middle income and worsened poverty (World Bank, 2022). According to (Martin et al., 2016), shock are frequently unexpected and startling incidents that throw off the "normal" course of economic progress.

Some research proved that shock influence might result in growing regional disparities in development and prosperity. (Cutrini, 2019), who investigated the connection between the escalation of regional disparities and structural change in Europe, found that after the 2008 crisis, polarisation increased, and numerous economic groups were created. The group also depends on path-dependent processes and local economic structures. Different living standards among areas were caused by this mismatch in local economic systems, which had an uneven effect and became a regional issue (Gentili et al., 2020). Shock influences the evolution of sectors, especially when the economic cycle abruptly shifts to the downside (Holm & Østergaard, 2015). However, responses may vary between areas (even within the same nation) and function as a catalyst for structural change.

Unfortunately, very little research has been done to date on how the industrial revolution may affect regional resilience. Most studies highlight the effect of structural transformation on overall output. In contrast, the factors influencing overall productivity over time in various economic environments might vary (Vries et al., 2013). (Vries et al., 2013) discovered that over the time, the speed of structural change continues to alter and that its consequences on economic development are diverse in their research of the African economy. Identifying the structural change component that significantly affects resilience might be key in accelerating recovery so that it does not widen regional disparity.

Hence, the three alternative definitions of structural change are examined in this study. The first term indicates changes in productivity within a sector (within effect), while the second term gauges whether workers move to sectors with higher productivity (between effect). The third item, called the interaction term, sums together the effects of shifting labour shares and sectoral productivity (dynamic effect). The remainder of the

study is divided into the following sections: Section II's examination of the literature on structural change and resilience. The discussion and findings are in Section III. Section IV also provides the conclusion. The appendix then gives further information regarding how our database was created.

Regional Resilience

Shocks can vary in intensity and duration, and they can also have different consequences depending on where they occur. Additionally, different shocks evoke different reactions and, hence, different levels of resilience (Martin et al., 2016). Economic resilience is also frequently employed to establish how to comprehend and react to various effects of shock periods and to take the ability to forecast economic situations. The capacity of an area to endure and adapt during times of adversity is the definition of regional economic resilience used in this research. It may be understood in terms of the country's economic growth, which may slow down during crises but may quickly pick up steam and modify its economic structure.

Engineering resilience and ecological resilience are the two main principles of resilience. Engineering resilience is the return to the previous position or trajectory following the regional economic recovery. Ecological resilience is the amount of stress a system can withstand before changing the way it functions, looks, or is situated (Walker et al., 2006). As a result, "ecological" resilience is evaluated by contrasting the pre-shock and post-shock (stable) conditions. (Martin, 2012) has used the word "adaptive" resilience to describe a region's capacity to restructure itself, that is, to change its structure (technology, enterprises, industries, and institutions) over time in order to maintain a positive development trajectory in employment, output, or wealth. Based on its ability to create more/less productive industries than those decimated by the recession, an area is seen to recover strongly (weakly) from a recession.

Structural Transformation

There are several ways to define structural change. The majority of suggestions for structural transformation are focused on the results of the process. Theoretically, shifts in demand preferences and sector-specific productivity lead to a structural shift (Dietrich, 2012). Although structural transition also includes structural unemployment and societal costs, it may restrict the beneficial effects of structural change on economic progress (GHK, 2011). This might cause a structural change from more productive to less productive activities on a continent like Africa (McMillan et al., 2014). This negative flow may be influenced by a number of factors, including the quantity of natural resources, globalisation, and institutional and governmental frameworks. Despite the extractive sectors' normally high productivity, the availability of natural resources has a growth-restricting effect on structural change since they do not offer a significant amount of employment to absorb the extra labour from agriculture (McMillan et al., 2014).

Economic shock frequently causes significant structural changes to the labour market, including increases in employment and a gradual expansion of another economy (Orlowski, 2021). The growth of industries frequently reveals regional differences. The formation of enterprises depends on the capacity of certain locations to keep up with the condition, thus some regions provide better conditions and more fascinating surroundings than others (Brenner, 2004). The industry's development in response to outside events is also influenced by responsiveness (such as a shock). Thus, structural change in productivity and resilience are two key traits that govern the development of a sector in a given area (Holm & Østergaard, 2015). According to some study, structural change is necessary to increase labour productivity and has a significant impact on regional performance. However, many claim that the structural productivity gain of employee reallocations across sectors is overshadowed by the impact of productivity increases inside individual industries (Andriansyah et al., 2021).

Structural Change Effect to Regional Resilience

An external shock (like the Covid19 epidemic) might lead to market saturation and labour movement constraints, which can negatively affect the growth of multiple businesses and even the entire economy (Bessen, 2019). The capacity of the region to diversify into developing economic activities and modify its industrial structure to accommodate evolutionary change is one of the aspects of regional resilience, according to

(Boschma, 2015). A high level of industrial resilience and more flexibility allow regions that keep diversifying their businesses to respond more quickly to changing circumstances and open up new economic avenues. (Boschma, 2015).

An area may show resilience during the process in response to a certain shock. Its ability to withstand more shocks, though, might decrease. Theoretically, any site may have a certain amount of resistance to potential shocks at any given time. The capacity to adapt led to changes that led to the downfall of certain sectors while causing others to prosper. Some industries in each region may experience a decline as a result of these dynamics at the industrial level. But it could also lead to a long-lasting economic boom in a certain area. However, these dynamics vary depending on the environment. The industry may appear untouched in some locations while falling or growing in others.

2. Methodology

In this analysis, panel data was utilized and the notation for calculating regional economic resilience suggested by (Martin et al., 2016) was followed. In their 2016 study, Martin et al. measured the shock resistance of the provinces and looked at existing and anticipated changes (decreases or increases) in regional economic production. It is believed that regional employment will fluctuate along with the national average, falling during a recession and rising during a recovery. Following would be the way to indicate the anticipated change in employment in region r during shock or recovery periods of length k:

$$(\Delta E_r^{Contraction})^{expected} = \sum_i g_N^{t+k} E_{ir}^t \qquad (1)$$

Where g_N^{t+k} is the pace of national employment change throughout periods of shock; $(\Delta E_r^{Contraction})^{expected}$ is the 'expected' (counterfactual) regional response; and E_{ir}^t is employment in the industry i in region r in starting time t, the base year where the moment at which shock or recovery begins, while $\Delta E_r^{Contraction}$ is real counterfactual regional response. Then, the regional resistance may be quantified as:

$$Resis_r = \frac{(\Delta E_r^{Contraction}) - (\Delta E_r^{Contraction})^{expected}}{|(\Delta E_r^{Contraction})^{expected}|} \qquad (2)$$

The resistance index measurements are centered at zero. If the Resistance-value larger than zero shows that a region's economy is more resistant to shock and capable of recovery than the national economy (good resilience).

Then, in order to calculate the structural change, this study adopted a different nomenclature from Vries et al. (2013). It is break down the total structural change into three decomposition form—"within effect," "between effect," and "dynamic effect". The "within effect" reflects the increase in productivity within sectors, whereas the "between effect" reflects the productivity effect of labor movement to above productive sectors, and the "dynamic effect" captures if employees shift to sectors with above-average productivity levels and if productivity growth is greater in sectors with rising employment shares. The annual employment provincial statistics (regional level) for the nine major economic sectors are used for the empirical study (table 1), which is based on time-series data from the Indonesian business sector's BPS (Bureau of Statistics).

The decomposition of structural change concept was phrased as follows:

$$\Delta P = \sum i\ (P_i^T - P_i^0)*S_i^0 + \sum i\ (S_i^T - Si^0)*P_i^0 + \sum i\ (P_i^T - P_i^0)*(S_i^T - S_i^0) \qquad (3)$$

Where Si is the share of sector *i* in total labor, Pi the labor productivity level of sector *i*, and superscript 0 and T are the start and end periods, respectively.

Table 1: Indonesian Sector Database

Nine Major Economic Sectors	Agriculture, Forestry, Hunting and Fishery (AFH) Mining and Quarrying (Min) Manufacturing Industry (Man) Electricity, Gas and Water (EGW) Construction Wholesale, Trade, Retail, Restaurant and Hotels (TR) Transportation, Storage and Communication (TSC) Financing, Insurance, Real Estate and Business Services (FR) Community, Social and Personal Services (CS)
Variables included	Labour (person) Gross value added at current national prices (regional output)
Regional included	34 provinces of Indonesian Regions
Year of the Study	2011-2020

The study introduced the Human Development Index as the control variable using Lagged Dependent Variables (LDVs) with a 3-year lag in HDI since the effects of HDI can take years to manifest (Martini, 2020). To examine the effect of Covid19 during the observation period, this study additionally included a dummy variable of Covid19 that is 1 if a Covid19 shock occurs at that moment and 0 otherwise.

3. Results and Discussions

3.1. Economic Resilience Profile of Indonesian Regions

Figures 2 and 3 display the data distribution for resilience indicators. The greater the resistance index, which indicates a higher level of resilience in the region, the bluer the colour. Equations (1) and (2) were used to obtain the resilience index (depicted in appendix 4). When a shock occurred, the resistance of most Indonesian provinces decreased, but the deep was different. During COVID19, the effect of covid differs among island depending on the locale. On Java Island, there is almost no change in the resilience index between covid and before covid. In contrast, Papua Island's resistance index increased significantly following the covid epidemic compared to before it happened. This odd phenomenon resulted from Papua's increased labor force during COVID19 (2020), especially in the AFH industry, which will be responsible for roughly 80% of the new jobs. It has seen a substantial reduction during Covid19 compared to its nearest neighbor, Maluku Island.

Figure 1. Economic Resilience index before Covid time (2019)

Source: Author's calculation

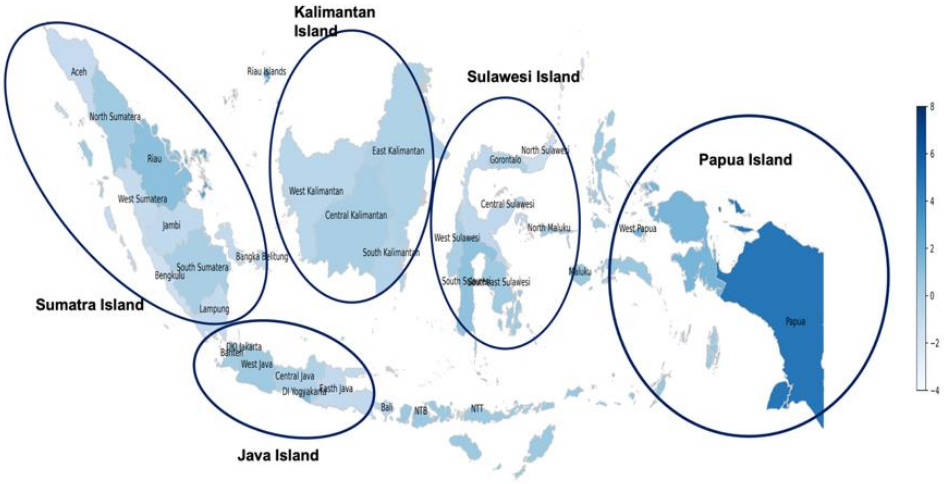

Figure 2. Economic Resilience Index during Covid time (2020)

Source: Author's calculation

When comparing the figures above, it is apparent that the NTT (East Nusa Tenggara) and Maluku region's resistance index of resilience has significantly decreased. Both provinces saw growth in the total number of workers (see appendix), but only roughly 3% from the prior year. In general, it can be said that the effect of covid prior to and during covid varies across Indonesia. While most provinces endure declines, others have improved or maintained their resilience. The western provinces of Sumatra Island, including Bengkulu, Lampung, Aceh, and West Sumatra, are in the worst possible position as they shift the sign from positive to negative. On the other hand, the best position corresponds to those on Java Island, where resilience is still growing positively on average.

3.2. Structural Transformation in Indonesia

However, when we break down the total level of output into its three structural components—the "within effect," "between effect," and "dynamic effect"—it becomes clear from Chart 3 that not all three elements of production decline in response to a significant shock. Starting in 2011, structural changes "within effect" had a greater positive effect on overall productivity than its "dynamic effect," which had a smaller effect.

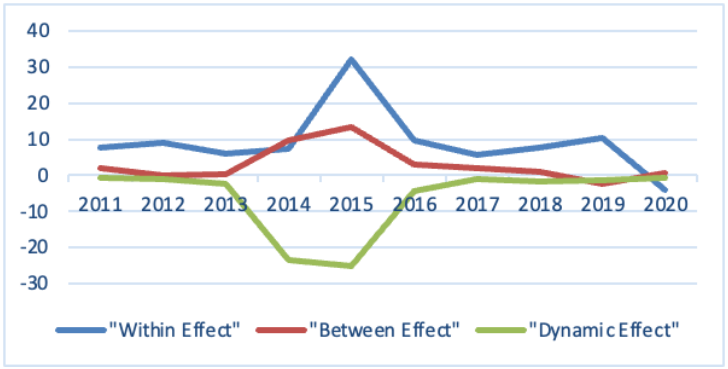

Chart 3. Decomposition of Labor Productivity Growth 2011—2020

Source: Author's calculation

The rate of structural change and growth in Indonesia both fell in 2014. If we take a closer look at each structural change's breakdown, only the "dynamic effects" have dropped, while the "within effect" and "between effect" continue to increase in value. It demonstrates that during this time, the sector's productivity

continued to increase, and people continued to shift between industries, resulting in significant labor flows. As a result, this year saw enough individuals moving from the agricultural sector to other industries (see figure 6).

Static reallocation gains (within and between effects) substantially contribute to the increase in total productivity from 2014 to 2015. The services sector grew, and its aggregate productivity increased from -2 in 2014 to 10 in 2015. Because there is a sector with a sizable percentage that saw great productivity growth, the labor share is declining, so the "dynamic effect" is still experiencing a drop in productivity in the interim. At the same time, the corporate world started returning to normal in 2015. In 2017, the "dynamic effect" grew to a steady point while the "within effect" and "between effect" started to decline. The covid-19 epidemic dealt Indonesia's commercial sector a significant hit until 2020. The decomposition results show that productivity fell across almost all industries.

3.3. Regional Resilience and Structural change Relation

Using the panel regression model, the results of this section's analysis of the effect of structural change variance on regional resilience are reported in Tables 2 and 3 (see appendix for more detail explanation). The study employs three alternative types of structural change to stabilize the residual variance of all variables, as indicated in the table, and a natural logarithmic value for resilience. Results from the regression of the three main types of structural change are shown for all models in columns (1) through (6) of table 4 in this paragraph ("within effect", "between effect", and "dynamic effect"). The first three columns in Table 4 give the panel regression results for the observation period (2011–2020). This model demonstrates the general effect of Covid19 and HDI. Additionally, table 5 from columns (1) to (3) displays observation during Covid19 (2020), while the final three columns (4) to (6) revealed the result for observation between 2011 and 2019 for examining the link between structural change and resilience.

Table 2's columns (1) through (3) show that Covid19's effect is consistently substantial. With a 1% significant level, it has a detrimental effect. Moreover, the "within effect" coefficient remains constant even after including all sectors. It is demonstrated that, while holding all other factor constant, an average 1% increase in the "within effect" of structural change is predicted to enhance resilience by 0.23% and significance by 5%. In contrast, there is no statistically significant effect on resilience from the other two types of structural change (the "between effect" and "dynamic effect"). When Covid19 is absent, the resilience index drops by an average of 170,1%, which is significant at 1%, holding all factors constant. This result provides proof that the effect of Covid's presence is substantial. Holding all other factors constant, an increase in the HDI after three years is associated with the resilience of 11,9%, significant in 1%.

Next, columns (4) through (6) in table 2 showed the panel regression before the Covid19 occurred (period 2011 to 2019), with the results being provided. The results are nearly identical from column (1) to column (3); while leaving all other variables constant, an average 1% change in the "within effect" of structural change is associated with a change in the resilience about 0.244%, significant in 5%. By paying great attention, we can observe that some sectors each contribute significantly to the region's resilience. Due to its high export share, particularly in crude oil, natural gas, and coal, the AFH dan Min sector plays a vital role in the robustness of the regional economy in Indonesia. In addition to producing a wide range of other goods, such as sugar, tea, tobacco, copra, and spices, Indonesia is one of the top exporters of cocoa, palm oil, rubber, and coffee. Consequently, productivity will enhance regional resilience under normal circumstances, particularly in the AFH and Min sectors (no shock). While this is happening, the Min sector's job reallocation to its sector and concurrent productivity increase will favor regional resilience. On the other hand, certain services do not contribute to a rise in regional resilience, while others have a constructive effect but are not statistically significant.

Table 2: Panel Regression Result (1)

Dependent Variable: Resistance Index of Resilience						
Independent Variable (Ln Res)	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**
ln "within effect"	0.285***	0.229***	0.230**	0.280***	0.260***	0.244**
	(0.0588)	(0.0835)	(0.0923)	(0.0623)	(0.0873)	(0.0953)
ln "between effect"	-0.145	-0.179	-0.191	-0.146	-0.149	-0.170
	(0.1213)	(0.1402)	(0.1342)	(0.1327)	(0.1497)	(0.1440)
ln "dynamic effect"	-0.363***	-0.142	-0.0678	-0.376***	-0.140	-0.0451
	(0.0856)	(0.0847)	(0.0837)	(0.0918)	(0.1012)	(0.0995)
hdi3_lag			0.119***			0.117***
			(0.0398)			(0.0399)
cov	-1.211***	-1.771***	-1.701***	No	No	No
	(0.2370)	(0.3977)	(0.4138)			
Years	2011-20	2011-20	2011-20	2011-19	2011-19	2011-19
State effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes
_cons	-0.155	0.0763	-8.221***	-0.138	0.294	-7.829***
	(0.1042)	(0.2145)	(2.7964)	(0.1102)	(0.2345)	(2.8378)
N	336	334	330	302	300	296
R-sq	0.1731	0.2647	0.2933	0.1665	0.2859	0.3163
adj. R-sq	0.1631	0.1893	0.2171	0.1581	0.2062	0.2361

Robust standard errors in parentheses.
* p<0.1; ** p<0.05; *** p<0.01
Source: Author's calculation. Data retrieved from BPS.

Table 3 shows the cross-sectional regression between structural change and regional resilience during the Covid19 (2020). The strategy is based on (Meng et al., 2022)'s cross-sectional assessment of the regional economic resilience of several Chinese provinces in the face of the Covid19 pandemic. As can be observed from the table, resilience is strongly and negatively associated with the "within effect," but resilience is significantly and positively correlated with the "dynamic effect." Compared to prior regression, the "within effect" shows the opposite relationship to resilience during the Covid19 epidemic than it had before Covid19.

Holding other factors constant, an increase in the "within effect" of structural change of 1 is typically linked with a fall of around 0.141 on the resilience index, significant at 1% level. In other words, during the Covid19 shock, a rise in sector productivity relates to a decrease in resilience. This association may be understood by looking more closely at the various sectors that substantially affect resilience. Some industry will presumably reduce employment as it raises production, maybe by utilizing more effective technologies. On the other hand, it is best to avoid decreasing the workforce during the Covid19 time since it presents a serious resilience issue. Based on the results in table 5, industries like construction and social communities (SC) that are not dependent on cutting-edge technology to increase their productivity have a statistically significant positive "within effect" on resilience.

Additionally, Table 3 demonstrates a substantial positive correlation between "dynamic effect" and resilience. A further modification in the "dynamic effect" of structural change results in an average correlation of 0.393 points on the resilience index, which is significant at the 5% level and controls for other factors. Therefore, to significantly affect resilience during COVID19, it is necessary to take both measures to increase productivity and reallocate labor to more productive sectors simultaneously to build regional resilience during the Covid19 shock.

Only the "dynamic effect" shows a substantial positive link to regional resilience throughout the Covid19 phase, showing that building resilience requires boosting sector productivity and extending employment share to more productive sectors. The increase in productivity shows that the industry may survive despite the shock effect. At the same time, the number of new hires keeps growing, reducing the possibility of unemployment in the industry. Encouragement of the quantity and diversity of occupations available in a region is one strategy that may be used to make it simpler for people to transition from one industry to another. These characteristics concur with (Martin et al., 2016) finding that more varied industrial structures in a regional context are probably more resilience.

Table 3: Cross-Section Regression Result (2)

Dependent Variable: Resistance Index of Resilience			
Independent Variable (Resilience)	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**
"Within effect"	-0.0409*	-0.113	-0.141***
	(0.0216)	(0.0786)	(0.0112)
"Between effect"	-0.0804	0.0637	-0.0117
	(0.0709)	(0.1684)	(0.0313)
"Dynamic effect"	-0.148	0.581	0.393**
	(0.1154)	(0.4997)	(0.0685)
hdi3_lag			-0.209**
			(0.0232)
Covid19	Yes	Yes	Yes
Years	2020	2020	2020
State effects	No	No	No
Time effects	No	No	No
Robustness	Yes	Yes	Yes
_cons	-0.0971	10.62	21.23***
	(0.2429)	(5.0137)	(1.4898)
N	34	34	34
R-sq	0.1272	0.9431	0.9992
adj. R-sq	0.0399	0.3743	0.9868

Robust standard errors in parentheses.
* p<0.1; ** p<0.05; *** p<0.01
Source: Author's calculation. Data retrieved from BPS.

3.4. Java Island and Outside Java Island

We investigate whether there is statistical support for the idea that a particular industry plays a significant role in areas with various workforce compositions by dividing the provinces in Java and outside of Java Island. Because Java Island is home to the nation's capital (Jakarta Province) and around 150 million Indonesians, or 60% of the country's population, reside there, there is a distinction between Java and the other islands (Badan Pusat Statistik, 2022). Since Java is home to around 80% of the processing industries, there is a wider variety of workers there (sources from BPS).

Table 4 shows the results of panel regression for Java Island in columns 1 through 3 and outside Java Island in columns 4 through 6. From the result in the table, "between effect" and "dynamic effect" have a major effect on regional resilience on Java Island, but "within effect" is the only factor that significantly affects resilience outside of Java. In Java Island, 1% of a structural change's "between effect" is linked to a 1,486% decline in resilience, significant at 10% level. In comparison, 1% of a change in its "dynamic effect" is linked to a 0,405% change in resilience, significant at 10% level, while holding all factors constant. When all other factors are held constant, a situation outside Java Island that changes by 1% is typically related to a 0.244% change in resilience, which is substantial at 5%. Additionally, there are different result on HDI effect (human development index) between the two groups. When all other parameters are held constant, the HDI has significant correlation on regional resilience outside Java about 0.00117% while in Java Island HDI has no statistically significant effect.

Focusing on locations outside of Java, HDI can be one aspect in imposing regional resilience. This result is consistent with some research, including (Giannakis & Bruggeman, 2017) finding that resilience and regional education levels are highly correlated. Therefore, promoting regional resilience for the area outside of Java may concentrate on raising sectoral production. For the areas on Java Island, increasing sectoral productivity while facilitating workers' movement to other, more productive industries can boost the region's resilience. These characteristics concur with (Martin et al., 2016) finding that more varied industrial structures in each region are probably more resilient. So, it may be advantageous to boost regional resilience to make it easier for people to transition from one industry to another by fostering more varied enterprises.

Table 4: Panel Regression between Java and Outside Java Island

	Java Island			Outside Java Island		
Independent Variable (ln Res)	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**
ln "within effect"	0.0907	-0.692	-1.170	0.280***	0.260***	0.244**
	(0.0599)	(0.8349)	(1.1788)	(0.0623)	(0.0873)	(0.0953)
ln "between effect"	-0.767	-1.001*	-1.486*	-0.146	-0.149	-0.170
	(0.3913)	(0.4635)	(0.6513)	(0.1327)	(0.1497)	(0.1440)
ln "dynamic effect"	-0.0533	0.404	0.405*	-0.376***	-0.140	-0.0451
	(0.2250)	(0.2750)	(0.1880)	(0.0918)	(0.1012)	(0.0995)
hdi3_lag			0.190			0.117***
			(0.1595)			(0.0399)
Years	2011-19	2011-19	2011-19	2011-19	2011-19	2011-19
State effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.111	-0.314	-14.07	-0.138	0.294	-7.829***
	(0.3156)	(2.1849)	(10.0172)	(0.1102)	(0.2345)	(2.8378)
N	54	54	54	302	300	296
R-sq	0.2214	0.7035	0.7410	0.1665	0.2859	0.3163
adj. R-sq	0.1747	0.3168	0.3761	0.1581	0.2062	0.2361

Robust standard errors in parentheses.
* p<0.1; ** p<0.05; *** p<0.01
Source: Author's calculation. Data retrieved from BPS

There are several potential gaps in this study. First off, there is a potential bias since the effect estimates in the model differ between those done before Covid19 using panel data (from 2011 to 2019) and those done during Covid19 using cross sectional regression (using only 2020 data base). Therefore, it is preferable for future study if the data utilized is presented as a panel between non-covid19 (from 2011 to 2019) and during covid (from 2020 to 2022). Second, the potential of adopting a more accurate model (other than the one now being used, namely natural logarithmic), such employing the second order model, third order model, and so on, has not been noticed by the study, it is used to accommodate the possibility of exponential data. Third, to determine whether there is a geographic region effect, the spatial panel regression option can be added as a comparison with the panel regression model in the current study.

Conclusions

According to this study's findings, the pandemic has generally had a negative effect on the regional resilience in Indonesia's provinces (Covid19), and the effect varies among areas due to their different economic structures. The findings highlight that before the Covid19 shock (normal condition), only the "within effect" of structural change exhibited a substantial positive correlation with regional resilience. It implies that, prior to Covid19, rising sectoral production is positively associated with regional resilience.

Min (mining and quarrying) and AFH (agriculture, forestry, hunting, and fishing) sectors have a beneficial influence on regional resilience when individually examining each sector that favourably affects regional resilience prior to Covid19. The "dynamic impact" has a strong positive link with resilience in the Min sector, which means that if productivity levels rise in the Min sector and employment in the sector grows concurrently, regional resilience will rise as well. In the AFH sector, however, both the "within effect" and the "between effect" have a significant positive correlation on regional resilience. This means that, depending on the direction, either increasing the shift in employment shares in the sector or increasing productivity in the AFH sector can help to increase regional economic resilience. It should be highlighted that because most processing is still done manually or with basic technologies, the issues facing Indonesia's agriculture industry are still low-tech (Suprehatin, 2021).

Meanwhile, to boost regional resilience during Covid19, the "dynamic effect" is significantly and has positive correlated to resilience while the "within effect" is significantly and negative correlated to resilience. Meaning, during covid19, it is necessary to increase sectoral productivity and reallocate jobs to this sector (above the productive sectors). It can be said that a worker's ability to switch to a more productive industry in a crisis can increase a region's resilience in a downturn. Laborers will find it simpler to shift occupations during this recession if there are more diversified business sectors accessible in their community. Economic diversity has been shown to affect resilience.

This study intends to construct a collection of facts relating to structural transformation and regional economic resilience that, in our opinion, will help policymakers better understand local economies. It is not intended to resolve questions of causality or circularity. It was discovered that regional disparities in economic structure brought on distinct types of structural change affecting resilience. However, the geographical considerations to cope with the possible autocorrelation have not been used in this work. Because of this, it may be essential for future studies to explore the geographical dependency of structural change and regional resilience.

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Appendix

Appendix 1: Descriptive Statistic

Variable Description	Obs	Mean	Std.Dev.	Min	Max
Resilience Index	336	-.746	55.318	-354.145	496.36
Log of resilience index	336	.013	1.99	-5.193	6.207
Whitin effect structural transformation	336	9.173	16.884	-28.251	143.949
Between static effect of structural transformation	336	2.956	10.025	-46.044	56.675
Dynamic effect of structural transformation	336	-6.202	12.118	-72.145	2.677
Log form of SC1	336	1.701	1.32	-3.631	4.969
Log form of SC2	336	.645	1.555	-3.95	4.037
Log form of SC3	336	.28	1.85	-5.537	4.279
Whitin effect structural transformation					
Agro, Forestry, Hunting and Fishery	336	1.298	1.913	-3.252	14.613
Mining and Quarrying	336	.984	6.444	-26.364	49.091
Manufacturing	336	.824	5.433	-19.318	39.243
Electricity, Gas and Water	334	.014	.214	-.919	1.968
Construction	336	.842	2.489	-14.954	15.105
Trade, Retail restaurants and hotels	336	.826	3.427	-10.868	45.238
Transport, Storage and Communication	336	2.85	11.1	-26.055	100.217
Financing, Real estate, business service	336	.642	3.706	-4.678	57.484
Community social and personal service	336	.894	1.828	-2.528	13.958
Between static effect of structural transformation					
Agro, Forestry,Hunting & Fishery	336	-.268	1.756	-9.464	9.446
Mining and Quarrying	336	-.227	5.07	-45.72	17.982
Manufacturing	336	.641	5.152	-21.023	31.831
Electricity, Gas and Water	334	.051	.243	-.847	1.83
Construction	336	.136	2.35	-10.698	24.511
Trade, Retail restaurants and hotels	336	.43	2.854	-16.678	34.824
Transport, Storage and Communication	336	1.885	8.941	-19.406	83.599
Financing, Real estate, business service	336	.197	2.835	-24.341	37.495
Community social and personal service	336	.112	1.939	-17.666	14.132
Dynamic effect of structural transformation					
Agro, Forestry,Hunting & Fishery	336	-.133	.411	-5.157	.407
Mining and Quarrying	336	-.565	1.509	-13.624	2.731
Manufacturing	336	-.539	1.906	-17.48	.894
Electricity, Gas and Water	334	-.044	.118	-1.251	.022
Construction	336	-.176	.597	-8.645	.636
Trade, Retail restaurants and hotels	336	-.248	2.546	-34.439	.885
Transport, Storage and Communication	336	-4.154	10.484	-69.91	.355
Financing, Real estate, business service	336	-.229	.886	-14.404	.515
Community social and personal service	336	-.114	.391	-4.638	2.006
During covid (1) or not (0)	340	.1	.3	0	1
Human development index	338	68.857	4.391	55.01	80.77
Growth rate	337	4.923	3.382	-15.74	21.76
Name of province	340	17.5	9.825	1	34
The value of export every year	304	437.232	810.699	0	4964.3
HDI with lag 3 year	335	68.828	4.399	55.01	80.77

Appendix 2: Regional Group Division between Java and Outside Java

No	Province	Location
1	Special Capital Region of Jakarta	Java Island
2	West Java	
3	Central Java	
4	Special Region of Yogyakarta	
5	East Java	
6	Banten	
7	Aceh	Outside Java Island
8	North Sumatra	
9	West Sumatra	
10	Riau	
11	Jambi	
12	South Sumatra	
13	Bengkulu	
14	Lampung	
15	Bangka Belitung	
16	Riau Islands	
17	Bali	
18	NTB	
19	NTT	
20	West Kalimantan	
21	Central Kalimantan	
22	South Kalimantan	
23	East Kalimantan	
24	North Kalimantan	
25	North Sulawesi	
26	Central Sulawesi	
27	South Sulawesi	
28	Southeast Sulawesi	
29	Gorontalo	
30	West Sulawesi	
31	Maluku	
32	North Maluku	
33	West Papua	
34	Papua	

Appendix 3: Regional Group Division in 5 Biggest Island

No	Province	Island
1	Aceh	Sumatra
2	North Sumatra	
3	West Sumatra	
4	Riau	
5	Jambi	
6	South Sumatra	
7	Bengkulu	
8	Lampung	
9	Bangka Belitung	
10	Riau Islands	
11	Special Capital Region of Jakarta	Java
12	West Java	
13	Central Java	
14	Special Region of Yogyakarta	
15	East Java	
16	Banten	
17	Bali	
18	NTB	
19	NTT	
20	West Kalimantan	Kalimantan
21	Central Kalimantan	
22	South Kalimantan	
23	East Kalimantan	
24	North Kalimantan	
25	North Sulawesi	Sulawesi
26	Central Sulawesi	
27	South Sulawesi	
28	Southeast Sulawesi	
29	Gorontalo	
30	West Sulawesi	
31	Maluku	
32	North Maluku	
33	West Papua	Papua
34	Papua	

Appendix 4: Panel Regression between Structural Change and Regional Resilience

(Table 2 Explanation)

Dependent Variable: Resistance Index of Resilience						
Independent Variable (ln Res)	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**
ln "within effect"	0.285***	0.229***	0.230**	0.280***	0.260***	0.244**
	(0.0588)	(0.0835)	(0.0923)	(0.0623)	(0.0873)	(0.0953)
ln "between effect"	-0.145	-0.179	-0.191	-0.146	-0.149	-0.170
	(0.1213)	(0.1402)	(0.1342)	(0.1327)	(0.1497)	(0.1440)
ln "dynamic effect"	-0.363***	-0.142	-0.0678	-0.376***	-0.140	-0.0451
	(0.0856)	(0.0847)	(0.0837)	(0.0918)	(0.1012)	(0.0995)
"Within effect" in EGW Sector		1.147	1.118		0.915	1.010
		(1.0863)	(0.9994)		(1.1173)	(0.9446)
"Between effect" in EGW Sector		1.249	1.107		1.265	1.246
		(1.2682)	(1.1716)		(1.3912)	(1.2133)
"Dynamic effect" in EGW Sector		2.519	1.958		2.708	2.335
		(1.8432)	(1.8435)		(1.7918)	(1.6969)
"Within effect" in TSC Sector		-0.486	-0.492		-0.885*	-1.014**
		(0.3177)	(0.3276)		(0.5167)	(0.4967)
"Between effect" in TSC Sector		-0.474	-0.482		-0.901	-1.038*
		(0.3327)	(0.3440)		(0.5364)	(0.5183)
"Dynamic effect" in TSC Sector		-0.438	-0.444		-0.851	-0.981*
		(0.3199)	(0.3299)		(0.5230)	(0.5034)
"Within effect" in TR Sector		-0.0823	-0.0637		-0.479**	-0.444**
		(0.1115)	(0.1084)		(0.2122)	(0.2032)
"Between effect" in TR Sector		0.0325	0.0290		-0.429*	-0.419*
		(0.1319)	(0.1361)		(0.2377)	(0.2319)
"Dynamic effect" in TR Sector		-0.123	-0.104		-0.542**	-0.510**
		(0.1194)	(0.1202)		(0.2155)	(0.2082)
"Within effect" in Min Sector		0.0153	0.0250*		0.0000352	0.0136
		(0.0097)	(0.0144)		(0.0165)	(0.0207)
"Between effect" in Min Sector		-0.00472	0.0123		-0.0408	-0.0245
		(0.0274)	(0.0266)		(0.0344)	(0.0349)
"Dynamic effect" in Min Sector		0.123*	0.165**		0.135*	0.188**
		(0.0628)	(0.0698)		(0.0738)	(0.0837)
"Within effect" in Man Sector		0.00104	-0.00492		-0.0213	-0.0153
		(0.0355)	(0.0338)		(0.0589)	(0.0522)
"Between effect" in Man Sector		-0.0166	-0.0226		-0.0354	-0.0253
		(0.0338)	(0.0373)		(0.0607)	(0.0600)
"Dynamic effect" in Man Sector		0.0757	0.0809		0.0390	0.0311
		(0.0637)	(0.0590)		(0.0810)	(0.0770)
"Within effect" in FR Sector		-0.0534	-0.0447		0.307	0.340
		(0.1382)	(0.1579)		(0.2252)	(0.2455)
"Between effect" in FR Sector		0.00217	0.0287		0.331*	0.372*
		(0.1291)	(0.1434)		(0.1931)	(0.2056)
"Dynamic effect" in FR Sector		-0.388**	-0.384*		0.0881	0.155
		(0.1905)	(0.2207)		(0.3011)	(0.3444)
"Within effect" in Construction Sector		0.000682	0.00432		0.170	0.149
		(0.1110)	(0.1129)		(0.1750)	(0.1611)
"Between effect" in Construction Sector		-0.0475	-0.0348		0.133	0.115
		(0.1165)	(0.1161)		(0.1818)	(0.1655)
"Dynamic effect" in Construction Sector		-0.168	-0.0835		-0.0533	-0.0129
		(0.2796)	(0.2768)		(0.3099)	(0.2926)
"Within effect" in CS Sector		0.252	0.260		0.346	0.408**

		(0.2005)	(0.1758)		(0.2358)	(0.1877)
"Between effect" in CS Sector		0.171	0.174		0.252	0.291*
		(0.1895)	(0.1691)		(0.2010)	(0.1684)
"Dynamic effect" in CS Sector		0.767	0.537		0.993**	0.840
		(0.5415)	(0.5843)		(0.4880)	(0.5222)
"Within effect" in AFH Sector		0.249***	0.251***		0.395***	0.413***
		(0.0898)	(0.0790)		(0.1268)	(0.1142)
"Between effect" in AFH Sector		0.301***	0.283***		0.429***	0.411***
		(0.0807)	(0.0749)		(0.1098)	(0.0990)
"Dynamic effect" in AFH Sector		-0.104	-0.171		0.307	0.235
		(0.2327)	(0.2164)		(0.3399)	(0.2966)
hdi3_lag			0.119***			0.117***
			(0.0398)			(0.0399)
cov	-1.211***	-1.771***	-1.701***	No	No	No
	(0.2370)	(0.3977)	(0.4138)			
Years	2011-20	2011-20	2011-20	2011-19	2011-19	2011-19
State effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes
_cons	-0.155	0.0763	-8.221***	-0.138	0.294	-7.829***
	(0.1042)	(0.2145)	(2.7964)	(0.1102)	(0.2345)	(2.8378)
N	336	334	330	302	300	296
R-sq	0.1731	0.2647	0.2933	0.1665	0.2859	0.3163
adj. R-sq	0.1631	0.1893	0.2171	0.1581	0.2062	0.2361

Robust standard errors in parentheses.

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Source: Author's calculation. Data retrieved from BPS.

Appendix 5: Cross-Section Correlation between Structural Change and Regional Resilience during Covid19 Outbreak (Table 3 Explanation)

Dependent Variable: Resistance Index of Resilience (Res)			
Independent Variable	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**
"Within effect"	-0.0409*	-0.113	-0.141***
	(0.0216)	(0.0786)	(0.0112)
"Between effect"	-0.0804	0.0637	-0.0117
	(0.0709)	(0.1684)	(0.0313)
"Dynamic effect"	-0.148	0.581	0.393**
	(0.1154)	(0.4997)	(0.0685)
ln "Within effect" in EGW Sector		0.845	0.656
		(1.0990)	(0.2490)
ln "Between effect" in EGW Sector		-0.409	-1.041**
		(0.9809)	(0.1391)
ln "Dynamic effect" in EGW Sector		-0.0887	0.196
		(0.9272)	(0.1367)
ln "Within effect" in TSC Sector		-1.169	-0.349
		(1.5133)	(0.2569)
ln "Between effect" in TSC Sector		-0.409	0.465
		(1.5289)	(0.2357)
ln "Dynamic effect" in TSC Sector		0.671	-0.172
		(1.5840)	(0.2250)
ln "Within effect" in TR Sector		-0.486	-0.232
		(1.4467)	(0.1434)
ln "Between effect" in TR Sector		0.498	-0.175
		(2.2592)	(0.2952)
ln "Dynamic effect" in TR Sector		-0.624	-0.237
		(2.0323)	(0.2517)
ln "Within effect" in Min Sector		-0.640	-0.842***
		(0.5562)	(0.0743)
ln "Between effect" in Min Sector		-0.600	-0.542**
		(0.5715)	(0.0740)
ln "Dynamic effect" in Min Sector		0.615	0.711**
		(0.6225)	(0.0723)
ln "Within effect" in Man Sector		-1.564	-0.590*
		(0.9722)	(0.1763)
ln "Between effect" in Man Sector		-1.871	-1.260**
		(1.2830)	(0.2857)
ln "Dynamic effect" in Man Sector		1.971	0.991*
		(1.2234)	(0.2485)
ln "Within effect" in FR Sector		-4.215	-3.588**
		(1.9634)	(0.3736)
ln "Between effect" in FR Sector		-3.275	-3.027***
		(1.5481)	(0.2677)
ln "Dynamic effect" in FR Sector		3.889	3.420***
		(1.7876)	(0.3199)
ln "Within effect" in Construction Sector		3.657*	2.175**
		(1.4896)	(0.2805)
ln "Between effect" in Construction Sector		5.711*	4.388***
		(2.3615)	(0.3987)
ln "Dynamic effect" in Construction Sector		-4.290*	-2.743**
		(1.7883)	(0.3211)
ln "Within effect" in CS Sector		0.122	0.889**
		(1.1440)	(0.1339)
ln "Between effect" in CS Sector		1.229	1.642***
		(1.2877)	(0.1585)
ln "Dynamic effect" in CS Sector		-0.690	-1.323**
		(1.2625)	(0.1441)
ln "Within effect" in AFH Sector		-2.429	-2.267***
		(1.2685)	(0.2184)
ln "Between effect" in AFH Sector		-1.930	-1.730***
		(0.9977)	(0.1622)
ln "Dynamic effect" in AFH Sector		2.579	2.388***
		(1.2501)	(0.2045)

Years	2020	2020	2020
State effects	No	No	No
Time effects	No	No	No
Robustness	Yes	Yes	Yes
_cons	-0.0971	10.62	21.23***
	(0.2429)	(5.0137)	(1.4898)
N	34	34	34
R-sq	0.1272	0.9431	0.9992
adj. R-sq	0.0399	0.3743	0.9868

Robust standard errors in parentheses.

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Source: Author's calculation. Data retrieved from BPS.

Appendix 6: Panel Regression between Structural Change and Regional Resilience in Java and Outside Java Island (Table 4 Explanation)

	Java Island			Outside Java Island		
Dependent Var (ln Res)	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**	**Without control each Sector**	**With control each Sector**	**With control each Sector & HDI**
ln "within effect"	0.0907	-0.692	-1.170	0.280***	0.260***	0.244**
	(0.0599)	(0.8349)	(1.1788)	(0.0623)	(0.0873)	(0.0953)
ln "between effect"	-0.767	-1.001*	-1.486*	-0.146	-0.149	-0.170
	(0.3913)	(0.4635)	(0.6513)	(0.1327)	(0.1497)	(0.1440)
ln "dynamic effect"	-0.0533	0.404	0.405*	-0.376***	-0.140	-0.0451
	(0.2250)	(0.2750)	(0.1880)	(0.0918)	(0.1012)	(0.0995)
ln "Within effect" in EGW Sector		-6.954	-9.174		0.915	1.010
		(5.9401)	(7.3883)		(1.1173)	(0.9446)
ln "Between effect" in EGW Sector		-8.170	-10.39		1.265	1.246
		(7.0433)	(8.1549)		(1.3912)	(1.2133)
ln "Dynamic effect" in EGW Sector		-5.689	-10.53		2.708	2.335
		(8.1018)	(8.3218)		(1.7918)	(1.6969)
ln "Within effect" in TSC Sector		0.0381	2.021		-0.885*	-1.014**
		(2.7400)	(3.8623)		(0.5167)	(0.4967)
ln "Between effect" in TSC Sector		0.271	2.364		-0.901	-1.038*
		(2.8694)	(4.0525)		(0.5364)	(0.5183)
ln "Dynamic effect" in TSC Sector		0.162	2.132		-0.851	-0.981*
		(2.7753)	(3.8913)		(0.5230)	(0.5034)
ln "Within effect" in TR Sector		1.165	1.015		-0.479**	-0.444**
		(0.6068)	(0.5230)		(0.2122)	(0.2032)
ln "Between effect" in TR Sector		0.581	0.123		-0.429*	-0.419*
		(0.8974)	(0.9878)		(0.2377)	(0.2319)
ln "Dynamic effect" in TR Sector		6.600	10.71**		-0.542**	-0.510**
		(4.5006)	(3.3568)		(0.2155)	(0.2082)
ln "Within effect" in Min Sector		2.202	2.111		0.0000352	0.0136
		(1.9042)	(1.8854)		(0.0165)	(0.0207)
ln "Between effect" in Min Sector		-0.975	-1.633		-0.0408	-0.0245
		(1.7002)	(1.8310)		(0.0344)	(0.0349)
ln "Dynamic effect" in Min Sector		9.120**	9.888**		0.135*	0.188**
		(2.7327)	(2.9128)		(0.0738)	(0.0837)
ln "Within effect" in Man Sector		-1.487	-1.990		-0.0213	-0.0153
		(1.1832)	(1.4675)		(0.0589)	(0.0522)
ln "Between effect" in Man Sector		-0.404	-0.452		-0.0354	-0.0253
		(0.7468)	(0.8096)		(0.0607)	(0.0600)
ln "Dynamic effect" in Man Sector		-1.370	-1.093		0.0390	0.0311
		(2.5882)	(2.3600)		(0.0810)	(0.0770)
ln "Within effect" in FR Sector		-0.717	-1.505		0.307	0.340
		(1.2786)	(1.9537)		(0.2252)	(0.2455)
ln "Between effect" in FR Sector		-0.386	-0.949		0.331*	0.372*
		(1.4728)	(2.0718)		(0.1931)	(0.2056)
ln "Dynamic effect" in FR Sector		0.950	0.282		0.0881	0.155
		(0.9646)	(0.9228)		(0.3011)	(0.3444)
ln "Within effect" in Construction Sector		0.252	0.524		0.170	0.149
		(2.4712)	(2.9425)		(0.1750)	(0.1611)
ln "Between effect" in Construction Sector		-0.454	-0.374		0.133	0.115
		(2.4219)	(2.7480)		(0.1818)	(0.1655)
ln "Dynamic effect" in Construction Sector		-5.464	-4.984		-0.0533	-0.0129
		(2.8410)	(2.8196)		(0.3099)	(0.2926)
ln "Within effect" in CS Sector		2.771	3.476*		0.346	0.408**
		(1.5033)	(1.4988)		(0.2358)	(0.1877)
ln "Between effect" in CS Sector		3.953**	4.940**		0.252	0.291*
		(1.2114)	(1.6197)		(0.2010)	(0.1684)
ln "Dynamic effect" in CS Sector		-6.524	-7.780		0.993**	0.840
		(5.1535)	(5.5556)		(0.4880)	(0.5222)
ln "Within effect" in AFH Sector		-0.621	-1.544		0.395***	0.413***
		(1.5929)	(1.9190)		(0.1268)	(0.1142)

ln "Within effect" in AFH Sector		-0.621	-1.544		0.395***	0.413***
		(1.5929)	(1.9190)		(0.1268)	(0.1142)
ln "Between effect" in AFH Sector		1.592	2.415		0.429***	0.411***
		(2.3294)	(3.1803)		(0.1098)	(0.0990)
ln "Dynamic effect" in AFH Sector		0.626	-5.789		0.307	0.235
		(6.9821)	(10.4387)		(0.3399)	(0.2966)
hdi3_lag			0.190			0.117***
			(0.1595)			(0.0399)
Years	2011-19	2011-19	2011-19	2011-19	2011-19	2011-19
State effects	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.111	-0.314	-14.07	-0.138	0.294	-7.829***
	(0.3156)	(2.1849)	(10.0172)	(0.1102)	(0.2345)	(2.8378)
N	54	54	54	302	300	296
R-sq	0.2214	0.7035	0.7410	0.1665	0.2859	0.3163
adj. R-sq	0.1747	0.3168	0.3761	0.1581	0.2062	0.2361

Robust standard errors in parentheses.

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Source: Author's calculation. Data retrieved from BPS.

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Research Paper

Labor Market Outcomes of Vocational High Schools (SMK) and General High Schools (SMA) during the COVID-19 Pandemic

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Abstract

The fourth Sustainable Development Goals (SDGs) adopts a lifelong learning approach to education and introduces vocational and tertiary education into the global agenda. While Vocational Education and Training (VET) was almost absent in previous international development frameworks, the agenda 2030 and its SDGs highlight greater importance to it. Consequently, many governments in developing countries promote vocational secondary education to improve labor market outcomes. This study aimed to determine the development of return on investment for Vocational High Schools (SMK) and Senior High Schools (SMA) in 2020. The data used the August 2020 National Labor Force Survey (SAKERNAS) data with Two-Step Heckman and the Mincer Revenue Function. As a result, in 2020, the return on investment in vocational education was 16.82% higher than the rate of return on investment in high school education. However, observed by the age group, the results show that SMK only provides an initial wage advantage for men, which then declines with age. Although male SMK graduates experienced poorer results, female SMK graduates did not experience the same decline.

Keywords: Vocational High School (SMK), Income, Two-Step Heckman, Mincer Income Function

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1. Introduction

Vocational Education and Training (VET) is an integral part of the education SDG (SDG 4) as referred to in the targets SDG 4.3. It is reaffirmed in the 4th SDGs, focusing on inclusive and quality education for all, that education is a means to enhance the quality of human capital and increase economic growth. Secondary education, both vocational and general education, is a critical level of education in increasing human capital since the graduates of this education level can either work or enter tertiary education. Indonesia is committed to improving the quality and competitiveness of human capital, following the commitment to achieving SDG 4. In enhancing human capital, one main strategic program is improving technical and vocational training (TVET), as stated in Presidential Regulation No. 18 of 2020 concerning the Medium-Term Development Plan of 2020—2024 (2020).

Indonesia is a country with a large working-age population (15—64 years) of 181.7 million people in 2019. It is due to changes in the age structure where the growth of children (under 15 years old) and parents (65 years old) and above) grows more slowly than the working-age population. This demographic situation is advantageous because the population of productive age (working age) is more than the population of dependent age (children and the elderly) (Morris, 2022). Indonesia's current demographic condition is also an opportunity to create a demographic bonus through the contribution of the productive population who work to accelerate economic growth (Hayes & Setyonaluri, 2015).

Although the productive age continues to increase, Indonesia's productivity level remains stagnant. Increased productivity is needed to avoid the middle-class income trap characterized by a low productivity level. Labor productivity is an essential economic variable closely related to economic growth, competitiveness, and living standards. Labor productivity can be calculated based on the number of workers, working hours, and total factor productivity. The Asia Productivity Organization (APO) calculates the productivity of countries in the world using the productivity index, which shows the movement of labor productivity based on the number of workers, working hours, and total factor productivity.

APO data shows Indonesia's productivity level is still far below China, India, and several other ASEAN countries. Indonesia's productivity indexes regarding the number of workers and working hours are 1.27 and 1.30, respectively. Indonesia is in the bottom three after Myanmar and Malaysia. The low productivity of Indonesia is partly due to the level of education and training of Indonesian workers, where there are still many unskilled workers that affect productivity levels (APO, 2019).

Expanding access to vocational education is the choice of policymakers in developing countries, primarily to increase employment. Vocational education is preferred, as it is considered to provide better technical skills than general education and can bridge the transition to the world of work (Zimmermann et al., 2013). Vocational education provides certain subjects in a specific curriculum to produce skilled workers ready to work in the labor market. Because it targets a specific job, the workforce skills must follow the work type to increase the income. Vocational education is said to prepare particular resources for specific jobs, allowing the workforce to be more productive (Tilak, 2002). Thus, it expects that graduates of vocational secondary education will have more advantages and competitiveness than graduates of general schools.

Senior secondary education is a crucial level of education for Indonesia's economic development. The government prioritizes SMK to prepare a competent workforce to be absorbed by the labor market. In 2019, the government began transforming vocational development through the Vocational Revitalization program aimed at 300 schools. In 2021, the government launched the Center of Excellence Vocational School program. Expanding access to vocational education is the choice of policymakers in developing countries, primarily to increase employment. The expansion of SMKs carried out by the government since 2019 has implications for the increasing number of SMK graduates in the labor market.

The debate about the relative benefits of senior secondary vocational education and general education remains discussed in the literature. The government's policy on vocational education in secondary schools has been going on for the last two decades due to the difficulty of young people getting jobs, especially those who did not graduate from university. It prompted the government to advocate for vocational education, to encourage positive expectations for vocational high school graduates to find decent jobs, to help tackle youth unemployment, and to expand employment opportunities for high school graduates.

Vocational secondary education is often used as a last resort for individuals in their choice of school. On the other hand, vocational secondary education can equip students with specific technical skills considered essential for jobs requiring specific jobs. The basic assumption of vocational education is that training the skills that match the demands of the labor market will increase worker productivity, thereby contributing to national economic development. Many believe that vocational secondary education can reduce unemployment.

Based on previous research on the rate of return, there are studies showing that the income of vocational high school graduates is higher than that of general high school graduates (Arum & Shavit, 1995; Pasay & Quarina, 2015). Regarding age, Pasay & Quarina (Pasay & Quarina, 2015) found that the older the age, the higher the probability for individuals to work and earn wages. However, after reaching a certain point, the working probability of individuals will decrease. Graduates with low education will also find it more difficult to compete in the labor market because their productivity rate and abilities will decline faster than workers with higher education.

Meanwhile, other studies reveal that the rate of return for general high school graduates is higher than for vocational high school graduates (Newhouse & Suryadarma, 2011). Newhouse & Suryadarma argued that the increase in the service sector in the structure of the Indonesian economy compared to the manufacturing sector could also affect the rate of return earned between men and women. Women benefit more from the service sector development in Indonesia since they prefer to major in business and tourism, compared to men, who tend to choose more technical sectors.

However, an economic recession can also contribute to job losses, lower incomes, and increased poverty. Job loss due to recession will affect future income, lost productivity, or decreased skills due to prolonged unemployment. Based on human capital theory, educated workers will be better able to cope with the impact of an economic crisis because they will be able to adapt to changing needs of employers and new technologies. The Asian Development Bank (Asian Development Bank, 2021) documents changes in rates of return before, during, and after the crisis. In Argentina, during the 1992-2002 crisis, the incomes of educated workers were less affected by the crisis than less educated workers. Sparrow, Dartanto, and Hartwig (Sparrow et al., 2020) stated that the COVID-19 crisis and restrictions on distance and mobility severely impacted economic growth. In Q2 2020, GDP fell by 5.3% compared to the previous year's same quarter.

This paper aimed to analyze the difference in income received between vocational secondary education (SMK) and general secondary education (SMA) in Indonesia. Using the Mincer equation, we estimated the contribution of schooling and skills to earnings. This study argues that SMK provides an initial wage advantage for males, which declines with age, while women graduates did not experience a similar setback. However, understanding the changes profitability of vocational education might contribute to policy recommendations to improve vocational education and enhance human capital. In other words, it would support SDG 4 to ensure quality education and promote lifelong learning opportunities for all.

The difference between this research and previous research is that the latest focuses on the secondary education level of SMA and SMK and their development in 2020. Another difference is the use of data from the 2020 National Labor Force Survey (Sakernas) using the Two-Step Heckman method. Heckman's two-step approach (Heckman, 1979) was adopted to detect selectivity bias and to correct if such potential bias is present. Initially, a probit model of labor force participation is estimated. Afterward, the derived inversed mills ratio was included in the human capital earnings function (wage equation) as an additional regressor.

2. Methodology

Human Capital Investment and Rate of Return to Education

The rate of return on education investment concept compares the costs incurred to invest in education and the potential benefits (Borjas, 2015). An individual's decision to invest in higher education is affected by considerations of comparing the costs and benefits of education. Rationally, individuals will choose to invest in education to a higher level if the rate of return obtained is also high (McConnell et al., 2016).

The benefits of investment in education are observed through the rate of return on education. At the individual level, the costs incurred by individuals are an opportunity or alternative costs of the total costs paid when taking education. Alternative costs consist of two, i.e., direct (forgone earnings) and indirect costs. Indirect costs are due to the loss of individual data if they skip school or enter the labor market. Direct costs (out-of-pocket expenses) include tuition, books, stationery, and other necessities, which are expenses to finance their education.

On the other hand, the benefits of investment in education can be seen from the increase in income earned by individuals while working. Benefits received by individuals from education are divided into direct and indirect benefits of a long-term nature. The direct benefit that individuals get when investing in education is in the form of lifetime earnings, where individuals with a higher educational level will get a higher income than other individuals who do not invest. The productivity of workers with higher education will be higher to increase the income of the community as a whole.

Becker (Becker, 1964) also developed a theory about the effect of education on income. Becker applies the on-the-job training model to see how education affects income. Becker divides training into general and specific training. General training is training provided by the company where workers pay for the training because then the company will compensate them in the future. Instead, specialized training is provided and paid for by the company to increase its production of the company.

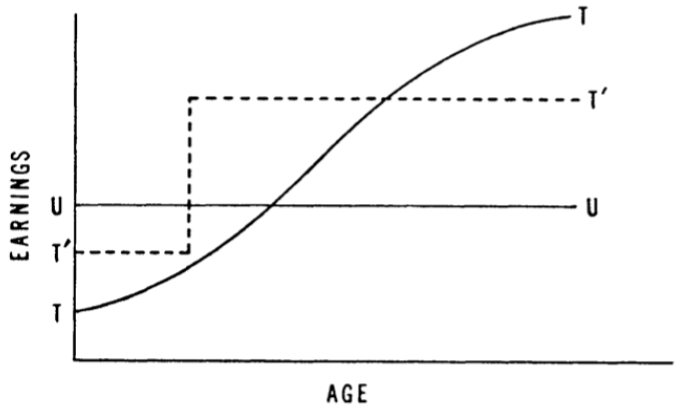

Figure 2: Relationship Between Individual Income and Training

Source: K. Becker (1964)

In Figure 2, training has a positive effect on income. The law outlines the relationship between income and age of individuals without training. It shows that without training, individual income will stagnate. On the other hand, income is higher when individuals are trained, where the TT line represents when individuals are trained, while the TT' line represents marginal productivity. The concave form describes "the rate of increase in income is influenced more by younger than older age." The income of individuals who attend training will be below those who do not attend training, but the income level will eventually increase for individuals who receive training. It concludes that skilled workers will enjoy higher profits than unskilled workers.

Data and Sample

The data used in this study were secondary data from the August 2020 National Labor Force Survey (SAKERNAS) collected from Household Members (ART) aged five years and over by the Central Statistics Agency (BPS). The samples for the August 2020 Sakernas were 300,000 households. The information contained in the Sakernas data includes, among others, gender, age, marital status, education level, major in education/field of study, place of residence, activities a week and a month ago, activities to find work/preparing for a business, main job, additional work, working hours throughout the job, and work experience. The August 2020 Sakernas data survey was conducted during the COVID-19 pandemic crisis.

Concerning COVID-19, Sakernas August 2020 has data on changes in wages or income and working hours received by workers during the COVID-19 pandemic.

The unit of analysis in this study were high school, vocational, and university graduates comprising five age groups, i.e., 15-24 years, 25-34 years, 35-44 years, 45-54 years, and 55-64 years. The samples used were secondary school and higher education graduates with jobs. It aimed to observe the rate of return to education among high school graduates.

Table 2: Two-Step Heckman Variable Based on Sakernas August 2020

Variable Name	Symbol	Definition Operational	Question Code	Scale/ Category
Probability Model Working				
Probability Working	*p_work*	Probability of individual work choice	r9a, r9b, r9c, r10a	p_work =1, work p_work =0, not in the workforce or currently unemployed
Education	*educ*	The highest level of education that an individual has taken	r6a	educ=1, Vocational High School (SMK) educ=2, Senior High School (SMA) educ=0, SMA/SMK to lower (elementary and junior high)
Type of Gender	*sex*	Individual Gender	k4	sex=1, male sex=0, female
Age	*age*	Age on birthday last birthday	k6	Numeric
Age Square	*age2*	Age squared	k6	Numeric
Marital Status	*mar*	Individual marital status	r4	married =1, married or once married married =0, not married yet
Educational Return on Investment Model with Mincer's Income Function				
Revenue Log	*income*	Monthly wages divided by a month's working hours, then formed in logarithms (ln)	r14a1, r14a2	Numeric
Education	*educ*	The highest level of education attained by an individual	r6a	educ=1, SMK educ=2, high school educ=0, SMA/SMK to lower (elementary and junior high)
Work Type	*collar*	The main types of work of workers, namely white collar, gray collar, and blue collar	r13b_kbji2	Collar=1, white collar Collar=2, blue collar Collar=0, gray collar
Work Sector	*sector*	Workers based on their field of business	sector9	Sector 1= Agriculture, Plantation, Forestry, Hunting and Fisheries Sector 2= Mining and Quarry Sector 3= Electricity, Gas, and Water

				Sector 4= Construction Sector 5= Trade, Home Meals, and Accommodation Services Sector 6= Transportation, Warehousing, and Services Communication Sector 7= Finance, Leasing, Real Estate, and Corporate Services Sector 8= Social Services and Individual Services
Training	*train*	Getting training/courses/training and obtaining certificates	r6d & r6e	Train=1, training Train=0, no training
Age Group	*age group*	Respondent's age category	k6	Age group =0, 15-25 Age group =1, 25-35 Age group =2, 35-45 Age group =3, 45-55 Age group =4, 55-65 Age group =5, >65
Sex	*sex*	Individual Gender	k4	sex=1, male sex=0, female
Marital Status	*mar*	Individual marital status	r4	married =1, married or once married married =0, not yet married
Living Area	*urban*	Respondents' living area	classification	Urban=1, urban Urban=0, rural
Island Territory	*island*	Classification of big islands in Indonesia	Code_prov	Java =1 Sumatra =2 Borneo =3 Sulawesi=4 Nusa Southeast /Bali=5 Maluku/Papua=6
Change of Working Hours	*hours*	Have decreased or increased working hours during Covid-19	R16b	Working Hours Increase / Fixed=0 Working Hours Decrease=1

Methods and Estimation Model

This research used Heckman's Two-Step Model. This model consists of two stages, where the analysis uses a different model at each stage. The first stage, estimation, was performed using the probit model. This stage aimed to select a selectivity bias that appears and can affect the estimation results. The selection bias is because vocational and high school graduates who participate as workers were selected as samples. The selection of the sample indicates that the sample used is not a random subset of the population. Based on Heckman (Heckman, 1977), the first step is to estimate the probability of vocational and high school graduates working and having an income. The form of the probit equation used is as follows:

$$EMP_i = \gamma o + \gamma_1 Edu_i + \gamma_2 Sex_i + \gamma_3 Age_1 + \gamma_4 Age2_1 + \gamma_5 Married_1 + u_i$$

Then, the above equation will form the Inverse Mills' Ratio. Inverse Mills' Ratio (λ_i) is a variable that corrects selection bias when estimating Mincer's income function.

$$\lambda_i = \frac{\phi\left(\gamma_i Z'_{ij}\right)}{[1 - \Phi\left(\gamma Z'_i\right)\}}$$

where ϕ and Φ are the probability density functions and the cumulative probability density functions for the standard normal distribution of variables. The equation would be inserted into Mincer's income equation as an additional independent variable. Mincer equation has been used in various previous literature to estimate how much influence the educational level has on the average level of income earned by individuals (Patrinos, 2016). The form of the Mincer equation is as follows:

$$lnWage_i = \beta_0 + \beta_1 Edu_i + \beta_2 Exp_i + \beta_3 Exp_{2i} + \varepsilon i$$

where:

$lnWage_i$	=	natural logarithm of the average net income of individuals per month
i	=	individual
β_0	=	constant
Edu_i	=	last higher education level (number of years of schooling)
Exp_i	=	work experience (in a unit year)
Exp_{2i}	=	square form of work experience
ε	=	error term

The form of the above equation is expanded in this study with the following equation:

$$lnWage_i = \beta_0 + \beta_1 educ + \beta_2 sex + \beta_3 agegroup + \beta_4 mar + \beta_5 urban + \beta_7 train + + \beta_8 sector + \beta_9 collar + \beta_{10} island + \beta_{11} whours + \varepsilon$$

where:

$\ln Wage_i$	=	natural logarithm of the average net income of individuals per month
β_0	=	constant
Edu_i	=	secondary high school education
Sex	=	sex
Agegroup	=	age groups
Mar	=	marital status
Urban	=	classification of a residential area
Train	=	training program participation
Island	=	island territory
Sector	=	field of business
Collar	=	types of occupation
Island	=	classification of big islands in Indonesia
Whours	=	increased or decreased working hours due to COVID-19
ε	=	error term

The Mincer equation was estimated in the second stage of the Two Step Heckman model using the Ordinary Least Square (OLS), where the results of the estimated average rate of return to education and differences in income levels between age categories were analyzed in this study. After the bias correction from the first step of Two-Step Heckman was obtained and substituted into the Mincer income function, the final form of the equation is:

$$lnWage_i = \beta_0 + \beta_1 educ + \beta_2 sex + \beta_3 agegroup + \beta_4 mar + \beta_5 urban + \beta_7 train + + \beta_8 sector + \beta_9 collar + \beta_{10} island + \beta_{11} whours + \lambda_i + \varepsilon$$

3. Results and Discussions

The study's main objective was to estimate the rate of return on investment in secondary education. The rate of return on investment in secondary education was calculated by estimating the Mincer Income Function. The analysis was carried out with Sakernas data in August 2020 during the COVID-19 pandemic. Table 4 below shows the estimation result from the Mincer Income Function using the Two-Step Heckman method.

Table 3 below describes the individual characteristics of general and vocational high school graduates with income. Both SMK and SMA graduates were majority male at 68% and 64%, while the women were 32% and 36%, respectively. Furthermore, most vocational and high school graduates also worked in the trade, restaurant, and accommodation services sectors, with a percentage of 32% and 29%, respectively. Most high school and vocational graduates did not attend training. Vocational high school graduates participated in training by 27%, higher than high school graduates at 18%. The type of work with many high school and vocational graduates was blue-collar work, amounting to 50%. The socio-demographic characteristics of SMK graduates were male, married, and living in urban areas. Meanwhile, high school graduates were dominated by married men living in rural areas.

Table 3: Characteristics of Working Population Based on High School Education

		Education				Total	
		SENIOR HIGH SCHOOL		VOCATIONAL HIGH SCHOOL			
		N	Percent (%)	N	Percent (%)	N	Percent (%)
(1)		(4)	(5)	(6)	(7)	(8)	(9)
Type Gender	Woman	32,804	35.62%	13,428	31.98%	46,232	34.48%
	Man	59,301	64.38%	28,565	68.02%	87,866	65.52%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Work Sector	Agriculture, Plantation, Forestry, Hunting, and Fishery	22,888	24.85%	6,986	16.64%	29,874	22.28%
	Mining and excavation	1,611	1.75%	689	1.64%	2,300	1.72%
	Manufacture	10,326	11.21%	7,215	17.18%	17,541	13.08%
	Electricity, Gas, and Water	621	0.67%	463	1.10%	1.084	0.81%
	Construction	4,307	4.68%	2,278	5.42%	6.585	4.91%
	Trade, Restaurant, and Accommodation Services	27,216	29.55%	13,565	32.30%	40,781	30.41%
	Transportation, Warehousing, and Communication Services	5,621	6.10%	2,863	6.82%	8,484	6.33%
	Finance, Leasing, Real Estate, and Corporate Services	1,421	1.54%	809	1.93%	2,230	1.66%
	Community, Social, and Individual Services	18,094	19.64%	7,125	16.97%	25,219	18.81%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Training	Not Once Training	75,305	81.76%	30,684	73.07%	105,989	79.04%
	Once Training	16,800	18.24%	11,309	26.93%	28.109	20.96%
		92,105	**100%**	**41,993**	**100%**	**134.098**	**100%**
Age Group	15-24 years old	16,427	17.84%	10,832	25.79%	27,259	20.33%
	25-34 years old	22,120	24.02%	10,486	24.97%	32,606	24.32%
	35-44 years old	24,664	26.78%	10,561	25.15%	35,225	26.27%
	45-54 years old	21.313	23.14%	7,074	16.85%	28,387	21.17%
	55-64 years old	6,297	6.84%	2,400	5.72%	8,697	6.49%
	>65 years old	1,284	1.39%	640	1.52%	1,924	1.433%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Marital Status	Single	21,661	23.52%	13,279	31.62%	34,940	26.06%
	Married/ Ever Married	70,444	76.48%	28,714	68.38%	99.158	73.94%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Residence	rural	46,981	51.01%	16,272	38.75%	65,253	47.17%
	Urban	45,124	48.99%	25.721	61.25%	70.845	52.83%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Type Work	Blue Collar	46,020	49.96%	21.148	50.36%	67,168	50.09%
	White Collar	10,145	11.01%	4,669	11.12%	14,814	11.05%
	Gray Collar	35,940	39.02%	16,176	38.52%	52,116	38.86%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Region	Java	22,185	24.77%	17,526	41.74%	40,341	30.08%
	Sumatra	31.541	34.24%	11,881	28.29%	43,422	32.38%
	Borneo	9,329	10.13%	3,465	8.25%	12.794	9.54%
	Sulawesi	12.744	13.84%	4,359	10.38%	17,103	12.75%
	Nusa Tenggara/Bali	7,179	7.79%	2,824	6.72%	10.003	7.46%

		Education				Total	
		SENIOR HIGH SCHOOL		VOCATIONAL HIGH SCHOOL			
		N	Percent (%)	N	Percent (%)	N	Percent (%)
(1)		(4)	(5)	(6)	(7)	(8)	(9)
	Maluku/Papua	8,497	9.23%	1,938	4.62%	10,435	7.78%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**
Change of Working Hours	Fixed/Incremental Working Hours	68,198	74.04%	30,475	72.57%	98,673	73.58%
	Working Hours Down	23.907	25.96%	11,518	27.43%	35,425	26.42%
		92,105	**100%**	**41,993**	**100%**	**134,098**	**100%**

Source : BPS, Sakernas August 2020. Processed by author.

Based on the demographic characteristics shown in Figure 3, male wages were consistently higher than female workers for both senior high school graduates and vocational high school graduates. The relationship between age and monthly wages for high school graduates and vocational high school graduates is presented in Figure 3. Workers in the 15-25 year age group tended to have lower wages than other age groups. Investment in human capital for education tended to be conducted at young ages, resulting in increasing wages along with the increasing age of workers. In total, the peak monthly wage for SMK graduates was in the 44-55 year age group, while the peak salary for high school graduates was IDR 1,665,574. The similarity between the monthly wage pattern for SMA and SMK graduates was that both formed an inverted U pattern.

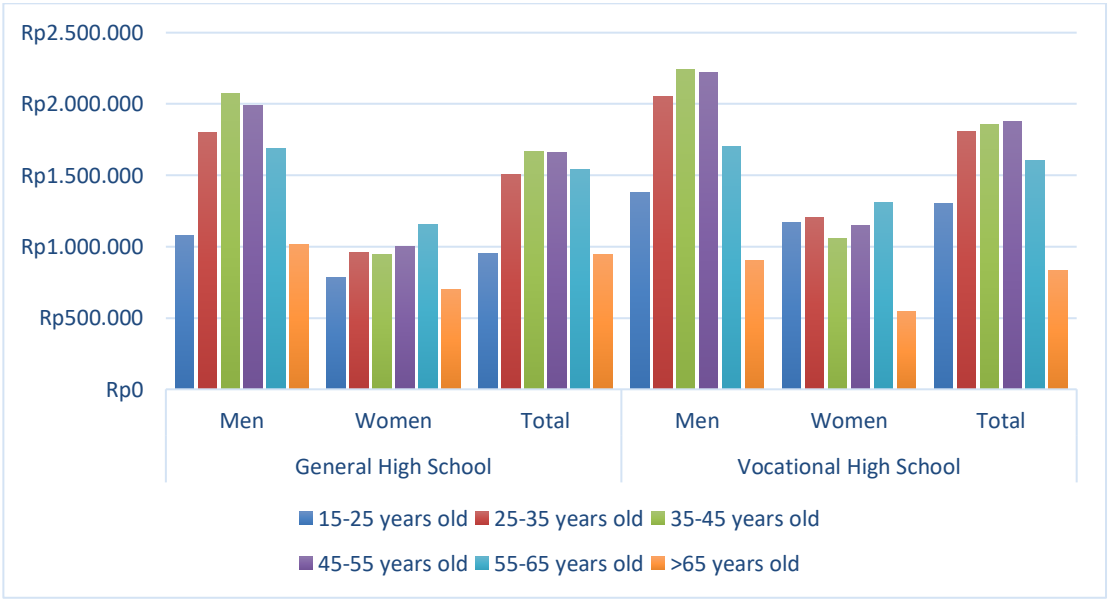

Figure 1 Average Wages of Workers by Age Group, Gender, and Last Education

Source : BPS, Sakernas August 2020. Processed by author

Table 4: Estimated Results of Individual Income Levels in the Second Stage of the Heckman Two Step-Model

Variable Independent	Variable Dependent: Income Individual	Standard Error
Vocational education	0.1682***	0.015
Individual Characteristics		
Type Gender	0.3916***	0.016
Age Group		
25-34	0.0867***	0.138
35-44	0.1403***	0.016
45-54	0.1569***	0.016
55-64	0.1392***	0.170
65+	-0.1494***	0.034
Marital Status	0.1231***	0.008
Urban	0.1975***	0.005
Training	0.0924***	0.006
Type of Work		
White Collar	0.3679***	0.010
Gray Collar	0.2773***	0.008
Sector Work		
Mining and excavation	0.7048***	0.180
Manufacture	0.4340***	0.010
Electricity, G, and Water	0.3241***	0.025
Construction	0.2887***	0.122
Trade, Restaur, ant and Accommodation Services	0.1230***	0.010
Transportation, Warehousing, and Communication Services	0.1627***	0.011
Finance, Leasing, Real Estate, and Corporate Services	0.3992***	0.188
Community, Social, and Individual Services	0.0737***	0.010
Island Territory		
Sumatra	-0.0564***	0.006
Borneo	0.1298***	0.009
Sulawesi	-0.1076***	0.008
Nusa Tenggara/Bali	-0.1937***	0.010
Maluku/Papua	0.1103***	0.010
Change of Working Hours	-0.2036***	0.005

Variable Independent	Variable Dependent: Income Individual	Standard Error
Variable Interaction		
Age Group#Education		
SMK#25-34	-0.0393*	0.015
SMK#35-44	-0.7147***	0.015
SMK#45-54	-0.0757***	0.017
SMK#55-64	-0.1199***	0.025
SMK#65+	-0.2031***	0.054
Type of Gender#Education		
boy#high school	0.1041***	0.012
Type of Job#Education		
Collar White#SMK	0.0208	0.016
Collar Gray#SMK	-0.0497***	0.011
Lambda	-0.1054***	0.030
Observations	**134.098**	
R2	**0.1915**	
Number of Observations	**90,696**	

Standard errors in parentheses

*** p<0.01, **p<0.05, *p<0.1

Source: BPS, Sakernas August 2020 (processed)

From the Mincer Income Function results, SMK graduates had a higher wage of 16.8% compared to SMA graduates. As for gender, men had 39.1% higher wages than women. In addition to gender, age, marital status, urban and rural areas, and island areas were other variables used to represent the demographic characteristics of each individual. The age variable used in the income model acted as a proxy or estimate of a person's experience other than years of service (Rahayu, 2010). The older the workers age, there is the accumulation of increased productivity or experience. In the age variable, the highest increase in income was in the 45-54 age category by 15.6% compared to the 15-24 year age group. Income in the age group 65 and over decreased by 14.9% compared to those aged 15-24.

In the marital status variable, married working individuals would have increased income by 12.3% compared to single workers. Meanwhile, individuals living in urban areas had 19% higher income or wages than those in rural areas. Farahnasy's research (Farahnasy, 2006) demonstrated that workers in urban areas are more productive than rural ones. The quality of workers in urban areas was also higher than in rural areas due to higher levels of education in urban than in rural areas. As for the island areas, workers in Kalimantan and Maluku/Papua had a higher income of 12% and 11% compared to workers in Java.

The coefficients related to the characteristics in this study are the employment, training, and type of work sectors. People who work in the mining, quarrying, and manufacturing sectors increased their income by 70% compared to the agricultural sector. Although all sectors experienced an increase compared to the agricultural sector, the COVID-19 pandemic affected several employment sectors. Based on LPEM (LPEM, 2020), Indonesia's GDP in Quarter III was recorded at -3.49% (y.o.y), putting Indonesia into the definition of recession. By employment sector, the four main sectors of the Indonesian economy that contribute more than half of the GDP, such as manufacturing, wholesale and retail trade, construction, mining, and quarrying, experienced negative growth in Q3 2020. These sectors experienced a heavy contraction due to the policy of physical and social restrictions as the daily number of COVID-19 cases continues.

Regarding training, the sample who had attended training received 9.24% higher income than those who had never attended the training. By participating in the training, individuals will have a higher ability to work optimally and productively than individuals who do not participate in job training. The collar variable shows that the sample working in the white collar had the highest income compared to the gray-collar and blue-collar workers.

Variable changes in working hours showed a significant negative result of 20%. It means that a decrease in working hours will impact a 20% decrease in income compared to increased and fixed working hours. Job loss due to the COVID-19 recession in 2020 is said to affect future incomes, lost productivity, and a decline in skills due to prolonged periods of unemployment (ILO, 2021).

Regarding the correction of selection bias, the value of the lambda variable or Inverse Mills' Ratio for secondary education graduates (SMA and SMK) is significant and negative, ceteris paribus. This significant result means that selection bias is found when entering the labor market (Taniguchi & Tuwo, 2014). Therefore, self-selection, i.e., the cause of different rates of return to education between women and men in this study, is relevant. The negative coefficient value of the lambda variable shows that the unobserved variable negatively affected the monthly income earned by high school (SMA) and vocational high school (SMK) graduates.

The rate of return on vocational education may decline over time. It can happen if the special skills taught in vocational schools do not experience renewal compared to general skills. The specialized skills of vocational graduates allow graduates to immediately work and earn wages upon graduation, while graduates from general or senior high schools need to be further trained by the companies that employ them. However, over time high school graduates may find it easier to upgrade their skills to meet job demands. In both cases, vocational education provides an initial advantage that will decline over time.

Results for SMK graduates, particularly those between the ages of 25 and 35, show that returns to vocational schools have declined sharply with age. Figure 4 shows that at the age of 15-24 years, the income of SMK graduates was higher than that of SMA graduates. However, with increasing age, the income level of SMK graduates decreases, thereby reducing the gap between the incomes of SMA and SMK graduates. The highest income for vocational high school graduates was in the 45-54-year-old age group. From 55 years and over, the income level of SMK graduates is lower than that of SMA graduates. It indicates that the benefits of vocational education income do not last long in the long term. The policy to continue to a higher level is critical since vocational education will only provide job benefits at the beginning before experiencing diminishing with age.

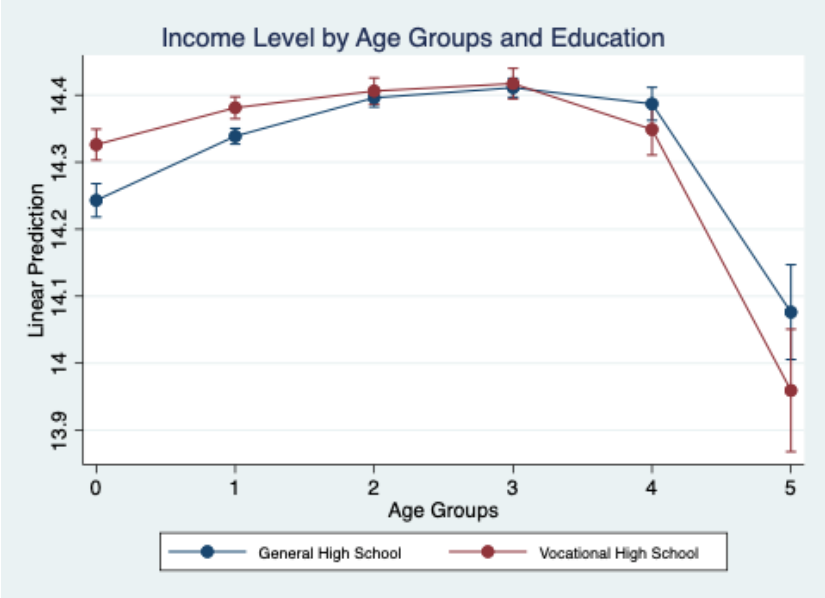

Figure 2 Income Level of High School and Vocational High School Graduates by Age Group and Education

Source : BPS, Sakernas August 2020. Processed by author

Figure 5 shows the differences in income levels of SMA and SMK by gender and age group. For men, the income of SMK is higher than that of SMA, only in the 15-24 year age group. Furthermore, starting at the age of 25 to 65 years and over, male graduates of SMK experienced a decrease in income compared to men who are high school graduates. It did not happen to women who graduated from SMK. The income gains obtained by women graduating from SMK compared to SMA occurred in all age groups except those aged 55 to 65 years and over. The income of female high school graduates also experienced an increase in the 45-54 year age group.

The decline in men's rates of return could be related to changes in Indonesia's economic structure. From 2003 to 2007, employment in the service sector grew by about four percent per year, while employment in the industrial sector grew by 2.5 percent per year (World Bank, 2011). The increasing prominence of the service sector may disproportionately affect vocationally trained men as they tend to choose engineering majors. Women, on the other hand, tend to choose to study business management or tourism skills, the demand for which may remain strong. In an increasingly service-oriented economy, there is likely to be a decline in demand for the industrial and engineering majors that most men choose in vocational schools. Another potential explanation for the recent decline in male vocational returns is the decline in the quality of vocational training for males. For example, technical vocational training may require more investment to stay relevant to new advances in technology (Newhouse & Suryadarma, 2011).

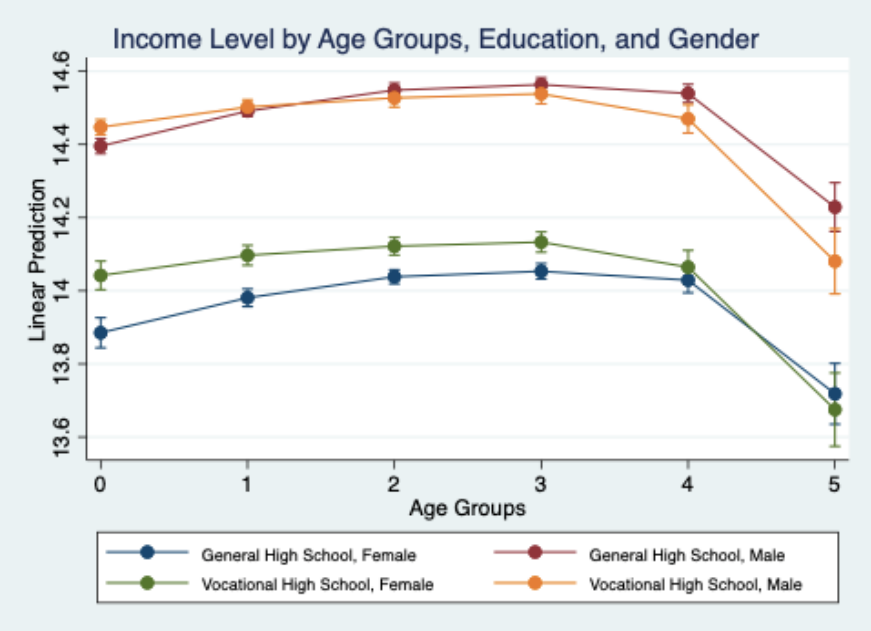

Figure 3 Income Level of High School and Vocational High School Graduates by Age Group, Education, and Gender

Source : BPS, Sakernas August 2020. Processed by author.

Figure 6 shows that vocational graduates who work in white-collar jobs had higher incomes than high-school graduates who work in gray-collar jobs. Meanwhile, SMK graduates who work in blue-collar jobs had higher incomes than high-school graduates in gray-collar jobs. Figure 6 also shows that white-collar SMK graduates had higher incomes than white-collar high school graduates before age 65. It was also discovered in SMK graduates in blue collars. For the gray collar there is a trend of initial gains for SMK graduates in the 15-24 age group but continue to decline until age 65 years and over.

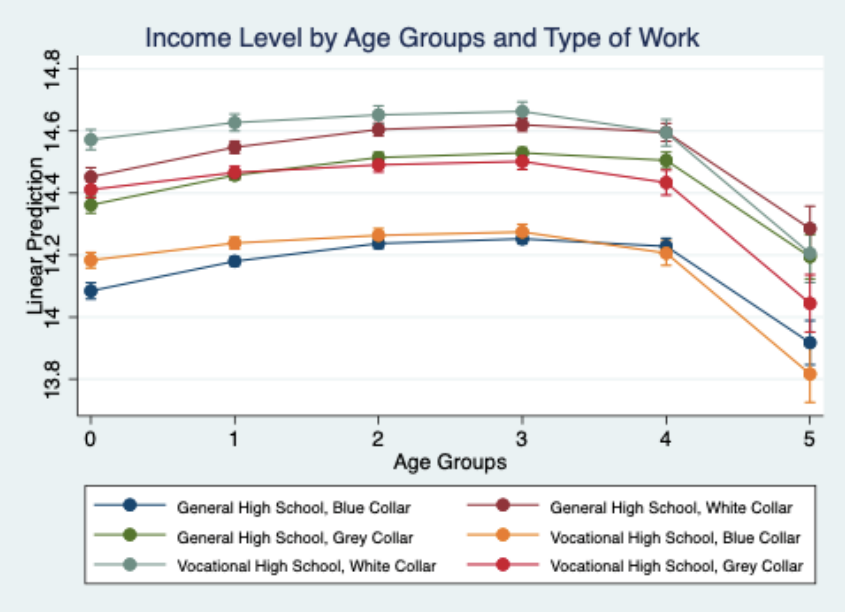

Figure 4. Income Level of High School and Vocational High School Graduates by Age Group and Type of Work

Source : BPS, Sakernas August 2020. Processed by author.

Conclusions

This study seeks to estimate and compare the difference in income between SMK and SMA. The analysis that becomes the bottom line of this research is the result of the interaction between the age group of high school graduates and vocational high school graduates with the gender on income. SMK provides an initial wage advantage for men, which declines with age. Although male secondary school graduates experienced worse outcomes, similar declines were not experienced by female vocational high school graduates. As for age groups, this empirical study also shows that for women, SMK will provide a higher return on income than male SMK graduates.

Based on these findings, this study recommends encouraging training programs by re-skilling and up-skilling for high school (SMA) and vocational high school (SMK) graduates. The demand for new skills and skill upgrades will continue to grow as individuals must undergo several job transitions throughout their working life. If workers do not have access to re-skilling or up-skilling, workers will likely experience stagnant skills that impact productivity and innovation. As most workers have left formal education on the job, re-skilling and up-skilling programs for the adult age group play an important role in ensuring opportunities for skills upgrading, responding to skills changes, and preventing skills imbalances.

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Research Paper

The Corelation of Pandemic and Indonesia Presidency of G20 in The Capital Market G20 Member Countries

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Abstract

The correlation between the capital market of G20 member countries is important to analyze. Depending on a country's economy, capital market integration may have different effects. A more intense bilateral relationship (trade intensity) can significantly affect the movement of capital market shares between countries. The current research used the Multivariate GARCH Model/DCC-GARCH method. The condition of capital market integration before the Indonesian G20 Presidency showed that Indonesia (JKSE) had the strongest integration with Australia (ASX) (0.563814) and South Korea (KOSPI) (0.542470). After the G20 presidency, Indonesia (JKSE) had the strongest capital market integration with India (NSE) (0.507229) and the USA (NYSE). It was also found that China (SSE) had an integration with South Korea (KOSPI), while Germany (DAX) and Australia (ASX) had an integration with the UK (FTSE100). The conclusion is that the higher autocorrelation, the higher the effect of the volatility of stock market movements in the two countries involved. Furthermore, capital market integration can be influenced by geospatial and economic relations.

Keywords: DCC, GARCH, G20, Integration

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1. Introduction

Indonesia held the Group of Twenty (G20) presidency from 30 November 2022 to 1 December 2021. The G20 forum is an international forum that coordinates economic and development policies. This forum represents the world's economic and political power, as its composition covers 80% of the global GDP, 75% of global exports, and 60% of the global population. It is established to ensure that the world can arise from crises and develop strong, sustainable global economic growth. The G20 consists of nineteen countries and one region: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korean Republic, Mexico, Russia, Saudi Arabia, South Africa, Turkey, England, USA, and the European Union. In the Indonesian presidency, the theme of the forum was "Recover Together, Recover Stronger," emphasizing the efforts to rise from the COVID-19 pandemic.

The stock market price of a country may be highly fluctuating and cause transmission from one country's capital market to another country. The fluctuating market price of a country could be caused by co-movement volatility, which results in a spillover effect or asymmetric information transmission in the capital market. Fluctuating stock price movement is also affected by a country's macroeconomic conditions and global conditions. According to Wang & Guo (2020), capital market integration among countries may have different effects depending on a country's economic stability. A more intense bilateral relationship (trade intensity or economic cycles) may significantly affect the capital market stock movement among countries (Wang & Guo, 2020). According to Wang & Guo (2020), during an unstable economic condition due to crises, capital market correlation among countries becomes increasingly complex due to fundamental factors that cannot explain the market correlation among countries. The fundamental macroeconomic factors that may affect the capital market price include Gross National Product (GNP), interest rate, and exchange rate (Wongbangpo & Sharma, 2002).

According to Zhang et al. (2019), a crisis in developed countries may significantly affect developing countries. They further argued that the intensity of the co-movement may also be affected by spatial aspects. From a multidimensional spatial perspective, a strong relationship between countries may affect their integration and co-movement (Zhang et al., 2019). The COVID-19 pandemic in 2020 and 2021 has resulted in economic instability due to a supply-demand imbalance and restricted mobility of goods and services. A country's unstable capital market condition may significantly affect the risk transfer from one country to another due to the transfer of information. Capital market information is not only impacted by the fundamental aspects but also by the spatial, political, and economic relationships among regional organizations (Zhang et al., 2019).

The G20 forum is an international economic cooperation forum comprising the world's twenty largest economies (Wang & Guo, 2020). The total gross domestic product (GDP) of the G20 countries covers nearly 85% of the global economy (Wang & Guo, 2020). The G20 countries may considerably influence the global economy and international financial stability (Wang & Guo, 2020). The total value of the capital market of the G20 countries is known to represent 86% of the global capital market (Wang & Guo, 2020). The USA serves as a G20 country member with the largest stock market (40.55%), followed by China (11%), while Indonesia makes up only 0.66% of the global stock market.

In general, there are three explanation categories for the co-movement among different stock markets (Pretorius, 2002). First, the co-movement may be accounted for by the contagion effect, a part of the stock market's co-movement that could not be explained by economic fundamentals (Pretorius, 2002). The second category is economic integration, meaning that when two countries' economies are integrated, their stock market is likely to be dependent on each other (Pretorius, 2002). Economic integration is related to a trading relationship and the co-movement of economic indicators that may influence the stock market's return, such as interest rate and inflation (Pretorius, 2002). The third category includes the stock market characteristics that influence the degree to which two stock markets are dependent on each other, such as industry similarity, volatility, and market size (Pretorius, 2002).

Economic integration may reflect the interdependence between one country and another. A country's financial condition may be influenced by its policy, institutions, and market conditions. A capital market's movement integration process could be defined as changes in attribute (stock price) from one country to another due to the transfer of information. These changes could be in the form of different assets in the same sectors or the same assets in different sectors and regions. The global economy is

closely associated with the financial market and inter-region movements, which serve as one of the keys to an investment portfolio.

Unstable financial conditions like the 2008 global economic crisis may cause shock in the economic and financial market, in addition to the transmission of capital market movement. The global financial crisis due to the COVID-19 pandemic has resulted in an unstable global economic condition and financial market, which also led to the increased relevance of Socially Responsible Investment (SRI). The transfer of information and investment risk of certain assets or capital markets among countries may account for the increased SRI value. The investment risk could be seen in the capital market's volatility. During the financial instability due to the COVID-19 pandemic, investors need information and analysis to holistically evaluate various portfolio diversification strategies to help them minimize potential risks and improve their overall performance (Díaz et al., 2022). The integration of capital market movement between developing and developed countries is relatively low in normal conditions but may increase during the crisis (Wang & Guo, 2020). In this regard, increased integration may result in higher volatility. The significant increase in co-movement integration among countries during the crisis is also explained in the study conducted by Pretorius (2002). Stronger integration of a country's capital markets may be affected by the market's interrelationship (Pretorius, 2002).

From the macroeconomic perspective, two major economic variables affect capital markets' interdependence. First, the stronger the two countries' bilateral trading relationship, the higher the co-movement level of their capital markets. Second, macroeconomic variables like interest rates and inflation are also known to affect the capital market as these variables influence capital market yield. The correlation among these variables is likely to impact the relationship between countries' capital markets.

The G20 member countries also develop liberal economic and trade agreements in addition to their efforts in th3 post-COVID-19 pandemic recovery. A study on the relationship between trade and economic conditions in the capital market movement among developing countries was conducted by Beine & Candelon (2011). They reported a positive relationship between financial liberalization and capital market return integration (Beine & Candelon, 2011). Trade agreements may also increase the correlation between the involved countries (Beine & Candelon, 2011). Policy reform that influences the real and financial sectors in developing countries may significantly affect the financial investors' behavior. A previous study reported the important role of integration for policymakers in formulating the policy direction and appropriate intervention to the capital market, either in a stable condition or in a recession (Jiang et al., 2017). A stronger integration among capital markets is likely to decrease the global portfolio diversification benefits, while in certain cases, a higher correlation in a short period is likely to indicate a crisis period (Jiang et al., 2017).

The DCC model can predict capital market integration. Several studies have been conducted measuring the integration and spillover effects on the capital market. Trade and financial integration pathways can also contribute indirectly to domestic contagion during crises (Bekaert et al., 2011). The global crisis and potentially damaging consequences of contagion effects continue to attract the attention of economists and policymakers (Kenourgios et al., 2011). Policy responses to crises are unlikely to prevent dispersion among countries, creating fewer domestic risks that can be internationally diversified when it is most desirable (Kenourgios et al., 2011). Research related to COVID-19 made some important contributions to equity market participants and emerging market regulators (Kamaludin et al., 2021). The correlation between the ASEAN-5 equity market and the new daily COVID-19 is significantly positive with Dow Jones Industrial Average Index (DJIA) (Kamaludin et al., 2021). Research about the impacts of the COVID-19 pandemic showed that crude oil prices also affect macroeconomic conditions through their influence on monetary policy instruments, inflation, and other economic activities (Ali et al., 2022). Research about the condition correlation during a crisis implied that the investors and portfolio managers seeking portfolio diversification and hedging opportunities in a high-risk environment, such as the COVID-19 pandemic (Yıldırım et al., 2022). Capital market correlation results in spillovers on commodity prices such as oil prices. The COVID-19 pandemic seems to have played a significant role in affecting the asymmetric impact of oil prices in both the short and long term (Baek, 2022). Other studies also mentioned that commodities that have an effect on spillover volatility include oil and gold (Mensi et al., 2022). The fact that the economic condition is very important implies that it is fundamental to implement policies to maintain supply and demand. Other studies also stated that economic conditions have a relationship between financial assets and commodity price volatility (Antonakakis et al., 2023). In

addition, the correlation is also related to the type of financial asset, the COVID-19 outbreak, and high-frequency information transmission between major cryptocurrencies (Yousaf & Ali, 2020).

2. Methodology

The samples of this study were closing prices in the G20 member countries. The data were processed in the form of returns to avoid the effect of currency risk. In this study, the closing price of the G20 member countries was presented in USD. The study was conducted before the Indonesian G20 Presidency (January 2020- 29 October 2021) and after the Indonesia Presidency (30 October 2021 - 22 April 2022). The samples in this study had the following criteria: 1) they were in the form of a comparison of the same conditions where the COVID-19 pandemic started, 2) they were emerging countries and developing countries sharing the same characteristics, 3) large sample data (daily closing prices) were used, 4) the first difference method to produce good and analyzable data (stationary/no unit root test). The present study was conducted during the COVID-19 pandemic and post-pandemic economic recovery period when Indonesia held the G20 Presidency to avoid other factors that potentially affected the study results. This study focused on the capital markets of the G20 member countries, including Indonesia, China, England, Australia, the USA, Brazil, Japan, Germany, South Korea, and India. The data were the capital markets' closing prices.

2.1 DCC-GARCH Model (1,1)

The Generalized Autoregressive Conditional Heteroskedasticity (GARCH (1,1)) was first introduced by Bollerslev (1986). The Multivariate GARCH model (1,1) was developed to make it more parsimonious; among the MGARCH (1,1) is the Dynamic Conditional Correlation (DCC-GARCH) model (Engle, 2002). DCC-GARCH (1,1) model was applied for the following reasons: 1) It allowed researchers to obtain coefficients for time-varying correlation and a cross-market conditional correlation through covariance matrix decomposition into conditional standard deviation matrix and correlation matrix; 2) it allowed researchers to understand the time-varying conditional pattern; 3) It provided a consistent estimate for conditional correlation matrix; 4) It did measure not only co-movements but also the level of co-movement among other countries. The following is the DCC-GARCH (1,1) model used in this study:

$$rt = \gamma 0 + \gamma 1 rt - 1 + \gamma 2\, r \frac{n}{t-1} + \varepsilon t, \varepsilon t \rightarrow N(0, Ht)$$
$$rt = \gamma 0 + \gamma 1 rt - 1 + \gamma 2\, r \frac{l}{t-1} + \varepsilon t, \varepsilon t \rightarrow N(0, Ht)$$

where $rt - 1$ refers to a lagged return of n (current stock price index), and $r\frac{l}{t-1}$ represents lagged return of the benchmark stock index, Ht represents $k + k$ matrix of conditional standard deviations for return series. Dt The matrix was obtained from Univariate GARCH (1,1) estimates (Bollerslev, 1986) where:

$$ht = c0 + \sum_{i=1}^{q} \propto_1 \varepsilon_{t-1}^2 + \sum_{i=1}^{p} \beta_2 h_{t-j}$$

C_0 Is the constant, while $\propto_1$ and β_1 are ARCH and GARCH (1,1) coefficients, respectively. The dynamic conditional correlation (Engle, 2002) was estimated in two stages: First, estimating the GARCH (1,1) parameter, and second, estimating the correlation. In this study, the DCC-GARCH (1,1) analysis technique was applied. The model measured the stock market correlation. The specific equation of DCC-GARCH (1,1) is presented as follows:

$$rt \mid =_{t-1} \sim N(0, Dt\ Rt\ Dt)$$
$$D\text{^}2\ t = diag\ \{\omega_i\} + diag\ \{K_i\} \circ r_{t-1}\ r_{t-1}^{l} + diag\ \{\lambda_i\} \circ\ D_{t-1}^2$$
$$\varepsilon t\ =\ D_{t-1}^2\, rt$$
$$Qt\ =\ S \circ (\tilde{\imath}\,\tilde{\imath}'\ -A\ -\ B) + A \circ \varepsilon t - 1\ \varepsilon t - 1\ +\ B \circ Qt\text{-}1$$
$$R_t = diagonal\ Q_t^{-1}\ Q_t\ \ diagonal\ Q_t^{-1}$$

The log-likelihood is as follows:

$$rt \mid =_{t-1} \sim N\ (0, Ht)$$
$$L\ =\ -\frac{1}{2}\sum_{t-1}^{T}(n\ log\ (2\pi)\ +\ log\ |H_t| + r_t' H_t^{-1} rt$$

The model was formulated into asymptotic consistency and normality of parameters that met the requirements if parameter D were stated in θ. Log likelihood could be stated as the number of partial volatility and correlation of $L\ (\theta, \phi)\ =\ LV\ (\theta)$ + LC $((\theta, \phi)$. The formula to measure the volatility is presented as follows: $(\theta) = -\ 1/2 \sum (nlog(2\pi) + log\ |Dt|^2 + rt\ D_t^{-2} rt$. Components of correlation are as follows: $(\theta, \phi)\ =\ -1/2 \sum (log\ |Rt| + \varepsilon t\ R_t^{-1} \varepsilon t - \varepsilon t\ ' \varepsilon t)$. Thus, partial volatility represented the number of GARCH (1,1) likelihood of each individual sample.

$$LV(\emptyset)\ = -1/2 \sum_{t-1} \sum_{i}^{n} =\ 0(n\ log(2\pi)) + \log\ (\text{hi,t}) + r_{i.t/} h_{it}$$

The DCC-GARCH (1,11) model was also applied by Sugiyanto & Robiyanto (2021) to analyze the dynamic integration of the Indonesian capital market during the COVID-19 pandemic.

3. Results and Discussions

3.1 Capital Market Return Volatility before Indonesia G20 Presidency (January 2020 to 29 October 2021)

The present study used Augmented Dicky-Fuller to test the return unit root of each capital market issuer. The ADF results indicated that all variables (return) did not have unit roots, supporting valid estimates of integration between Indonesia and G20 member countries. The return of each capital market issuer had been in the stationary phase, indicated by the return volatility that was close to mean reversion. Based on the $\alpha + \beta\ < 1$ from GARCH (1,1) (before the G20 Indonesia Presidency), the $\alpha + \beta$ value showed that the values of India (NSE) and the USA (NYSE) were 0.99681 and 0.97800, respectively. The α value revealed short-term run persistence, while the β value showed long-run persistence. The highest α value was NYSE (0.396969), suggesting the presence of a short-term run. In other words, the stock risk was positively associated with the stock return of 0.396969 in a short-term period. Beta stock indicated a systematic risk level of stock toward the market risk. A stock beta value is divided into three: β > 1, meaning that the stock systematic risk is higher than the market's systematic risk; β < 1, meaning that the stock systematic risk is lower than the market's systematic risk; and β = 1, meaning that the stock systematic risk equals to the market systematic risk (Wang & Guo, 2020). The highest β value was found in Shanghai Stock Exchange (SSE) (0.859485), implying the presence of a short-term run, in which the stock risk had positive effects with a return of 0.859485 in a long-term period. A higher β value usually possesses a higher stock risk and offers a higher stock return.

Table 1: Descriptive Analysis of the Capital Market before the G20 Presidency of Indonesia

Stock Exchange		Mean	Skewness	Kurtosis	Log Likelihood
JKSE (Indonesia)	(1)	0.00031	-0.26772	10.57472	1220.940
SSE (China)	(2)	0.00089	0.22178	5.91620	1298.961
FTSE100 (England)	(3)	0.00026	-0.32481	15.48474	1206.304
ASX (Australia)	(4)	0.00060	-0.68806	11.76439	1210.201
NYSE (America)	(5)	0.00069	-0.65191	15.72384	1304.007
IBOV (Brazil)	(6)	-0.00040	-0.60494	11.22027	974.112
NIKKEI (Japan)	(7)	0.00061	0.16269	8.23321	1235.850
DAX (German)	(8)	0.00073	-0.54552	13.90793	1200.858
KOSPI (South Korea)	(9)	0.00100	0.07017	7.46314	1173.125
NSE (India)	(10)	0.00107	-0.72852	18.46656	1214.870

Table 2: GARCH Testing (before the G20 Presidency)

		GARCH (1,1)			
Stock Exchange		**c**	**α**	**β**	**α+β**
JKSE (Indonesia)	(1)	0.001067	0.238803	0.667132	0.90593
SSE (China)	(2)	0.001058	0.084333	0.859485	0.94382
FTSE100 (England)	(3)	0.000380	0.175559	0.780025	0.95558

		GARCH (1,1)			
Stock Exchange		c	α	β	α+β
ASX (Australia)	(4)	0.001053	0.246292	0.695520	0.94181
NYSE (America)	(5)	0.001320	0.396969	0.581030	0.97800
IBOV (Brazil)	(6)	0.000003	0.200675	0.695321	0.89600
NIKKEI (Japan)	(7)	0.001443	0.227315	0.617547	0.84486
DAX (German)	(8)	0.000890	0.172397	0.794890	0.96729
KOSPI (South Korea)	(9)	0.001522	0.198219	0.730077	0.92830
NSE (India)	(10)	0.001333	0.153965	0.842845	0.99681

3.2 After Indonesia's G20 Presidency (30 October 2021 to 22 April 2021)

The present study used Augmented Dicky-Fuller to test the return unit root of each capital market issuer. ADF result indicated that all variables (return) did not have unit roots, supporting valid estimates of integration between Indonesia and other G20 member countries. The return of each capital market issuer had been in the stationary phase, marked by return volatility that was close to mean reversion. Based on the $\alpha + \beta < 1.$ from GARCH (1,1) (before the G20 Presidency of Indonesia), the $\alpha + \beta$ value showed that the values of England (FTSE100) and South Korea (KOSPI) were 0.99681 and 0.99349, respectively.

The highest α value was SSE (0.664075), indicating the presence of a short-term run. In other words, the stock risk was positively associated with the stock return of 0.664075 in a short-term period. Beta stock indicated a systematic risk level of stock toward the market risk. The highest β value was found in KOSPI) (1.052791), indicating the presence of a short-term run, which means that the stock risk had positive effects with a return of 1.052791 in a long-term period. A higher β value usually possesses higher stock risk and offers a higher stock return.

Table 3: Descriptive Analysis of the Capital Market after PG20 Indonesia

Stock Exchange		Mean	Skewness	Kurtosis	Log Likelihood
JKSE (Indonesia)	(1)	0.00055	-1.32408	8.21951	458.006
SSE (China)	(2)	-0.00100	-1.18182	7.41097	427.176
FTSE100 (England)	(3)	-0.00015	-1.02686	7.13787	400.197
ASX (Australia)	(4)	-0.00039	-0.76163	4.12915	397.843
NYSE (America)	(5)	-0.00050	-0.69843	6.36311	416.711
IBOV (Brazil)	(6)	0.00190	-0.79828	5.27222	347.912
NIKKEI (Japan)	(7)	-0.00136	0.13966	2.91632	394.249
DAX (German)	(8)	-0.00105	0.21138	7.93913	367.343
KOSPI (South Korea)	(9)	-0.00103	-0.10501	3.37686	405.940
NSE (India)	(10)	-0.00071	-0.75882	5.45398	380.216

Table 4: GARCH Testing (after the G20 Presidency)

		GARCH (1,1)			
Stock Exchange		c	α	β	α+β
JKSE (Indonesia)	(1)	0.000830	0.250643	0.650289	0.90093
SSE (China)	(2)	0.000518	0.664075	0.193143	0.85722
FTSE100 (England)	(3)	0.000751	0.371373	0.623198	0.99457
ASX (Australia)	(4)	-0.000403	0.165835	0.602067	0.76790
NYSE (Aemrica)	(5)	-0.000474	0.166381	0.804018	0.97040
IBOV (Brazil)	(6)	0.001950	0.087810	0.820771	0.90858
NIKKEI (Japan)	(7)	-0.001079	0.097732	0.893910	0.99164
DAX (German)	(8)	-0.000048	0.317696	0.672783	0.99048
KOSPI (South Korea)	(9)	0.000336	-0.059297	1.052791	0.99349
NSE (India)	(10)	-0.000457	0.074648	0.850747	0.92539

3.3 Capital Market Integration

This study found that during the COVID-19 pandemic and before the G20 presidency, the integration of capital market return between Indonesia (JKSE) and Australia (ASX) was significant and positive, with a

value of 0.542470. This result revealed that both countries had an autocorrelation of 0.563814. Higher integration or autocorrelation with both countries may likely result in a higher volatility effect on the stock market movement in both countries. Indonesia (JKSE) exhibited the strongest integration with (ASX), Followed by South Korea with a value of 0.542470. The increase in return integration between Indonesia (JKSE) and South Korea (KOSPI) might be accounted for by the two countries' strong cooperation. A stronger capital market is related to the countries' fiscal condition, their geospatial proximity (Zhang et al., 2019), and economic cooperation (Hess, 2004). Strategic economic cooperation between Indonesia and South Korea to recover from the COVID-19 pandemic was done through Joint Committee Meeting on Economic Cooperation (JCEC).

After the G20 presidency, Indonesia (JKSE) exhibited the strongest capital market return integration with India (NSE), which was significant and positive with a value of 0.507229. The two countries' stronger integration was likely to be accounted for by the Indian Presidency in 2023, among other factors. The strategic cooperation between the two countries was strengthened, as both countries were committed to supporting a G20's common goal, namely post-COVID-19 pandemic recovery. In addition to India, the Indonesian stock market (JKSE) also exhibited co-movement with Australia. The cooperation constituted the follow-ups of cooperation with Indonesia, which was represented by the meeting between the Indonesian Ministry of Finance and the G20 Central Bank Governor. In the meeting, Indonesia was committed to contributing to the development of a green economy and post-pandemic recovery. In addition to India and Australia, a significant improvement was also noticed in the integration between Indonesia's JKSE and the USA's NYSE, increasing from 0.354906 (before the presidency) to 0.385410 (after the presidency). This improvement indicated a stronger collaboration and visits between the two countries.

Before the G20 Indonesia Presidency, the return integration of the Chinese stock market (SSE) was found to be significant and strong to South Korea (KOSPI) (i.e., 0.408792), followed by Australia (ASX) (i.e., 0.338025). The cooperation and geospatial proximity with South Korea may explain the integration. Zhang et al. (2019) assert that geospatial proximity may affect the stock market integration between the two countries. This study also found that England (FTSE100) had the strongest relationship with Germany (DAX) (0.857682), followed by the USA (NYSE) (0.663646) and Australia (ASX) (0.651556). Meanwhile, Australia (ASX) exhibited the strongest integration with England (FTSE100) with a value of 0.651556. This stronger integration appeared to be accounted for by the free trade agreement between the two countries. The USA (NYSE) exhibited the strongest return integration with England (FTSE100) (0.663646) and Germany (DAX) (0.641797). Brazil (IBOV) also showed the strongest return integration with the USA (NYSE) (0.510837), which may be accounted for by the geospatial proximity between the two countries. Japan (NIKKEI) was found to have the most significant integration with Australia (ASX) (0.578511), followed by South Korea (KOSPI) (0.578279). Germany (DAX) had the strongest return integration with England (FTSE100) (0.857682) and Australia (ASX) (0.595169). The integration between South Korea (KOSPI) and Australia (ASX) appeared to increase (0.609940), followed by integration with Japan (NIKKEI) (0.578279). Meanwhile, the integration between India (NSE) and England (FTSE100) also increased (0.50856), followed by the increase in integration with Indonesia (JKSE) (0.495020).

After the G20 Presidency of Indonesia, the Chinese stock market (SSE) exhibited the most significant and strongest integration with South Korea (KOSPI) (0.410766), followed by integration with Australia (ASX) (0.389756). This study also found that England (FTSE100) had the strongest relationship with Germany (DAX) (0.770253), followed by a relationship with the USA (NSE) (0.638378). The Australian stock market (ASX) revealed the strongest integration with South Korea (KOSPI) (i.e., 0.58385) and India (NSE) (i.e., 0.560597). Meanwhile, the USA (NYSE) had the strongest integration with Germany (DAX) (0.547575) and Brazil (IBOV) (0.527560). Brazil (IBOV) also showed the strongest return integration with the USA (NYSE) (0.527560), which may be accounted for by the geospatial proximity between the two countries. Japan (NIKKEI) was found to have the most significant integration with Australia (ASX) (0.540878), followed by South Korea (KOSPI) (0.540292). Germany (DAX) exhibited the strongest return integration with England (FTSE100) (0.770253) and the USA (NYSE) (0.547575). The integration between South Korea (KOSPI) and Australia (ASX) seemed to increase (0.583851), followed by integration with Japan (NIKKEI) (0.540292). Meanwhile, India (NSE) exhibited the strongest integration with England (FTSE100) (0.638378).

Table 5. Capital Market Integration Testing before Indonesia's G20 Presidency with DCC-GARCH (1,1)

		JKSE	SSE	FTSE100	ASX	NYSE	IBOV	NIKKEI	DAX	KOSPI	NSE
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
JKSE (Indonesia)	(1)		0.37293***	0.44789***	0.56381***	0.35490***	0.35691***	0.42538***	0.37706***	0.54247***	0.49502***
SSE (China)	(2)	0.37293***		0.31144***	0.33802***	0.22914***	0.17393***	0.29923***	0.29335***	0.40879***	0.33594***
FTSE100 (England)	(3)	0.44789***	0.31144***		0.65155***	0.66364***	0.45896***	0.37961***	0.85768***	0.48985***	0.50856***
ASX (Australia)	(4)	0.56381***	0.33802***	0.65155***		0.46419***	0.43301***	0.57851***	0.59516***	0.60994***	0.49619***
NYSE (America)	(5)	0.35490***	0.22914***	0.66364***	0.46419***		0.51083***	0.24015***	0.64179***	0.33706***	0.35198***
IBOV (Brazil)	(6)	0.35691***	0.17393***	0.45896***	0.43301***	0.51083***		0.25608***	0.45459***	0.40391***	0.33273***
NIKKEI (Japan)	(7)	0.42538***	0.29923***	0.37961***	0.57851***	0.24015***	0.25608***		0.39880***	0.57827***	0.33425***
DAX (German)	(8)	0.37706***	0.29335***	0.85768***	0.59516***	0.64179***	0.45459***	0.39880***		0.45461***	0.46904***
KOSPI (South Korea)	(9)	0.54247***	0.40879***	0.48985***	0.60994***	0.33706***	0.40391***	0.57827***	0.45461***		0.45587***
NSE (India)	(10)	0.49502***	0.33594***	0.50856***	0.49619***	0.35198***	0.33273***	0.33425***	0.46904***	0.45587***	

*significant at 10%, **significant at 5%, ***significant at 1%

Table 1.6. Capital Market Integration Testing after Indonesia's G20 Presidency with DCC-GARCH (1,1)

		JKSE	SSE	FTSE100	ASX	NYSE	IBOV	NIKKEI	DAX	KOSPI	NSE
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
JKSE (Indonesia)	(1)		0.23012***	0.34699***	0.40399***	0.38541***	0.31605***	0.22519***	0.39225***	0.38301***	0.50722***
SSE (China)	(2)	0.23012***		0.29761***	0.38975***	0.16551***	0.22845***	0.36475***	0.23753***	0.41076***	0.28012***
FTSE100 (England)	(3)	0.34699***	0.29761***		0.49959***	0.51709***	0.44423***	0.33579***	0.77025***	0.46925***	0.63837***
ASX (Australia)	(4)	0.40399***	0.38975***	0.49959***		0.32202***	0.30731***	0.54087***	0.39950***	0.58385***	0.56059***
NYSE (America)	(5)	0.38541***	0.16551***	0.51709***	0.32202***		0.52756***	0.27954***	0.54757***	0.36024***	0.46343***
IBOV (Brazil)	(6)	0.31605***	0.22845***	0.44423***	0.30731***	0.52756***		0.16761***	0.40404***	0.30453***	0.37286***
NIKKEI (Japan)	(7)	0.22519***	0.36475***	0.33579***	0.54087***	0.27954***	0.16761***		0.34302***	0.54029***	0.37862***
DAX (German)	(8)	0.39225***	0.23753***	0.77025***	0.39950***	0.54757***	0.40404***	0.34302***		0.45823***	0.60267***
KOSPI (South Korea)	(9)	0.38301***	0.41076***	0.46925***	0.58385***	0.36024***	0.30453***	0.54029***	0.45823***		0.48663***
NSE (India)	(10)	0.50722***	0.28012***	0.63837***	0.56059***	0.46343***	0.37286***	0.37862***	0.60267***	0.48663***	

*significant at 10%, **significant at 5%, ***significant at 1%

Conclusions

This study examined the correlation between the Indonesian capital market and other G20 members (i.e., China, England, Australia, USA, Brazil, Japan, Germany, South Korea, and India). Collaboration among the G20 member countries was found to affect the economic sectors positively, particularly in supporting their efforts in post-COVID-19 pandemic recovery. The study was conducted before the Indonesian G20 Presidency (January 2020- 29 October 2021) and after the Indonesian presidency (30 October 2021 - 22 April 2022). Applying dynamic conditional correlation (DCCGARCH), the data in this study were daily-time series data. This study concluded that during the COVID-19 pandemic and before the G20 presidency, the integration of capital market return between Indonesia (JKSE) and Australia (ASX) was significant and positive with a value of 0.563814, followed by South Korea (KOSPI) with a value of 0.542470. Higher integration or autocorrelation with both countries may likely result in a higher volatility effect on the stock market movement in both countries. After the G20 presidency, Indonesia (JKSE) exhibited the strongest capital market return integration with India (NSE), which was significant and positive with a value of 0.507229. A significant improvement was also noticed in the integration between Indonesia (JKSE) and the USA (NYSE). This improvement suggested a stronger collaboration and visits between the two countries. Furthermore, it was also found that China (SSE) exhibited integration with South Korea (KOSPI), while Germany (DAX) exhibited integration with England (FTSE100). Australia (ASX) also had a strong integration with England (FTSE 100). Capital market integration may be affected by the geospatial relationship and economic cooperation.

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Policy Paper

Identification of PEKKA Characteristics for the Women Empowerment Strategy in Sumedang Regency

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Abstract

Gender income disparity is one of the challenges in realizing community welfare in the Sumedang Regency. PEKKA worker is one of the vulnerable objects that need to be improved by the government of Sumedang Regency. This study aims to identify the individual characteristics of PEKKA to determine goals and priorities for women's empowerment strategies. This study's method is quantitative research in the form of a description with numbers or numerals (statistics). Reference studies that corroborate the analysis complement this study's method. The analysis describes the characteristics of female heads of household in Sumedang Regency. The results showed that PEKKA in Sumedang Regency dominates by middle-aged and older women. Their level of education and competence is low, so they commonly work in the informal sector as unassisted entrepreneurs and in the formal sector as laborers. These characteristics are factors that cause their common welfare. Therefore, the PEKKA Empowerment Program in Sumedang Regency needs to involve other regional government affairs, namely Education, Health, Social, Labor, Communication and Information, Cooperatives, Small and Medium Enterprises, Agriculture, and Fisheries. Through this strategy, the PEKKA Empowerment Program can be right on target to encourage the realization of the welfare of the people of Sumedang Regency.

Keywords: PEKKA, characteristics, welfare, empowerment strategy

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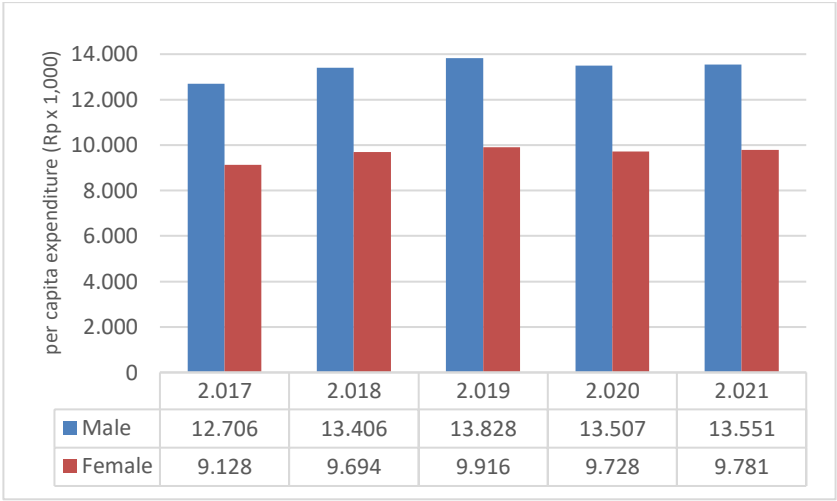
1. Introduction

National and regional development in Indonesia aims to prosper all communities regardless of gender status. Similarly, the Sumedang Regency's development includes welfare issues and gender equality in its development goals and objectives. Both of these issues are important because they are part of the Sustainable Development Goals that the Government (SDGs) of Indonesia needs to achieve by 2023.

One of the indicators used to measure welfare at the national level, including in the Sumedang Regency, is per capita expenditure. Using the composition of per capita expenditure can assess the economic well-being level of the population. If the food expenditure percentage to total home expenditure is lower, then the level of welfare better. Based on the processing of Central Bureau of Statistics (BPS) data visualized in figure 1, it can be seen that there is an inequality in per capita expenditure between male and female residents in Sumedang Regency. This welfare disparity is a challenge to realizing welfare goals for all genders in Sumedang Regency.



	2.017	2.018	2.019	2.020	2.021
Male	12.706	13.406	13.828	13.507	13.551
Female	9.128	9.694	9.916	9.728	9.781

Figure 1. Comparison of expenditure per capita by sex in Sumedang Regency

Source: Central Bureau of Statistics (BPS)

The main factor influencing low household spending as a measure of well-being is the low income earned. On gender issues, women are vulnerable objects in income disparities so their level of welfare is generally lower than that of men. According to (Susanto et al., 2018), the measure of welfare is closely related to productive people who receive income to meet their daily needs. Gender is a barrier to increasing community productivity and the number of people working. Generally, women have limited access to jobs, and finding suitable employment is very difficult. According to the (World Bank, 2012), in various countries, including developed countries, gender disparities are still found. Compared to men, women are more likely to work as unpaid family workers or in the informal sector. The women farmers tend to cultivate smaller areas with the types of commodities that are less economically profitable. As for women who are entrepreneurs, they have smaller companies in low-profit sectors. As a result, the average income of women tends to be lower than that of men.

Among these groups of women, the most vulnerable in terms of welfare are female heads of household, also known in Indonesia as Perempuan Kepala Keluarga (PEKKA). BPS defines PEKKA as the breadwinner in the family or someone who is considered the head of the family. PEKKA describes female heads of the household as women who carry out their roles and responsibilities as breadwinners, household managers, guardians of the continuity of family life, and decision-makers in their families(*Pekka.or.Id*).

Estimated in 2021, around 7.41% of the total population who have been positioned as heads of families in Sumedang Regency were PEKKA. Based on figure 1 above, it can be assumed the burden of PEKKA's life is heavier than the status of other women's positions in the household because they carry a heavier double burden. They have to take responsibility as the head of the family, which should be carried culturally by men. On the other hand, they still play the role of a mother who takes care of domestic

affairs. Therefore, the PEKKA group in Sumedang Regency needs to occupy a prioritized position in the strategy of community welfare in the gender aspect.

Local Government Intervention in Women's Empowerment refers to the Regional Government from Law of the Republic of Indonesia Number 23/2014. Implementation of policies by local governments to reduce gender inequality and welfare issues, including for PEKKA, includes (1) improving the quality of life for women and (2) improving the quality of families.

Empowerment of women is one of the efforts to improve women's welfare. (Hasanah, 2013) states that the main priority in women's empowerment is to realize independence. The meaning of this independence is the expectation of women as part of society states that the main priority in women's empowerment is to realize independence. So far, women are still forward-facing conditions of a lack of knowledge, skills, creative attitudes, and aspirations. As a result, many women live in poverty and are marginalized.

For PEKKA's empowerment policy to be more targeted, therefore must supporting with analysis and valid data. (Imelda Cahyaningrum, 2021) states that gender analysis forms the basis for planning and budgeting for empowerment programs. Top-down policies do not ensure that empowerment programs run on target with gender issues. As was in (Ir. Hendra Hamid, 2018) states that government officials need to hold several principles in community empowerment, which become a reference in implementation so that activities can run correctly and target-oriented, under the nature and concept of empowerment. Among these principles is the importance of identifying problems and noticing the target group's characteristics. Research by (Ristianasari et al., 2013; Septiani, 2019) shows a correlation between socio-demographic characteristics. (Nurwandi et al., 2018) stated that PEKKA's work program needs to be developed based on the context and needs of the community of female heads of households for poverty alleviation and leadership development.

Previous studies have identified the characteristics of female heads of households as the basis for determining strategies and targets for empowerment (Haryono et al., 2018). The recommendations for empowerment strategies from this study resulted from the characteristics identification of poverty, family, residential, and business of each head of the poor female household. Meanwhile, (Satriawan, 2021) identified the characteristics of the level of education, working hours, income, and age of the female head of the family in informal types of work to formulate empowerment strategies. Based on the previous description, to overcome the issue of gender welfare disparity in Sumedang Regency, the identification of PEKKA's characteristics as the basis for determining the priority of targets and strategies for women's empowerment is needed.

Purpose of the study

The study aims to identify the individual characteristics of PEKKA that can affect their income level. This characteristic identification can determine objects and priorities in women's empowerment strategies. This study can be used as a basis for policies to reduce welfare disparities in women, especially the PEKKA group in Sumedang Regency.

2. Research Method

The type of this study is policy research that supports the policymakers formulating fundamental policy from the information and recommendations in the paper. The method used in this study is quantitative with a library or secondary data analysis. This method is quantitative research in the form of a description with numbers or numerals (statistics). The analysis describes the characteristics of female heads of household who work in Sumedang Regency in terms of employment.

Descriptive quantitative analysis in this study uses data from the 2019-2021 National Labor Force Survey (Sakernas). Sakernas is a survey conducted by the Central Statistics Agency (BPS) specifically designed to collect data that can describe the general state of employment between the enumeration periods. The data displayed is an estimated value and may be highly influenced by the number of samples surveyed in that year.

3. Results and Discussions

Among the efforts to improve people's welfare is encouraging people to be productive, which is indicated by an increase in the number of working people. People who labor and are productive will earn income to meet their daily needs. In 2019-2021, BPS mentioned that working people in the Sumedang Regency are increasing. Even in 2020, the number of unemployed is also mounting due to the impact of COVID-19. In 2021 the working population in Sumedang Regency will reach 639,687 people or 90.84% workforce from the total population.

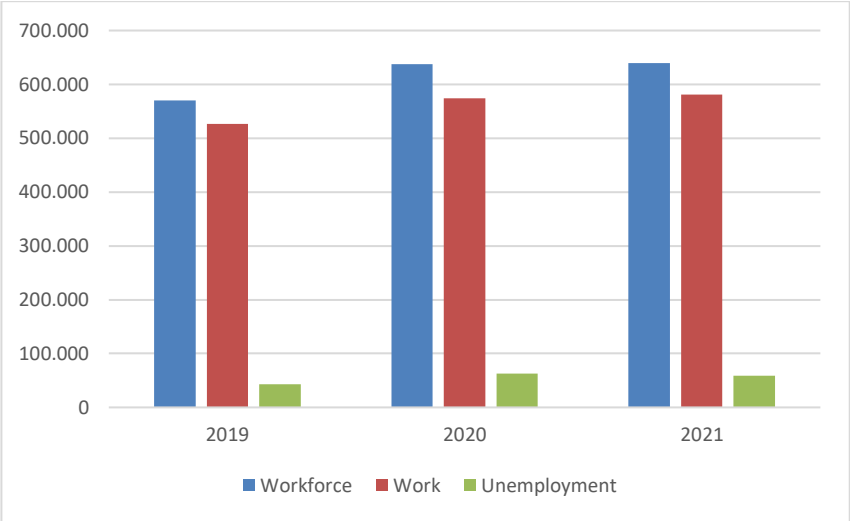


Figure 2. Population Aged 15 Years and Over by Type of Activity During the Previous Week and Sex in Sumedang Regency, 2021

Source: BPS-Statistics of Sumedang Regency (2022)

From the results of the disaggregation of Sumedang Regency employment data for 2019 to 2021, the increase in the proportion of working women is higher than the increase in the ratio of working men. In 2021 the proportion of working women had reached 41.68% of the total working population. The most significant increase occurred in 2020, 3.76% from the previous year. The COVID-19 pandemic forces women to be more productive to fulfill their household needs.

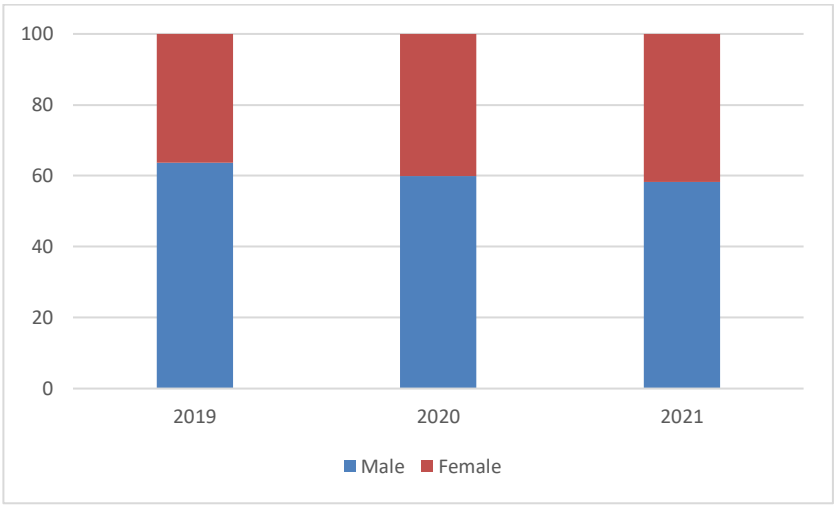


Figure 3. Percentage of the working population by gender

Source: National Labor Force Survey 2019-2021

Women united as a wife are dominant in women worker groups. Of course, the increase in the number of women working is in line with the increasing opportunities and roles for women to develop their potential. The stereotype of women only doing domestic work began to fade along with the opportunity for women to be able to do work outside the home or in the public sphere. (Hidayati, 2015) states that the increasing number of working women is affected by various factors, including the higher education of women, the desire to increase self-existence, and the demands to meet household needs.

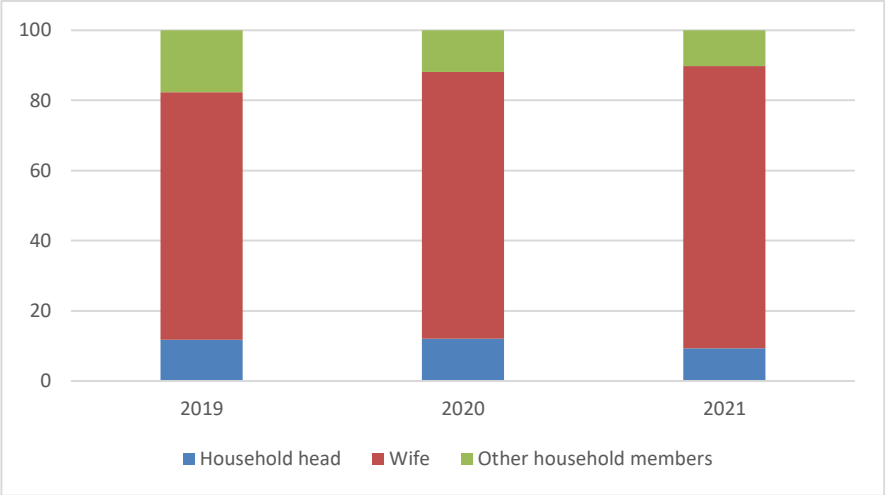


Figure 4. Percentage of working women based on their position in the household

Source: National Labor Force Survey 2019—2021

(Dilawati et al., 2021) showed that during the COVID-19 pandemic, women had a double burden. Women play a role in domestic affairs and efforts to meet household economic needs. There are three types of women working during the COVID-19 Pandemic. The first type is working women who surrender to circumstances due to limited abilities and hope for government assistance. Second, women can adapt in times of crisis, are dexterous, and can coordinate well with their husbands. Third, women are forced to work due to domestic violence and forced to work due to divorce.

Although the percentage is the lowest, women working in Sumedang Regency who are the head of the household (PEKKA) are the objects most vulnerable to facing threats and disturbances in meeting their household needs. Like other women, in 2020, the percentage of PEKKA working increased due to the demands of the household economy. According to the Co-Director of Pemberdayaan Perempuan Kepala Keluarga Foundation, 95% of female heads of households in Indonesia work in the informal sector, such as traders, laborers, farmers, or farm laborers. Almost half of them earn less than IDR 500,000 per month. Meanwhile, 32.6% of their income is only up to IDR 1 million per month. Only 18.3% whose income is more than IDR 1 million. The COVID-19 pandemic has caused PEKKA to be increasingly less prosperous, where previously they were in the underprivileged community group (Sindonews.com, n.d.).

As stated in the introduction of this paper, the disparity in welfare based on gender is a development challenge in Sumedang Regency. The indicator is inequality in the amount of per capita expenditure between women and men. The low women's per capita expenditure is caused by the low income they earn. Of course, PEKKA is a group that is included in this problem.

The low income of PEKKA in Sumedang Regency can be seen from the results of Sakernas data processing in 2021. 74.4% of PEKKA earn below average wages from all working PEKKA individuals. Meanwhile, the average value of PEKKA wages is Rp 1,467,200. When compared with the value of GRDP per capita for the population of Sumedang Regency in 2021, there is 88.82% of PEKKA earn wages below IDR 2,677,500. Compared with the 2021 poverty line in Sumedang Regency, 30.77% of PEKKA earn wages below IDR 360,054. Ironically, 5.22% of PEKKA do not pay for their work.

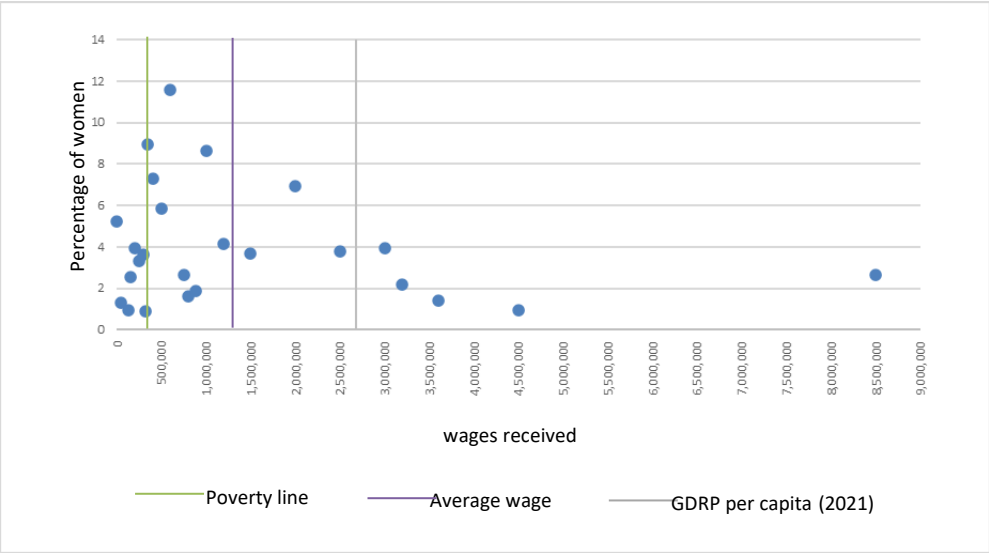


Figure 5. Comparison between the wages earned by women workers, GRDP per capita, and the poverty line.

Source: National Labor Force Survey 2019—2021

From the discussion above, it is clear that PEKKA in Sumedang Regency is a vulnerable object in the economy and the community's welfare. In addition to the limited access to work and appropriate types of employment, several factors cause the low income of PEKKA working in the Sumedang Regency.

a. Age Characteristic

In terms of age characteristics, PEKKA in Sumedang Regency is dominated by women aged over 54 years. Even the increase in PEKKA work in 2020 during the COVID-19 Pandemic era was dominated by PEKKA aged over 64. PEKKA's age, dominated by women older than middle age, indicates the causes of low productivity, resulting in low wages or income. The analysis results from the research by (Amnesi, 2013), (Pasaribu, 2018), and (Orlian & Ratna, 2020) show that age is very influential on women's pay. The older the woman, the lower her productivity, and the weaker her physical condition makes her unable to contribute income to the family.

(Sali, 2020) stated that as someone grows older, his physical or mental abilities will slowly decline. In old age, muscle tissue will wither and be replaced by connective tissue. Muscle shrinkage causes the elasticity of the muscles to decrease. The process of getting old is due to the lack of workability due to changes in the body's apparatus, the cardiovascular system, and hormonal. The optimal muscle strength for women is at 20—39 years.

Table 1: Percentage of age characteristics of Sumedang Regency PEKKA workers

Age	2019	2020	2021
15-24	4.78	2.35	2.11
25-34	6.33	0	0
35-44	17.48	6.73	2.81
45-54	22.95	19.32	22.91
55-64	27.38	30.62	37.60
>64	21.08	40.98	34.57

Source: National Labor Force Survey 2019—2021

b. Education Level

The quality of human resources is the most significant aspect of economic activity. The quality of products or services is strongly affected by the level of education of all components of human resources in the production process. The higher the quality of human resources, the more efficient the productivity of a country will increase (Atmanti, 2005). Qualified human resources can be measured by the quality of education, both formally and non-formally.

Based on table 2, working PEKKA in Sumedang Regency is dominated by women who have completed their last education up to Elementary School (SD) or equivalent. The low level of education certainly affects low competence, resulting in low productivity and income. (Wahyuni & Monika, 2017) and (Dewi et al., 2017) stated in their research that the level of education has a positive and significant effect on women's productivity and income. Meanwhile, (Yuniati, 2019) revealed that most of the female workforce is in the informal sector, and a low level of education causes them to get underpaid.

The low level of PEKKA's working education is in line with the achievement of the macro indicator Average length of schooling (RLS) for women in the Sumedang District. In 2021 the female RLS in Sumedang Regency reached 8.34 years. Meanwhile, the male RLS had reached 8.70 years.

Table 2: Percentage of PEKKA worker's age characteristics

Education Level	2019	2020	2021
Not finished elementary school (SD)	15.99	5.87	12.29
Sekolah Dasar (SD) or equaivalent	44.28	69.16	63.41
Sekolah Menengah Pertama (SMP) or equaivalent	10.73	5.70	8.28
Sekolah Menengah Atas (SMA)/Madrasah Aliyah (MA)	14.26	13.35	7.59
Sekolah Menengah Kejuruan (SMK)/Madrasah Aliyah Kejuruan (MAK)	4.74	2.80	2.35
College	10.01	3.12	6.09

Source: National Labor Force Survey 2019—2021

c. Training for PEKKA who did not finish elementary school

Training can improve productivity by enhancing the skills and the ability to work. Training should be an intermediary to increase PEKKA's work productivity. Research conducted by (Dadang Yunus Lutfiansyah, 2009) and (Wediawati & Setiawati, 2015) shows an increase in income and productivity for working PEKKA. Meanwhile, (Owners et al., 2013) mention that a training or course specifically designed for small businesses showed that roles played by women significantly improved small business owner's knowledge.

However, ironically, most PEKKA workers who did not complete elementary education have never attended training to increase their capacity and ability. Based on the graph in Figure 6, during 2019-2021, only around 4-12% of the PEKKA group of workers who did not complete the elementary school level had attended the training. In general, the low wage income of women in Indonesia is due to a lack of education and skills. Thus, the level of inter-gender wages increases every year (Hermawan et al., 2022).

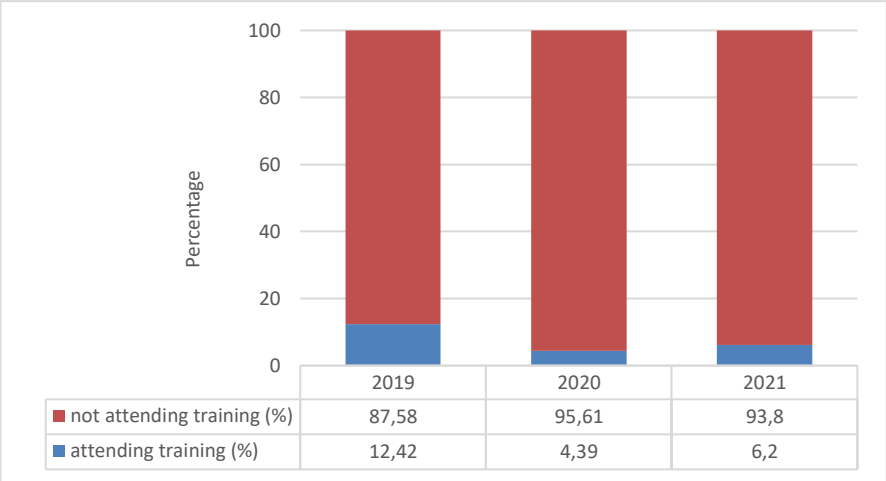


Figure 6. Percentage of PEKKA workers (not completing elementary school) who did not attend training

Source: National Labor Force Survey 2019—2021

d. Work status/position

Several previous studies have revealed the phenomenon of low education among women who are responsible for their family's livelihood. Therefore, they work in the informal sector and have one source of income; the income earned is also low. This issue becomes a barrier to these working women's ability to improve their standard of living and meet their daily needs (Falah & Syafiq, 2014).

In the formal sector, because of women's more dexterous and obedient nature, women are the preferred choice for employment as labor; it rarely demands high wages. Thus, they can be paid cheaply. The phenomenon is named "feminization," which shows how women are particularly vulnerable to labor market policy. Generally, their salaries are lower than those of male workers, but sometimes they have longer working hours (Asrani & Amalia, 2016).

Based on Sakernas data processing for 2019-2021, it is known that around 38.93-42.57% of PEKKA do work with their business status in the informal sector, such as selling food or other businesses, without anyone's help. The COVID-19 pandemic has also transformed some PEKKA who work in the formal sector such as laborers/employees/employees into PEKKA who work with assistance or involve other people. Since 2020-2021, there has been an increase of around 19-20% of PEKKA seeking help from temporary workers/family workers/unpaid workers. On the other hand, the number of PEKKA workers/employees/employees has decreased by around 20-21% since 2020.

Table 3: Percentage of PEKKA workers by employment status

Work status	2019	2020	2021
Unassisted Entrepreneur	38.93	39.43	42.57
Entrepreneurs who are assisted by temporary workers/family workers/unpaid workers	11.43	31.31	30.68
Entrepreneurs who are assisted by permanent and paid workers	2.61	3.51	0
Labor/employee/staff	37.96	15.52	14.53
Farming Freelance	5.88	2.31	5.34
Non-Farming Freelance	1.63	1.69	2.61
Family worker/unpaid	1.55	6.23	4.27

Source: National Labor Force Survey 2019—2021

e. Business sector and type of work

Based on the type of business field based on the Indonesian Standard Classification of Business Fields (KBLI), most PEKKA work in the wholesale and retail trade; Repairing and Maintenance of Cars and Motorcycles in the amount of 33.25% - 35.58%. Other business fields that PEKKA is mostly engaged in are the Processing Industry as well as Agriculture, Forestry, and Fisheries.

Table 4: PEKKA worker field (based on KBLI)

Business sector	2019	2020	2021
Wholesales, Retail, Car and Motor Repair	33.25	34.65	35.58
Agriculture, Livestock, Forestry, Fishery	14.84	28.71	25.16
Manufacturing Industry	21.97	20.07	16.9
Accommodation and Food and Beverage	9.79	12.23	15.31
Educational Services	11.83	3.12	3.44
Other Sectors	8.33	1.22	3.62

Source: National Labor Force Survey 2019—2021

Regarding the Indonesian Standard Classification of Occupations (KBJI), PEKKA in Sumedang Regency is dominated by those who work as service business personnel and sales personnel, with many between 11,668 – 15,452 people from 2019 to 2021.

These findings are similar to the pattern of female labor in developing countries working in the informal sector such as the agricultural and trade sectors. (International Labour Organization, 2003) conducted a study on eight cities in the third world. The results of the study suggest that those involved in the informal sector are generally poor, mostly of primary productive age, poorly educated, wages received below the minimum wage, and low business capital and the sector provides possibilities for vertical mobility.

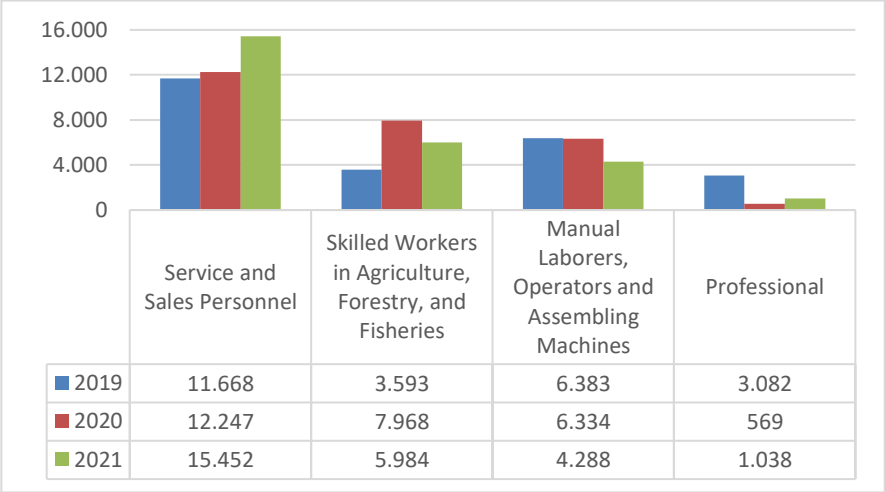


Figure 7. PEKKA type of work (based on KBJI)

Source: National Labor Force Survey 2019—2021

f. The use of Information and Communication Technology

PEKKA in Sumedang Regency, amounting to more than 25,000 people. In 2019 only about 21% used the internet in their work. This number will decrease further in 2020 and 2021. with a percentage of around 15-16%. Most of the working PEKKA associations use the internet and information as communication tools only. Only about 30% of information technology users use it for income-generating activities. The low utilization of technology by PEKKA causes them to be one step behind in the speed of productivity.

The influence of technology and information on productivity has been revealed in research conducted by (Sri & Margareta, 2020). Meanwhile, research conducted by (Fourqoniah & Aransyah, 2021) shows that the use of information technology, especially on social media, is very helpful for women who are entrepreneurs during the COVID-19 pandemic. Therefore, PEKKA's low use of information technology needs to be a concern for the government and other businesses. In general, women should better understand the importance of information technology and entrepreneurship, especially in this era of disruption.

Table 5: The Use of Information and Communication Technology by PEKKA Worker

The Use of Information and Communication Technology	2019	2020	2021
Number of PEKKA employed	26,049	27,752	30,173
Internet user	5,381	4,062	4,812
Using Information Technology for Communication	5,381	3,214	4,812
Using Information and Communication Technology for Promotion	1,469	4,062	1,570
Using Information Technology for Sales through social media	2,120	1,089	1,822

Source: National Labor Force Survey 2019—2021

Conclusions

The role of women in public work is increasing, especially in households whose economy is getting squeezed. Women who act as heads of families are vulnerable during their activities to fulfill their household needs. However, the female head of household (PEKKA) is a strong figure. The characteristics of PEKKA in Sumedang Regency show that they continue to struggle amidst their limitations and weaknesses.

Based on the analysis results, the factors of PEKKA's low-income level in Sumedang Regency come from their characteristics. This issue is part of the problem of income inequality between men and women and leads to gender disparities in welfare.

PEKKA workers in Sumedang District are dominated by middle-aged and old-age women, with the last education at the elementary level. Ironically, the majority of PEKKA with low education generally do not receive skills training and are unable to utilize information technology to increase their productivity. PEKKA mainly works in the informal sector as entrepreneurs on a micro-scale, casual workers in the informal sector, and workers in the formal sector.

Considering its characteristics, the Women's Empowerment Program for PEKKA in Sumedang Regency needs to involve government affairs in Education, Health, Social Affairs, Manpower, Communication and Information, Cooperatives, Small and Medium Enterprises, and Agriculture and Fisheries. Through this strategy, the Women's Empowerment Program can contribute to achieving the regional head's vision, particularly the community's welfare.

Recommendation

Clearly, from the description of the characteristics above, the Women's Empowerment Program, including PEKKA, is not only intervened by the Women's Empowerment Affairs as stipulated in Law 23 of 2014. Strategies to increase income or reduce PEKKA's welfare inequality also need to involve other matters. In other words, the Women's Empowerment Program for PEKKA is cross-sectoral. The following matrix describes the mapping strategy of local government affairs to strengthen the Women's Empowerment Program in Sumedang Regency:

Table 6: PEKKA Empowerment Strategy in Sumedang Regency

Local Government Affairs	Strategies
Education	Capture PEKKA dropouts to participate in Non-Formal Education and obtain an equivalency diploma
Health	Provide health insurance for PEKKA, especially for the elderly
Social	Providing social assistance to PEKKA workers who are elderly
Labor	Competency improvement training tailored to the characteristics of PEKKA workers
Communication and Information	Provide facilities and training in the use of communication and information technology. Especially for PEKKA who are elderly, they need assistance in the use of information and communication technology
Cooperatives, Small and Medium Enterprises	Empowering PEKKA with micro-scale businesses through data collection, partnership, licensing facilities, institutional strengthening
Agriculture and Fisheries	Assistance for production facilities and product processing facilities for PEKKA whose main focus is on the agricultural and fishery sectors

Intensive communication between Regional Apparatuses in the Women's Empowerment Program for PEKKA is required. A valid database is needed to make the program objectives effective. The Integrated Data on Social Welfare (DTKS) can use to implement this program. In addition, this program needs to be supported by religious and cultural leaders to build PEKKA's character by the religious and cultural norms adopted by the Sumedang community.

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Book Review

Kim, Youna. (Ed.). The Soft Power of the Korean Wave: Parasite, BTS and Drama (1st ed.)

Oxon and New York. Routledge, 2021. 231 pp.

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The Korean Wave has become one of the world's most recognizable non-Western popular cultures. Korean Wave popular culture has emerged as a potentially vital tool for soft power diplomacy in South Korea. It has increased South Korea's global prominence and caught the interest of a new generation (Kim & Nye, 2013). What is the driving force behind the Korean Wave's global rise in popularity? Who contributed to the spread of the Korean Wave? And what does the Korean Wave mean for South Korea's soft power? To answer these questions, the authors of the book titled "The Soft Power of Korean Wave: Parasite, BTS and Drama" present a different perception that looks beyond the typical Euro-American perspective by demonstrating the causes and implications of the Korean Wave of popular culture around the world. Many people who are interested in the developments of Korean popular and media culture will find this book to be informative and enjoyable to read.

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The book, published in 2021, could be considered the most comprehensive book to date to describe how Hallyu (Korean Wave) has made an important contribution to South Korean diplomacy. As a follow-up to another book by the editor, Youna Kim, titled "The Korean Wave: Korean Media Go Global" and published in 2013, this book is divided into three sections that focus on the recent phenomena of the Korean Wave: a movie titled Parasite, a music group named BTS, and television dramas. It consists of 15 chapters that cover a range of perspectives, including media and communications, cultural studies, sociology, history, and anthropology, and readers will find in them insights about the Korean Wave as a resource of soft power in the global digital age.

The book's opening section, "Parasite", explores the significant strike of Parasite in the context of the rise of the Korean Wave, especially in bringing the Korean film industry to a global audience. The first chapter demonstrates the role of film and media companies in establishing the global market as the target distribution for Parasite. There are also three chapters in this section that generally underlie Parasite's commentary on the social paradox in South Korea, and they have uncovered the film's criticism of the income inequality, class hierarchy, and gender inequality that are to be found beneath the luxurious image of South Korea (see chapters 2, 3, and 4). At the same time, this criticism can be sympathetic towards global social issues and create a significant charm for Parasite. Thereafter, Chapter 5 mostly discusses how Parasite can connect with diverse audiences beyond the language barrier through the exploration of emotions and its genres.

The second section of the book, titled "BTS", investigates this group's recent fame in the K-pop industry as well as its contribution to consolidating the cultural power of South Korea. The initial chapter introduces BTS's success in global pop music. The following three chapters highlight BTS's role in depicting South Korea's paradox (chapters 7, 8, and 9). Consideration is also given to how the idol-musicians address social problems and young people's concerns (chapter 7) and offer an alternative masculinity (chapter 8). The group has also sparked fandom activism to social activism around the world (chapter 9). The notion of BTS as South Korea's soft power instrument is embodied in their appointment as cultural ambassadors and in Western media's coverage of them.

The book's third section, "Drama", discusses how the popularity of Korean dramas has spread beyond Asia and become a phenomenon in other parts of the world, examining the growth in popularity of Korean dramas (chapters 11 and 14) and the role therein played by digital streaming platforms. Netflix's algorithm system has helped increase the international visibility of K-dramas (see page 171). Netflix rebranded Korean dramas, which used to be known as the "too emotional, with too many crying scenes" TV productions (Franzone, 2011), to a style of one package story-telling that combines elements from several genres, such as comedy, action, horror, and history (see page 179). The company has been successful in meeting the diverse needs of Western audiences, as well as audiences in Asia, the Middle East, and North Korea (see chapters 12, 13, and 16).

Throughout the three sections, the authors convincingly argue the significance of the Korean Wave as a soft power tool. However, one of the book's flaws is that it focuses only on three cultural products and their impact: the Parasite movie, BTS, and TV dramas. Several intriguing themes in Youna Kim's 2013 book, the forerunner of the present work, are not covered. One of the missing ideas is the research on online game culture that was actually one of the strongest themes in the 2013 work. Moreover, given that online gaming culture plays an increasingly important role in improving South Korea's image across the world (Holroyd, 2019), leaving out such an interesting theme is regrettable.

This book lays out South Korea's strategy of maximizing soft power to shape the country's image. As film is one example of the numerous weapons that soft power can use to create a country's image (Nye, 2004, 2008), South Korea has successfully used a global market strategy in promoting Korean cinema. Korean TV drama has put South Korea's global image in a positive light thanks to the strategic partnership with a global streaming platform company. More importantly, however, is the whole packaging of Korean cultural products, such as foods, tourist attractions, and fashion shown in Korean drama scenes. An added attraction is the boost to South Korea's tourism industry as foreign tourists visit the filming locations of their favourite dramas and purchase local products. Countries with strong entertainment industries can consider following South Korea's path to boost their soft power.

The authors of this book provide an excellent overview of the Korean Wave's cultural production, distribution, and consumption. This book can serve as a comprehensive reference to explain how Hallyu

has grown and developed in South Korean diplomacy. The positive development of South Korea's soft power, as described in this book, offers many lessons for other countries to follow, and the book may also inspire other countries to recognize the vitality of their own unique cultures, which can be projected on a worldwide scale. In the aspect of sustainable development, the book provides studies of the instrumentalization of popular culture to boost the country's economy and global influence in a peaceful way. Proven, Korean Wave as economic and soft power tools is a right investment for South Korea's sustainable development. This book receives 8 out of 10 for its profound strength.

Cover Book

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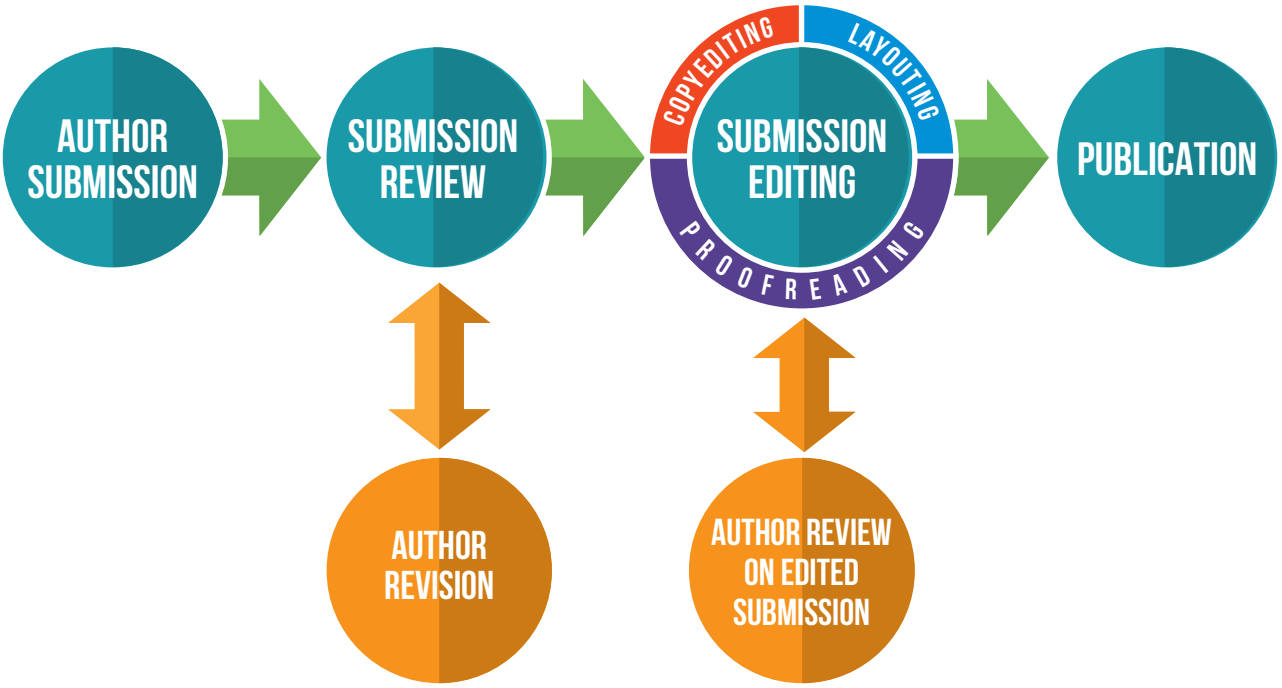

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