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Editorial Notes

Covid 19 and Environment: How We Can Learn for Environmental Management

Since the World Health Organization (WHO) announced the pandemic covid 19 as a global pandemic on March 2020, as of 6 August 2021, the aggregate number of Covid 19 confirmed cases had exceeded 200.6 million, and more than 200 countries and regions have been affected. In Indonesia, the first case of Covid 19 was reported in March 2020, and the accumulative number of confirmed cases reached around 3.6 million cases on August 2021 in all 34 provinces (World Health Organization, 2021). Not only does the outbreak of Covid 19 threaten public health, but it also impedes economic growth. According to the World Bank (2021), the global economy contracted at around 3.5 percent in 2020. Amongst the advance and emerging market economic groups, Euro Area, Latin America, and the Caribbean (Brazil, Mexico, Argentina) have experienced the lowest economic growth, which was around -6.6 and -6.5 percent, respectively. Generally, the economic contraction during the pandemic is induced by two factors, massive supply shocks and the reduction of demand for goods and services. These factors are mainly triggered by the policy taken by countries to strictly control people's movement and reduce the spread of Covid 19 and the surge in the uncertainty of economic development that leads to the turbulence of capital and financial markets (McKibbin & Fernando, 2020; Fernandes, 2020).

Despite the negative impacts of the Covid 19 pandemic on the economy, public health, and other sectors, the pandemic shows intriguing impacts on the environment in some aspects, such as air pollution and wildlife (Manan et al., 2020). Existing research shows that as the economic growth declines, the pollution diminishes, and vice versa (Raupach et al., 2007; Wang et al., 2019; Wang & Su, 2020). During the pandemic, the air quality increases due to the significant reduction in industrial activities, urban transportation, and energy consumption. According to Patel (2020), the pandemic remarkably improved air quality, particularly in the areas that strictly employ lockdown and quarantine measures. Globally, CO_2 and NO_2 emissions decrease during the pandemic by 25 and 35 percent, respectively. In the Southeast Asian Region, it is reported that three months after the outbreak, there is an improvement in air quality. NO_2 emission in major cities such as Jakarta, Kuala Lumpur, and Bangkok shrinks by 34, 27, and 22 percent, respectively (Kanniah et al., 2020).

A study conducted by Wang & Su (2020a) shows an improvement in the air quality in China, and it significantly contributed to the reduction of global GHG emissions. The reduction in energy consumption, particularly from coal, is the main factor that contributes to the air quality. During the outbreak of Covid

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19, the concentration of NO_2 reduces by 25 percent, while CO_2 concentration declines by 6.2 percent. However, the positive effects of the pandemic on air quality only occur in the short term during the quarantine. As some regions lifted the lockdown, industries resumed production, people movement increased, and energy consumption was in an upward trend. The air quality might decline, and it is predicted to exceed the level before the outbreak. In Indonesia, research on the impact of the Covid 19 pandemic is still limited. Caraka et al. (2020) investigated HCNO, CO, NO_2, and SO_2 density five months after the outbreak. The study shows that there is a significant difference in HCNO, NO_2, and CO density in Jakarta, East Java, and Sulawesi. In contrast, the SO_2 density remains the same before and after the outbreak.

The outbreak of Covid 19 also has a significant impact on wildlife. The quarantine measures and the reduction of people movement reduce the number of visitors to national parks and other ecotourism areas. As a result, human intervention in wildlife might be minimized. The Ministry of Environment and Forestry (2020) states that even though there is a reduction in the revenue from ecotourism, there is an improvement in the ecosystem of almost all national parks in Indonesia when the areas are closed for visitors. Moreover, some animals that are not seen for many years were spotted wandering in certain areas. However, the negative impacts of the pandemic on wildlife cannot be ignored, particularly the impact on ex-situ conservations where the feeding of the animal dramatically relies on the visitors. A prolonged pandemic might significantly endanger wild animals due to the lack of food.

The pandemic of Covid 19 provides many lessons to learn on how we can manage our environment in the future. With a specific intervention, the air quality and wildlife could be improved. The positive impacts of the pandemic on the environment offer a guide for policymakers to design standards, operations, and procedures for preserving and protecting the natural environment to minimize the negative impacts of climate change in the future. It is predicted that the magnitude of the impacts of climate change will be much bigger than the outbreak of Covid 19. However, with proper actions, we could mitigate the risks and minimize their impacts.

Dadang Jainal Mutaqin, S.Hut, M.Emd.

(Editorial Board)

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Research Paper

The Role of the Secondary Sector in Poverty Alleviation in Indonesia

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ABSTRACT

The relationship between economic growth and poverty reduction, although well established, is heterogeneous. The heterogeneity stems not only from socio-economic factors but also from the structure of output growth. In Indonesia, the secondary sector seems to be less poverty-reducing than other sectors. This study examines the impact of sectoral growth on poverty in Indonesia, with particular attention to the disaggregated secondary sector, and also analyzes the relative sensitivities of poverty reduction to the labor-intensive and non-labor-intensive sectors. The empirical analysis uses provincial panel data on Indonesia for the period 2003–2018 and employs the pooled OLS method. The results show that sectoral growth has little effect on improving the condition of the poor in Indonesia. Nevertheless, this conclusion has a high potential to be inappropriate. Perhaps a better conclusion on the linkage between sectoral growth and poverty can be drawn if the characteristics of mining-driven and nonmining-driven provinces in Indonesia are taken into account. In nonmining-driven provinces, the secondary sector pales in comparison to services in alleviating poverty. Six-sector disaggregation of the economy (with or without controlling for the distributional effect through labor intensity) reveals that, within the secondary sector, the subsectors that significantly reduce poverty in nonmining-driven provinces are mining and construction. Mining-driven provinces, however, do not display a linkage between sectoral growth and poverty. The significant role of labor intensity in determining whether sectoral growth is pro-poor suggests that adopting policies that lean toward discouraging businesses from employing labor is inadvisable.

Keywords: poverty, sectoral growth, labor intensity, mining, nonmining

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1. Introduction

The focus of studies on growth and poverty emerges partly due to the failure of earlier development thinking, which was disillusioned by the trickle-down effect in that it is widely believed that expanding economic capacity will lead to an increase in the mean income of the population and eventually improve social welfare. In reality, promoting economic growth solely within a trickle-down framework is commonly accompanied by several problems, such as an increase in inequality because of partiality toward the highest-income earners, which in an extreme case could result in the complete opposite of what is expected, that is, a trickle up.

Nonetheless, although there are some arguments against the significance of economic growth in poverty reduction because of the possible rise in inequality (Fosu, 2017), there is general agreement that economic growth will bring about a decline in absolute poverty. Numerous studies give support to the significance of economic growth in reducing the percentage of poor people. Such studies have taken different approaches to this issue: using cross-country panel data analysis (Dollar, Kleineberg, & Kraay, 2016; Dollar & Kraay, 2002; Harmáček, Syrovátka, & Dušková, 2017) or using cross-regional panel data analysis (Ravallion & Datt, 1996; Suryahadi, Suryadarma, & Sumarto, 2009).

Still, there is heterogeneity on how significant the role of growth in poverty alleviation is, although there is a consensus on the relationship between growth and poverty, which is the factor of interest in several studies (Bourguignon, 2003; Ravallion & Chen, 1997). Many researchers have examined this phenomenon by utilizing socio-economic factors such as inequality (Bourguignon, 2003), literacy/education (Afzal, Sarwar, & Fatima, 2017; Datt & Ravaillon, 2002), and migration rates (Murrugarra et al., 2011). Those factors have been shown to have a significant impact on the sensitivity of poverty alleviation to output growth. However, the source of heterogeneity on the role of growth in poverty reduction can also come from the structure of output growth itself. Hence production sectors are also a factor of interest in examining the effect of growth on poverty. In that regard, there is an ongoing discussion as to which sector is the main contributor to poverty alleviation. There is an ongoing debate over whether the expansion of a particular economic sector makes any significant contribution to the lot of the poor. Thus, studies on sectoral growth and poverty in a country—specifically, to distinguish the more pro-poor sectors from the less pro-poor sectors (Suryahadi *et al.*, 2009)—is pivotal because the government needs to have more detailed information in order to utilize the most effective route to reducing poverty. This is related to decision-making by the government regarding the direction of development, policy, and allocation of public resources and funds. However, many agree that the effect of sectoral growth on the poor depends on the characteristics of the particular country under study. In other words, the conclusions gathered from previous research on sectoral growth and poverty in any specific country or from research that uses cross-country data cannot be immediately used to answer the same question regarding other countries.

One of the earliest studies of the impact of growth on the poor which incorporate a sectoral point of view is by Lipton and Ravallion (1993), which focused on analyzing poverty and poverty-reduction policies in developing countries. The authors of that study emphasize that poverty exists predominantly in rural areas and that migration becomes the preferred choice for the poor to seek a better life. However, despite cities offer relatively higher income, rural workers face a high probability of not being absorbed by urban sectors because of low demand for such workers and incompatibility of skills. The migrants are thus in danger of becoming urban poor, while the aggregate poverty might not improve. Hence governments of developing countries, and informal sectors in urban areas that are the destination of urban migration, are advised to remove bias against people from rural sectors. Support for agricultural development should be one of the top priorities, followed by improvements in human and physical infrastructure.

Although the study by Lipton and Ravallion (1993) does not focus on directly disaggregating economic sectors to observe the impact on poverty, it reasserts the importance of rural sectors, particularly agriculture, in poverty alleviation. In contrast to Lipton and Ravallion's study, which examines only the direct effect of growth within a single sector through income generation, subsequent research by Thorbecke and Jung (1996) tried to address the effect of the interrelation of economic activities. By developing a multiplier decomposition technique similar to that used in a social accounting matrix, they examine the effects of output growth in different sectors on poverty reduction through the changes in income of different household groups. Their system also investigates the linkages and mechanisms that connect initial stimulation in one sector to the final effect, directly and indirectly, on the poor. In a case study of Indonesia, it was found that the agriculture and service sectors surpass the industrial sector at

reducing poverty (Thorbecke & Jung, 1996). The same technique was applied to South Africa by Khan (1999). The result was slightly different from the result for Indonesia: it was concluded that the agriculture, mining, and service sectors have the greatest impact on poverty alleviation in South Africa. Both studies propose the possibility of low distributional effects in manufacturing sectors as the cause of the low level of poverty alleviation. Thorbecke and Jung (1996) further argued that this occurs because of factor endowments of poor households, that is, unskilled labor, which are not compensated at a level that is concomitant with the demand in manufacturing sectors. However, no subsequent effort was made to support this argument.

Some studies are reluctant to focus on rural-sector growth in reducing poverty, even though most developing countries may have the highest poverty level in rural areas because of the rural sector not being pro-growth. For example, the driving force of poverty alleviation in India was indeed rural-sector growth (Ravallion & Datt, 1996). A similar conclusion was drawn in a case study of China, where the most important productivity in terms of poverty reduction comes from agriculture rather than from industry or the service sector (Ravallion & Chen, 2007). Bhattacharyya and Resosudarmo (2015) took a different approach to the linkage between growth and poverty. They considered the impact of mining and nonmining growth in Indonesia and found an asymmetric result for the two types of economic activities: mining and overall growth per capita appear not to affect poverty, while nonmining growth is significant at reducing poverty. Another result from their research is that the primary and tertiary sectors were found to significantly poverty reducing at the national scale and within urban and rural areas. A more recent study concludes that compared to an equal amount of productivity growth in the industry or the service sector, productivity growth in agriculture generally has the highest impact on poverty reduction. In other words, raising sectoral output by increasing productivity to the same extent will yield heterogeneous effects on the poor, with the increase in agricultural productivity being the dominant source (Ivanic & Martin, 2018). This conclusion suggests that improvements in technology and investment in the agriculture sector, together with formulation of efficient policies, are the keys to poverty reduction.

The result of many empirical studies on sectoral growth that advocate agriculture as the main driver of poverty reduction leads to the notion of agricultural fundamentalism (Hasan & Quibria, 2004). Nevertheless, despite being backed by numerous empirical data, this fundamentalism is not without criticism. The main rationale of the criticism is that agricultural growth suffers from constraints of supply and demand. Development in agriculture can be attributed to two main factors: mechanical advances that boost labor productivity, and discoveries in biological and chemical technology associated with growth in land productivity. However, the spatial dimension and seasonal characteristics of crop production inevitably halt the growth in mechanical technology in agriculture. In addition, biological and chemical technology in agriculture eventually faces critical physiological constraints, such as the ratio of grain to straw and increases in the productivity of animal feed, that prevent productivity from improving any further (Ruttan, 2002). Physiological constraints are also present on the demand side, as the population cannot consume more than its capacity. Hence, the remarkable growth of agricultural productivity in the past few decades may be difficult to maintain in the future.

Poverty reduction requires that the poor be employed in a productive sector to ensure higher incomes (Karnani, 2011). This emphasizes the difficulty of relying on agriculture to reduce poverty because of productivity constraints on agriculture that lead to limits on its potential to grow. Growth in the secondary sector does not have such constraints, and thus it is more likely to be sustainable provided there is no significant distortion in its development process. Therefore, promoting the secondary sector is crucial, especially for long-run poverty reduction and welfare improvement, given its potential for productivity growth. East Asian economies, dubbed miracle economies, are the perfect example of how an industrial-driven economy can successfully maintain a high level of growth and rapidly reduce poverty rates. China, one of the miracle economies, managed to dramatically reduce its poverty rate from 41.6% in 1980 to 15.9% in 2004 (Lin & Yu, 2015) and became one of the world's largest economies through a striking structural change from being driven by agriculture to being oriented to the manufacture of goods for export and industrial upgrading. China attributes this success to the adoption of a comparative-advantage-following (CAF) strategy according to its factor endowments—i.e., abundant labor—starting in 1978. South Korea also managed to maintain high economic growth and reduce poverty. It became a leading example of a successful development strategy in prioritizing the secondary sector with the help of the implementation of skill-development policies (Ra & Shim, 2009).

The underlying message in the success of East Asian economies is that, ideally, the secondary sector should be more poverty-reducing than the primary sector. However, in many developing countries,

including Indonesia, the secondary sector appears to have the lowest elasticity with respect to poverty. Research by Suryahadi *et al*. (2009) found that in Indonesia, the growth of services in urban areas, followed by growth in the rural primary sector, dominates poverty reduction in rural areas. Suryahadi *et al*. (2012) argued that the inconsequential impact of industrial growth on poverty alleviation in Indonesia post the Asian Financial Crisis was due to its sustained poor performance in Indonesian economy in term of labor absorption. Despite several theories surrounding the reasons behind this finding, there have been few empirical studies that specifically aim to understand why the secondary sector is less poverty-reducing. The only notable effort to shed light on this phenomenon is the cross-country study by Loayza and Raddatz (2010). They employ a level of disaggregation in the secondary sector and incorporate labor intensity. In a sense, they took the premise proposed by Thorbecke and Jung (1996), and later by Khan (1999), of a low distributional effect of industry on poverty reduction, which is assumed to be caused by most of the poor being endowed with only unskilled labor, and developed a theoretical model that includes the impact of unskilled labor absorption in a given sector on the percentage of poor people. In their work, however, it is stated that labor intensity is heterogeneous between different sectors and also within a given sector in different regions/countries (Loayza & Raddatz, 2010). This emphasizes that the results of a cross-country study may not be representative of conditions in Indonesia.

Ideally, the government should be able to take advantage of the sizeable share of—and growth in—the secondary sector and use it in its mission to reduce poverty because the result may be much more impactful than to concentrate on the growth of the seemingly pro-poor but less pro-growth sectors such as agriculture. The problem arises when a pro-growth sector is suspected not to be pro-poor. Possible reasons for this phenomenon are that not all subsectors of the secondary sector are pro-poor and that not all subsectors of the secondary sector are not pro-poor. For that reason, it is important to be able to determine which subsectors have the most desirable impact on poverty alleviation. There is no previous published literature that specifically addresses this issue in the case of Indonesia. Moreover, as stated earlier, most studies of sectoral growth and poverty reduction divide growth into three major categories (primary, secondary, and tertiary), while research that incorporates a higher level of disaggregation in sectoral growth is rare, possibly because of insufficient availability of data.

This research investigates whether disaggregating the secondary sector into its four separate components will shed light on their effects on the poverty phenomenon while simultaneously taking into account the economic structure of Indonesia concerning mining-driven and nonmining-driven provinces in a way that incorporates the findings in Bhattacharyya and Resosudarmo (2015). Can labor intensity explain the heterogeneity of the effects of sectoral growth on poverty? Specifically, to answer that question, this research analyzes the relative sensitivities of poverty reduction to the labor-intensive and non-labor-intensive sectors, with particular attention to the effects of disaggregating the secondary sector.

2. Methodology

2.1 Theoretical View

The effort to properly categorize the economy into several different sectors was begun approximately eight decades ago, for example, with the work of Clark (1940). Several subsequent studies on individual economic sectors followed the work of Clark with a roughly similar framework, that is, to separate economic activities into three categories: primary, secondary, and tertiary. Wolfe (1955) compared the previous studies on economic sectors and concluded that the primary sector could be seen as a part of the economy with certain productivity constraints that arise from natural growth factors, hence the placement of agriculture into this category. For the secondary sector, Wolfe asserted that mechanical factors are the source of constraints on its productivity growth, while for the tertiary sector, Wolfe sets relatively unaided human skill as the constraint on productivity growth. Manufacturing is the subsector that obviously should be categorized as the secondary sector. Clark (1940) also places mining, construction, and utilities in the secondary sector. Wolfe's explanation of this categorization is that mining, construction, and utilities exhibit strong mechanical factors and are thus suitable for placement into the secondary sector. The tertiary sector comprises services such as transportation and communication, arts and crafts, personal and domestic service, amusement, education, and government.

This study aimed to adapt the theoretical model developed by Loayza and Raddatz in 2010, which considers the structure of output growth and first sets out to elaborate a two-sector production function with asymmetric technologies. The use of two sectors is for the sake of simplification of the

formula derivation; the *n*-sector output production function (for $n > 2$) is analogous to this two-sector analysis. As stated earlier, the work of Loayza and Raddatz employs the categorization of economic sectors. Therefore, the primary sector is comprised of agriculture; the secondary sector consists of mining, manufacturing, construction, and utilities; and the tertiary sector includes all the services activities in the economy.

Suppose the population of a country consists of the rich and the poor. Each of these two categories has a production factor in the form of labor. The rich and the poor maximize their lifetime utility by consuming final goods with an identical discount factor. However, it is assumed that the poor do not have access to assets; hence their income stems exclusively from providing a labor service. As a result, their consumption depends entirely on their real wage. This implies that the real-wage rate determines the rate of poverty. On the other hand, suppose that the supply side of the economy consists of two agents: final-good firms and intermediate-good firms. To simplify, the final-good firms produce final good Y using two intermediate goods, y_1 and y_2, and operate under a neoclassical production function with constant elasticity of substitution (CES) mechanism,

$$Y = (b_1 y_1^{\beta} + b_2 y_2^{\beta})^{1/\beta}, \quad (1)$$

where b_1 and b_2 are the shares of intermediate goods 1 and 2, respectively, as the inputs for the final-good production, and $\beta = (\varepsilon - 1)/\varepsilon$, with ε as the elasticity of substitution between intermediate goods. The use of a CES production function implies that $\beta \leq 1$, and that $b_1, b_2 > 0$ and $b_1 + b_2 = 1$. Each intermediate good is produced under a labor-augmented technological change Cobb–Douglas production function in a perfectly competitive market:

$$y_i = k_i^{(1-\alpha_i)}(A_i n_i)^{\alpha_i}, \quad i = 1, 2, \quad (2)$$

where k_i, A_i, and n_i are the capital, level of technology, and labor, respectively, that are used to produce intermediate goods *i*. As in any labor-augmenting technology production function, the technology A_i is assumed to be an exogenous variable $A_i = e^{g_i t}$ that grows at a rate g_i. The constant return to scale and full capital and labor mobility is assumed for both functions.

The perfect competition assumption applied in the final-good production requires the price of the final good to be equivalent to the production cost of each unit of that good:

$$p = (p_1^{1-\varepsilon} + p_2^{1-\varepsilon})^{\frac{1}{1-\varepsilon}}, \quad (3)$$

where p is the price of the final good, and p_1 and p_2 are the prices of intermediate goods 1 and 2, respectively. To obtain the share of value-added from each intermediate sector to the final-good production, the first-order condition is applied to the final-good firm's optimization problem:

$$\frac{p_i y_i}{Y} = s_i = b_i \left(\frac{y_i}{Y}\right)^{\frac{\varepsilon-1}{\varepsilon}}, \quad i = 1, 2 \quad (4)$$

Equation (4) operates under the perfect-competition assumption in which economic profit is equal to 0 and the price of the final good is set to 1. Given the set of assumptions, the sum of the s_i has the characteristic of 1. By equation (4), the demand for intermediate goods 1 and 2 can be written as

$$\frac{y_1}{y_2} = \left(\frac{p_2}{p_1}\right)^{\varepsilon} \quad (5)$$

The perfect-competition assumption is also applied to intermediate-good firms, so the optimization problem will yield the following first-order conditions:

$$y_i = \frac{\omega n_i}{p_i \alpha_i} = \frac{r k_i}{p_i (1 - \alpha_i)}, \quad i = 1, 2 \quad (6)$$

Equation (6) illustrates the allocation of capital and labor inputs to intermediate-good production for each sector. Market clearing for capital and labor implies that $n_1 + n_2 = n$ and $k_1 + k_2 = k$.

Real Wage Derivation

The premise behind this research is that labor intensity differs across sectors. This means that any changes in laborers' income are affected overall and in terms of sectoral growth. Applying the assumption of free labor mobility between sectors that results in wage equalization, growth in wages depends on the sum of the products of weighted growth in the individual sectors and the corresponding labor intensities. This shows the importance of variation in labor intensities between sectors and simultaneously provides a closed-form formula for wage growth which will be the basis for empirical studies. To connect wage growth with poverty, this research assumes that unlike the rich, who are endowed with assets, the poor

benefit only from their labor. In other words, the real wage is the only source of income for consumption. Hence the rate of change of poverty will be a function of wage growth.

Following the labor allocation in equation (6), suppose the rate of growth mechanism ($\hat{x} = dx/x$) is applied to intermediate good 1 to obtain the rate of change in the real wage,

$$\widehat{\omega} = \hat{p}_1 + \hat{y}_1 - \hat{n}_1, \tag{7}$$

where $\widehat{\omega}$ is the rate of change in the real wage, and $\hat{p}_1$, $\hat{y}_1$, and $\hat{n}_1$ are the rates of change in the price of intermediate good 1, the output production per capita of intermediate good 1, and the amount of labor for intermediate good 1, respectively. Applying the same procedure to the share of sectoral value added to the final output s_1 to get the first two terms on the right-hand side of equation (7) while ensuring that $\hat{Y} = s_1\hat{y}_1 + s_2\hat{y}_2$ because of a constant return to scale, we obtain

$$\hat{s}_1 + \hat{Y} = \frac{\varepsilon - 1}{\varepsilon}\hat{y}_1 + \frac{1}{\varepsilon}(s_1\hat{y}_1 + s_2\hat{y}_2) \tag{8}$$

The last term on the right-hand side of equation (7) is the rate of change of employment in sector 1. Using the solution of the first-order condition on intermediate-good firms in equations (5) and (6), we obtain

$$\left(\frac{\alpha_1}{\alpha_2}\right)\left(\frac{n_2}{n_1}\right)\left(\frac{y_1}{y_2}\right)^{\frac{\varepsilon-1}{\varepsilon}} = 1 \tag{9}$$

Equation (9) will be used in the derivation of the real wage, that is, in obtaining the change in the employment level for each intermediate-good firm. Utilizing the market-clearing condition $n = n_1 + n_2$ while deriving the first-order condition on both final-good and intermediate-good firms, the rate of change in employment for firm 1 is

$$\hat{n}_1 = l_2\frac{\varepsilon - 1}{\varepsilon}(\hat{y}_1 - \hat{y}_2) + \hat{n}, \tag{10}$$

where l_2 is the share of employment in sector 2 (n_2/n).

Combining equations (8) and (10) leads us to equation (11), in which we have the elements of sectoral growth, labor intensity, and population growth.

$$\widehat{\omega} = \sum_{i=1}^{2} s_i\hat{y}_i + \frac{\varepsilon - 1}{\varepsilon}\sum_{i=1}^{2}(l_i - s_i)\hat{y}_i - \hat{n} \tag{11}$$

A transformation of equation (11) allows the use of per capita terms in the variables of sectoral growth. With a slight abuse of notation, we can rewrite equation (11) as

$$\widehat{\omega} = \sum_{i=1}^{2} s_i\hat{y}_i + \frac{\varepsilon - 1}{\varepsilon}\sum_{i=1}^{2}(l_i - s_i)\hat{y}_{i,} \tag{12}$$

where $\hat{y}$ is now the rate of growth of GDP per capita and $l_i = n_i/n$ is the ratio of the share of labor in sector i to the sum of labor in all sectors. The first term on the right-hand side of equation (12) illustrates how an increase in sectoral GDP per capita will increase output by an amount that corresponds to a rise in the real wage. The second term, which describes sectoral growth, depends on elasticity substitution across sectors and labor intensity ($l_i - s_i$), where the latter is defined as the difference between the share of employment and the share of sectoral value-added.

The formula for the rate of change in the real wage in equation (12) has the following implication; the larger the share of a sector, the more impact it has on the real wage. However, the impact of the share of a sector can be crowded out if it is not balanced by the share of employment, as indicated in the second term on the right-hand side of the equation. This implies that even though a sector has a substantial share of the economy if it is not labor-intensive, its impact on the rate of change of the real wage will be smaller than in a labor-intensive sector. This the real wage will grow more significantly if higher sectoral growth$\hat{y}$ occurs in a sector with a large share of employment l_i.

The next step is to connect the rate of change in the real wage to poverty. The notion that the poor are endowed only with income that comes from their labor is used to assist the theoretical analysis that changes in poverty are determined by changes in the real wage,

$$\hat{h} = \psi(\widehat{\omega}), \tag{13}$$

where $\hat{h}$ is poverty growth. Equation (13) implies that by association, the function that gives the changes in poverty is also a function of the variables used in the real-wage equation ($\hat{h} = \psi(\widehat{\omega}) = \psi(s, \hat{y}, l)$). It is expected that the first derivative of ψ in equation (13) will be negative ($\psi'(\widehat{\omega}) < 0$), to capture the idea that as the real wage increases, the poverty rate will decrease. It should be noted that by the assumption that the poor who work belongs to the category of unskilled labor, the share of employment in a given sector is the ratio of the share of unskilled labor employed in that sector to overall labor.

Poverty Measurement

The poverty headcount index is acknowledged as the most commonly used poverty indicator, mainly because it is easy to interpret (World Bank, 2014). Loayza and Raddatz (2010) use this measurement as their main poverty variable, although further robustness checks also involve other measures of poverty. The headcount index P_0 uses a simple formula to illustrate the proportion of the poor (N_p) in the total population (N):

$$P_0 = \frac{N_p}{N} \tag{14}$$

Hypotheses

Based on the theoretical considerations outlined above, the hypotheses in this research can be divided into two groups. First, although the aggregated secondary sector has been widely seen as not being pro-poor, at the disaggregated level, poverty reduction is more sensitive to some of its subsectors than to others. Second, labor intensity is the source of variation in the effect of sectoral growth on the poor through the mechanism of real-wage growth. This implies that poverty reduction is more sensitive to labor-intensive sectors than to non-labor-intensive sectors.

2.2 Empirical Strategy

Given the theoretical considerations already discussed, the research strategy can be depicted as in Figure 1.

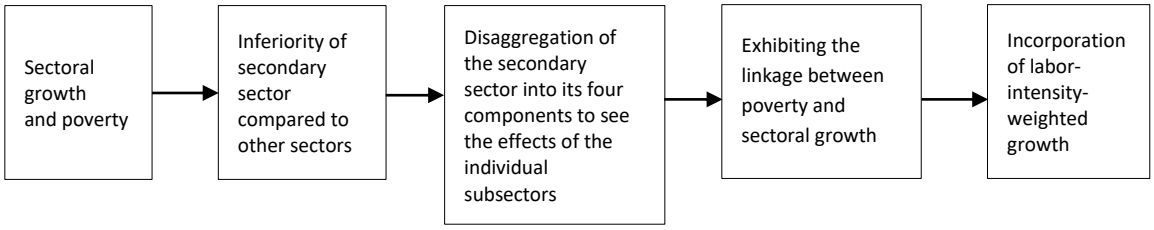


Figure 1. Research Strategy

Thus the first empirical model is as follows:

$$\hat{h}_{jt} = \delta_0 + \sum_{i=1}^{3} \delta_i \, s_{ijt} \hat{y}_{ijt} + \beta_1 UCT_{2005} + \beta_2 UCT_{2008} + \beta_3 UCT_{2009} + \varepsilon_{jt} \tag{15}$$

where the variables represent the following quantities:

$\hat{h}_{jt}$: rate of change in poverty headcount index (P_0) in province j at time t
s_{ijt} : share of GDP per capita of sector i in province j at time t
$\hat{y}_{ijt}$: growth of GDP per capita of sector i in province j at time t
UCT_{2005} : dummy variable for nationwide antipoverty policy (Unconditional Cash Transfer) in 2005
UCT_{2008} : dummy variable for nationwide antipoverty policy (Unconditional Cash Transfer) in 2008
UCT_{2009} : dummy variable for nationwide antipoverty policy (Unconditional Cash Transfer) in 2009
i : the sectors of GDP (in this case, the primary, secondary, and tertiary sectors)
j : province in Indonesia

The purpose of this part of the empirical analysis was to confirm that the secondary sector has the slightest effect on poverty in Indonesia. Assuming that it is true, the next model will examine whether decomposing the secondary sector into four categories (mining, manufacturing, construction, and utilities) yields the expected result; not all subsectors within the secondary sector are poverty-reducing. A similar model was employed:

$$\hat{h}_{jt} = \delta_0 + \sum_{i=1}^{6} \delta_i \, s_{ijt} \hat{y}_{ijt} + \beta_1 UCT_{2005} + \beta_2 UCT_{2008} + \beta_3 UCT_{2009} + \varepsilon_{jt} \tag{16}$$

with disaggregation of GDP among six sectors, where i = 1 denotes the primary sector (agriculture); i = 2 through i = 4 denote the subsectors of the secondary sector (mining, manufacturing construction, and utilities, respectively); and i = 6 denotes the tertiary sector (services). The share of sectoral GDP s_i and the sectoral growth $\hat{y}_i$ are now varied across the six sectors, hypothesis testing of the significance of a single parameter δ_i is done for every sector. In this case, it is expected to be negative for sectors suspected of being labor-intensive, such as construction (including the primary sector, although this is not the main concern of this research). On the contrary, sectors that are not labor-intensive are expected to have insignificant or even positive δ_i. This would mean that growth in every non-labor-intensive sector will either not decrease poverty or aggravate the condition of poverty in Indonesia.

To capture the next objective of this research and determine whether labor-intensive growth might help to explain the heterogeneity of the linkage between poverty and sectoral growth, a second empirical model is built with the basis of equation (12) in multi-sector form,

$$\hat{\omega} = \sum_{i=1}^{6} s_i \hat{y}_i + \frac{\varepsilon - 1}{\varepsilon} \sum_{i=1}^{6} (l_i - s_i)\hat{y}_i \tag{17}$$

Under the same assumption that changes in poverty are linearly related to real-wage growth, $\hat{h} = \theta_0 + \theta_1 \hat{\omega}$, sectoral growth affects poverty via changes in the real wage,

$$\hat{h} = \theta_0 + \sum_{i=1}^{6} \theta_{1i}\, s_i \hat{y}_i + \left(\sum_{i=1}^{6} \theta_{2i}\, (l_i - s_i)\hat{y}_i \right) \tag{18}$$

Thus the second empirical regression model can be written as

$$\hat{h}_{jt} = \theta_0 + \sum_{i=1}^{6} \theta_{1i}\, s_{ijt} \hat{y}_{ijt} + \left(\sum_{i=1}^{6} \theta_{2i} \left(\frac{l_{ijt}}{s_{ijt}} - 1 \right) s_{ijt} \hat{y}_{ijt} \right) + \beta_1 UCT_{2005} + \beta_2 UCT_{2008} + \beta_3 UCT_{2009} + \varepsilon_{jt} \tag{19}$$

θ_{1i} illustrates the elasticity of sectoral per capita growth to poverty reduction after being controlled by labor-intensity-weighted growth, and θ_{2i} reflects the effect of labor-intensive growth. $\hat{h}$ is the rate of change of poverty, and l_{ij} is the ratio of unskilled labor to overall labor in sector i and province j. It is expected that both θ_{1i} and θ_{2i} will be negative.

Nationwide Antipoverty Programs

The unconditional cash transfer in 2005 and 2008–2009 was a nationwide effort of GOI (The Government of Indonesia) to offset the effect of the reduction in fuel subsidies on poor households. The program was designed as emergency income support to aid household consumption that was affected by the rise in fuel prices. The unconditional nature of this cash transfer makes its effect instantaneous; that is, consumption among poor households will not severely decline under challenging times and obstruct poverty reduction. Omitting the control variable that accommodates the unconditional cash transfer would potentially bias the estimation of the growth–poverty linkage in the event of a reduction in fuel subsidies. Bhattacharyya and Resosudarmo (2015) controlled this factor by adding a time dummy in their empirical studies; however, they did not discern which antipoverty policy that happened in Indonesia. This is the point of departure from the research of Bhattacharyya and Resosudarmo (2015); that is, our study focuses on the nationwide unconditional cash transfer in 2005 and 2008–2009, and the resulting changes in the poverty rate when economic growth presumably contributed very little to poverty alleviation during that time.

Data and Sample

To produce a statistically sufficient model, this research aimed to compile panel data for Indonesia during the period 2003–2018, with provinces as an observation unit. The number of provinces in 2003 was 32; however, because of the circumstances surrounding the data for 2000, only 30 provinces were included in the analysis. Several regions that have proliferated since 2000 were regrouped into their respective original regions to ensure data continuation. The poverty headcount index (P_0) was taken from official data published annually by Statistics Indonesia (BPS). This research used unskilled labor, which is defined as the workers that belonged to categories 4–9 in ILO's ISCO-08 (International Labour Office, 2012; Weingarden & Tsigas, 2010): clerical support workers (major group 4); services and sales workers (major group 5); skilled agricultural, forestry, and fishery workers (major group 6); crafts and related trades workers (major group 7); plant and machine operators, and assemblers (major group 8); elementary occupations (major group 9). The ISCO categories correspond to similar categories in the data

used by Indonesia, that is, the occupational classification using KBJI (*Klasifikasi Baku Lapangan Pekerjaan Indonesia*), Standard Classification of Indonesian Employment. The unskilled labor data were obtained from Sakernas (National Labor Force Survey) collected by Statistics Indonesia. For the variable of sectoral growth per capita, we used the data on population and sectoral RGDP (Regional Gross Domestic Product) published by BPS.

To capture the effect of mining-driven versus nonmining-driven provinces, this research set a an average threshold of 20% share of mining to total output for 2003–2018 to the full set of sample data in order to separate mining provinces from nonmining provinces. It is well known that the economies of the provinces that satisfy that threshold depend on natural resources. There are twenty-four nonmining-driven provinces (Nangroe Aceh Darussalam, Sumatera Utara, Sumatera Barat, Jambi, Bengkulu, Lampung, Bangka Belitung, DKI Jakarta, Jawa Barat, Jawa Tengah, Yogyakarta, Jawa Timur, Banten, Bali, Nusa Tenggara Timur, Kalimantan Barat, Kalimantan Tengah, Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan, Sulawesi Tenggara, Gorontalo, Maluku, Maluku Utara) and six mining-driven provinces (Riau, Sumatera Selatan, Nusa Tenggara Barat, Kalimantan Selatan, Kalimantan Timur, and Papua).

Estimation Process

Essentially, our panel data approach has three types of models: OLS, a fixed-effect model, and a random-effect model. There are appropriate tests to determine which model best explains the dependent variable. The Breusch–Pagan Lagrange Multiplier Test for random effects is the tool we used to choose between OLS and the random-effect model. The null hypothesis of the Breusch–Pagan LM test is that there is no random effect. Failure to reject the null hypothesis means that OLS is more appropriate than the random-effect model. The Hausman test is used to determine the consistency of the estimation in the random-effect model versus the fixed-effect model. The ability to reject the null hypothesis via the Hausman Test implies that the fixed-effect model is more suitable than the random-effect model.

3. Results and Discussion

3.1 Empirical Result[1]

The panel regression result for the full sample with pooled OLS estimation is shown in the second column in Appendix 1. The coefficients of interest, share-weighted growth of industry and services, give a rough prognosis that growth in the industry and services sectors is poverty-reducing, even though the share-weighted growth of agriculture shows otherwise. However, it should be noted that all variables of interest fail to be statistically significant. The lack of individual significance in sectoral growth rates may be interpreted as evidence against the impact of sectoral growth on poverty, but that may be because of an insufficient disaggregation level (Loayza & Raddatz, 2010). Since the area of interest of this study is the secondary sector, the next step in the analysis is the further disaggregation into six sectors, with a particular focus on dividing the secondary sector into four subsectors. Appendix 2 presents the regression results based on that disaggregation. The coefficients for all subsectors of the secondary sector except manufacturing are negative. This indicates that the share-weighted growth of mining is poverty-reducing and that this is also the case for utilities and construction. However, it should be noted that out of the six sectors, only the share-weighted growth of construction and services is statistically significant.

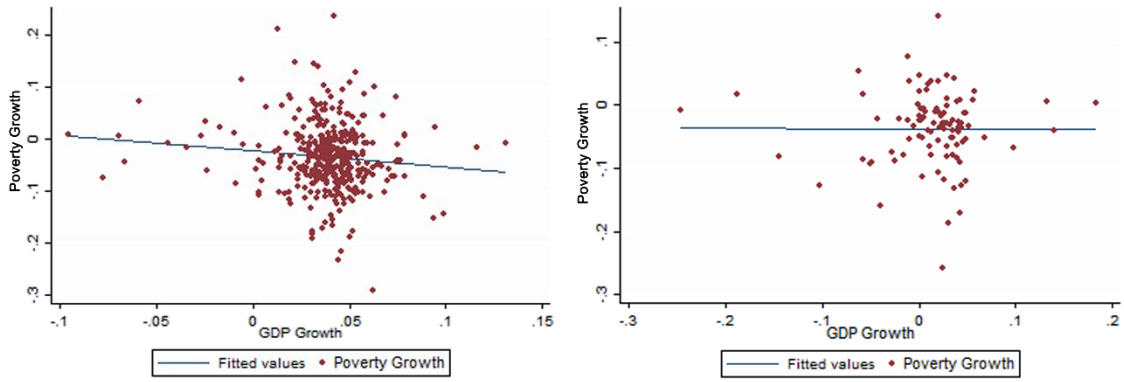
The lack of significance in some of the individual independent variables may be an indication that sectoral GDP per capita growth does very little to the poverty alleviation. However, it is very dangerous and potentially misleading to immediately infer that economic growth has failed to improve the conditions of poverty in Indonesia. The lack of statistical evidence could indicate failure to identify the appropriate independent variable in defining the pattern of the dependent variable, or use of an insufficient sample, or both, but it could also stem from a poor understanding of the economy structure in the various provinces in Indonesia. This is crucial because Indonesia is a large country with diverse characteristics: geographically, socially, and economically. Table 1 shows that in 2018 no province was agriculture driven. However, if we take into account the conditions in 2003–2018 and categorize each province (as agricultural, industrial, or services) by how long the main sector holds its position as the key driver of the economy, only two of the thirty provinces (Lampung and Sulawesi Tengah) can be said to be

[1] All regression models have been subjected to either the Breusch–Pagan Lagrange Multiplier Test or the Hausman Test. All the chosen models were estimated using pooled OLS regression.

agriculture driven. The lack of agriculture-driven provinces is an early indicator of the diminishing role of the primary sector in Indonesia, as commonly happens in developing countries. The preliminary assessment in Figure 1 clearly shows the difference in the relationship between growth and poverty in mining-driven and nonmining-driven provinces. A negative correlation between economic growth and poverty exists in nonmining provinces, whereas it is indeterminate in mining provinces. Thus taking into account the inconclusive findings of several studies of the linkage between natural resources and poverty (Bhattacharyya & Resosudarmo, 2015; Loayza & Rigolini, 2016; Pegg, 2006; Ross, 2001), the next step is to examine the linkage between growth and poverty in mining-driven and nonmining-driven provinces in Indonesia.

Table 1. GDP Share by Sector in Indonesia

Province	Share of Primary Sector (%)		Share of Secondary Sector (%)		Share of Tertiary Sector (%)	
	2003	2018	2003	2018	2003	2018
Nangroe Aceh Darussalam	17.0	27.9	59.8	21.9	23.2	50.2
Sumatera Utara	26.3	24.8	32.5	32.9	41.2	42.3
Sumatera Barat	25.1	22.3	22.7	23.5	52.2	54.2
Riau	13.7	19.9	69.3	61.3	17.0	18.9
Jambi	30.6	26.4	32.1	42.1	37.3	31.5
Sumatera Selatan	19.3	16.9	54.0	53.0	26.7	30.0
Bengkulu	39.7	27.9	10.7	14.5	49.5	57.6
Lampung	42.1	28.8	23.0	34.6	34.9	36.6
Kep. Bangka Belitung	22.1	18.4	46.9	43.9	31.0	37.7
DKI Jakarta	0.1	0.1	28.5	25.6	71.4	74.3
Jawa Barat	14.8	7.2	51.5	54.1	33.7	38.7
Jawa Tengah	21.0	12.9	39.1	47.1	39.9	40.0
DI Yogyakarta	19.2	8.3	24.5	23.7	56.3	68.0
Jawa Timur	18.4	10.5	35.3	44.8	46.3	44.7
Banten	9.3	5.5	58.2	46.0	32.5	48.5
Bali	22.3	13.5	15.7	17.6	62.1	68.9
Nusa Tenggara Barat	26.6	23.5	39.4	29.5	34.0	47.0
Nusa Tenggara Timur	42.6	27.1	10.6	13.8	46.7	59.1
Kalimantan Barat	26.0	23.2	29.9	31.7	44.1	45.2
Kalimantan Tengah	41.7	20.9	17.2	39.8	41.1	39.3
Kalimantan Selatan	24.0	14.0	41.3	46.7	34.7	39.3
Kalimantan Timur	6.7	8.1	79.4	71.9	14.0	20.0
Sulawesi Utara	21.1	19.4	30.5	28.8	48.5	51.8
Sulawesi Tengah	45.2	28.3	16.2	38.8	38.6	32.9
Sulawesi Selatan	35.0	22.6	27.6	30.2	37.5	47.2
Sulawesi Tenggara	37.3	23.3	22.3	40.1	40.4	36.6
Gorontalo	31.5	37.5	19.1	16.4	49.3	46.1
Maluku	34.7	23.3	7.4	15.6	57.9	61.1
Maluku Utara	36.3	21.2	22.7	24.9	41.1	53.9
Papua	17.0	10.3	67.2	57.8	15.9	31.9



A. Nonmining-driven provinces B. Mining-driven provinces

Figure 2. Growth–Poverty Relationship in Mining-Driven and Nonmining-Driven Provinces, 2003–2018

Nonmining-Driven Economy

In the regression results (Appendix 1), a diminishing effect of the primary sector on poverty is confirmed with insignificant coefficients for growth in the primary sector. It can also be seen that growth in both the secondary and tertiary sectors appears to be significantly poverty-reducing. However, the magnitude of the growth impact in the secondary sector on poverty alleviation is notably less than that in the tertiary sector. Disregarding the insignificant effect of the primary sector, these results validate the notion that industry is less poverty-reducing. Hence the empirical analysis was expanded to examine the six-sector disaggregation of the economy.

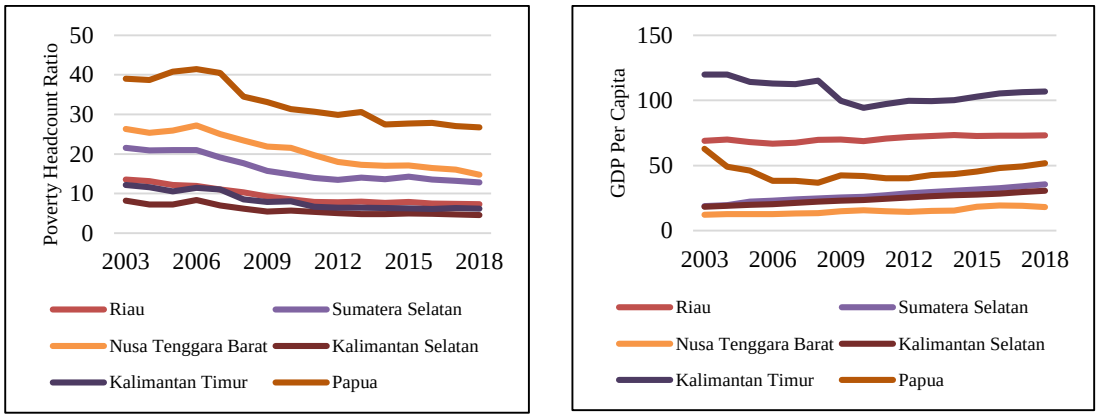
The decomposition of the secondary sector allowed for further examination of the inferior impact of industry on poverty compared to that of services. Appendix 2 shows the results of the regression of economic growth on poverty in the six sectors. That regression shows similar results as the regression with three-sector disaggregation; growth in agriculture is not statistically significant in reducing poverty, and growth in services has the strongest impact on the poor. All subsectors within the secondary sector indicate that they are poverty-reducing. However, only growth in mining and growth in construction appears to be statistically significant. Although this data set consists of only nonmining-driven provinces, all provinces still have some share of mining output to total output even though their share of mining lies outside the threshold set for sample division. This result might be an early sign that growth in manufacturing and utilities eclipses the impact of the secondary sector overall. Nevertheless, the regression results for the six-sector economy bring us to the next step of the empirical analysis, the incorporation of labor-intensity-weighted growth.

Appendix 3 presents the sectoral growth–poverty model with the inclusion of labor-intensity-weighted sectoral growth. All subsectors within the secondary sector show signs of poverty reduction, that is, the coefficients are negative. However, the statistical evidence points towards the notion that mining and construction are the only ones in which labor-intensity-weighted growth matters for poverty alleviation. Indeed, these results are aligned with the empirical model where growth in output per capita of mining and construction is poverty-reducing, while the effect in the service sector is otherwise. Before incorporating the labor-intensive-growth variable, share-weighted growth in the service sector is highly poverty-reducing. However, labor-intensity-weighted service growth appears not to significantly reduce poverty. It is safe to infer that this is mainly driven by the low ability of the service sector to absorb unskilled laborers. That is why when we take a look at the regional pattern of labor intensity in the service sector, only three out of twenty-four provinces have high labor intensity and none of those present within the very high category.

Mining-Driven Economy

The growth–poverty nexus in natural-resource-based regions (or in this case mining-driven provinces) is a source of puzzlement. Moreover, in his study, Rosiadi (2020) raises a question on the phenomenon of lower economic growth in countries with abundant natural resources compared to countries with low natural resources. As can be seen in Figure 1(B), the negative correlation between economic growth and the rate of change in the poverty headcount seems very weak in provinces that are

rich in mined materials. Nevertheless, the same formal test is needed to confirm our initial assessment of GDP growth per capita versus poverty reduction. Appendix 1 and 2 present the regressions of the three-sector and six-sector disaggregation. The sectoral growth in the three-sector disaggregation fails to be statistically significant, while in the six-sector disaggregation, only agriculture significantly reduces poverty. This might be a sign of an insufficient sample, as only six provinces are mining-driven; nevertheless, it appears that the phenomenon of the lack of a linkage between growth and poverty exists in the mining-driven economy in Indonesia. However, Figures 2(A) and 2(B) show that the poverty headcount in mining-driven provinces has declined, and the economy is growing. The inclusion of the unconditional cash transfer in this study and its strong significance in the results of the regressions leads to the argument that poverty in mining-driven provinces decreases not because of economic growth but rather as a result of the antipoverty program by the government.



A. Poverty Headcount Ratio

B. GDP Per Capita (Million Rupiah)

Figure 3. Poverty Headcount Ratio and GDP Per Capita (Million Rupiah) in Mining-Driven Provinces, 2003–2018

3.2 Discussion

One of the main empirical results of this study indicates that the sectoral growth in the economy has done very little to alleviate poverty in Indonesia. However, this does not mean that improving the performance of the economic sectors is a futile attempt at reducing poverty. The lack of empirical evidence of poverty reduction as a result of sectoral growth could be due to generalizing the economic conditions in Indonesia as a whole. Such a general assessment runs the risk of oversimplification, which could, in turn, result in ill-founded policy implications. This is a fact that has been acknowledged by Bhattacharrya and Resosudarmo (2015) who disaggregated growth into mining and nonmining growth and found asymmetrical results after finding that overall GDP growth per capita appears not to affect poverty reduction. In addition, Berardi and Marzo (2015) stated that the impact of economic growth on poverty reduction depends on the extent to which growth is inclusive and benefits the poor, which has been shown to vary depending on the structure of the economy.

Economic Growth–Poverty Linkage in Nonmining-Driven Provinces

Without controlling the distributional effect of growth in the form of labor intensity, it should be noted that in order to be pro-poor, a sector needs to have not only a substantial growth rate but also a notable size in the economy. In nonmining-driven provinces, the main drivers of poverty reduction, in descending order, are construction, services, and mining. Construction is a sector that relies more on manpower, in that no matter how high the level of technology is used in construction, there is still a need for a significant amount of labor. Moreover, construction, especially infrastructure development, has a substantial forward linkage because construction plays a major role in creating and attracting the buyer to the distribution systems (Fathi, 2014). In 2018, the ratio of the state budget for infrastructure to the value-added in construction project was 26.27%. Thus, the redistribution effect from construction and its remarkable growth sector can make that sector pro-poor.

Several provinces in the nonmining category consist of (or include) a metropolitan area, especially DKI Jakarta, Indonesia's capital. The consumption preference in those regions, and generally in Java, has moved from food to nonfood (especially tertiary) goods, which has encouraged growth in services. In addition, several provinces are driven by tourism, such as Bali and DI Yogyakarta. In these provinces,

services play a massive role in the economy (the shares of services in DKI Jakarta, DI Yogyakarta, and Bali in 2018 were 74.3%, 68%, and 68.9%, respectively), because tourism pushes growth in other sectors, such as trade, transportation, and communication. This large share of the service sector is arguably the main factor behind the finding that the service sector is seemingly pro-poor.

One inevitable question also emerges from this finding: Why is mining in nonmining-driven provinces poverty-reducing? First, mining in nonmining-driven provinces is on a relatively much lower scale compared to the resource-rich provinces such as Papua and Kalimantan Timur. Low-scale mining is typically not capital intensive and does not require heavy machinery and high technology, and it is also more likely to be local/national owned. Second, in nonmining-driven provinces, a significant portion of the mining sector comes from quarrying, which typically requires a sizeable amount of manpower. Therefore, in nonmining-driven regions, several provinces have high or even very high labor intensity. In addition, the ability of mining in nonmining-driven provinces to absorb unskilled labor is also compensated for by its share-weighted growth.

After controlling for labor intensity, construction and mining can retain their classification as pro-poor. This supports the notion that these two sectors are labor-intensive, that is, aside from having sizeable growth, construction and mining also absorb a fair amount of unskilled labor. However, the opposite occurs in services. The service sector is comprised of wholesale and retail trade, transportation and storage, accommodation and food service activities, information and communication, financial and insurance activities, real estate, business activities, public administration, education, health and social work activities, and other services. Many subsectors of the service sector, such as information and communication, financial and insurance activities, and education, are highly skill-intensive (and in turn, high productivity level), which limits the chances of unskilled labor to enter that sector. This is aligned with the study by Aggarwal (2018), who found that sectors with high productivity levels showed difficulties in creating a large number of employment opportunities.

Agriculture in nonmining-driven provinces does not indicate being poverty-reducing. This veers sharply from many previous studies that support agriculture as being fundamental to poverty reduction. Three significant contributors to the value-added from agriculture in nonmining-driven provinces are plantation crops, food crops, and fisheries. Food crops are mainly cultivated in Java Island because of the suitability of its soil in producing fruits, vegetables, and cereal crops. However, Java is also the densest island in Indonesia and the home of several manufacturing-based provinces. In recent decades, there has been a rapid land conversion from agriculture to factories because of the effort to move toward a more productive sector. As a result, the production of food crops has deteriorated sharply and brought down the share and the growth of agriculture. On the other hand, plantation crops such as palm trees, rubber trees, cocoa, and coffee have a large export value. It means that the production (and hence the income of its employees) depends on the price in not only the national market but also in the international market and the exchange rate. The development of plantation crops also faces challenges in the form of environmental issues such as deforestation laws and regulations.

Manufacturing in nonmining-driven provinces also does very little in the way of poverty alleviation. Ministerial regulation No. 51/M-IND/PER/10/2013 states that the manufacturing of food products and beverages, textile and apparel, leather and footwear, and furniture are the only four out of sixteen manufacturing categories that are labor intensive. Taking a closer look at the share of those labor-intensive manufacturing categories, in 2010–2018, the value-added from labor-intensive manufacturing was only 33%-40% of the total value added from manufacturing in Indonesia. As twenty-four of the thirty provinces in Indonesia are nonmining, it is safe to say that that figure also represents the condition of nonmining-driven provinces as a whole. In other words, manufacturing in nonmining-driven provinces still tends to be capital intensive.

There is one possible explanation of why the utility sector appears not to be poverty-reducing. Utilities comprise electricity and gas, water supply, sewerage, waste management, and remediation activities. Those categories are mainly operated and owned by state-owned enterprises. While state-owned enterprises are typically not profit-oriented, so that one might expect that they would make a significant contribution to the poor, state-owned enterprises are also heavily regulated. This is compounded by the fact that the development of utility enterprises faces many challenges, such as environmental regulations, capital limitations, and land conversion. In other words, even though one might argue that the development of utilities should be pro-poor, it is difficult to make utilities a pro-growth sector.

Economic Growth–Poverty Linkage in Mining-Driven Provinces

The economies of resource-rich regions such as Papua and Kalimantan Timur have been known to depend heavily on extraction activities. In 2018, 44.5% of the Kalimantan Timur's GDP came from mining. A similar situation is observed in Papua, although the share of mining is gradually declining, which used to be 59% in 2003. Massive-scale mining is a source of immense wealth; however, its capital-intensive nature makes it difficult for it to be a pro-poor sector. In addition, the export-oriented nature of mineral goods makes it vulnerable to the state of the global market and the exchange rate, which is why the mining sector in mining-driven provinces fails to alleviate poverty. Ross (2001) stated that many countries in the developing world possess tremendous oil and mineral wealth yet continue to suffer from crushing poverty. Berardi and Marzo (2015), who studied sectoral growth in resource-rich African countries, stated that poverty reduction is difficult to attain if a country with very low initial conditions in terms of per capita income, limited institutional capacities, and social development focuses on export commodities unless strong and effective redistribution policies are implemented.

The economies of mining-driven provinces usually have a substantial agricultural output, which comes from food crops and plantation crops. The large share of agriculture and its ability to absorb unskilled labor makes agriculture in mining-driven provinces poverty-reducing. Moreover, manufacturing in mining-driven provinces does not contribute to poverty reduction. possibly because even though manufacturing has a substantial share in mining regions in Indonesia, most of the manufacturing, such as oil, gas, chemicals, and paper products, are capital intensive. Utilities also fail to significantly reduce poverty because most power plants and other utilities enterprises are located in Java. Hence, the contribution of this sector in mining-driven provinces, which are mainly located on the islands of Sumatera, Kalimantan, and Papua, is minor.

In contrast to nonmining-driven provinces, the construction sector in mining-driven provinces appears not to be poverty-reducing. As mentioned earlier, infrastructure is a major contributor to value-added in a construction project. This could explain why construction in mining-driven provinces cannot alleviate poverty because infrastructure development occurs mainly on Java Island, although when President Joko Widodo (2014–present) is in office, there has been an exceptional effort to develop infrastructure outside Java. Another possible explanation for this construction–poverty linkage is that construction in mining-driven provinces is undertaken largely to support exploration/extraction activities and is operated by mining companies/subsidiaries, hence the impact of construction on poverty reduction becomes parallel with the mining sector. In mining-driven provinces, services also do not exhibit the characteristic of being pro-poor. This could be because the economy's dependence on the resource sector may not have sufficient forward linkages (Bhattacharyya & Resosudarmo, 2015) and thus cannot boost services to grow accordingly. In addition, resource-rich regions, especially Papua, have a high level of poverty, which reflects the consumption preferences of its people. Poor people tend to have far larger food consumption compared to nonfood consumption. This preference for food causes the service sector to face difficulties in terms of development.

The Role of the Unconditional Cash Transfer

One thing that is constant throughout the empirical results is the significance of the role of unconditional cash transfer in poverty reduction. A closer look at the coefficients of the dummy variables for the unconditional cash transfer, however, shows that the coefficient for 2005 is consistently positive. This leads to confusion as to why, unlike in 2008–2009, the unconditional cash transfer in 2005 did not have a favorable outcome on poverty alleviation. One possible answer is that it was due to the shock of the sudden sharp increase in fuel prices, which could not be offset by a nationwide antipoverty program at that time. Though one may argue that the use of dummy variables might not completely reveal solid evidence of cash transfer effect on poverty reduction, it is safe to say that a massive nationwide antipoverty policy is an important factor in poverty reduction in Indonesia.

This evidence of the role of the cash transfer inevitably leads to apprehension regarding the possibility of poverty reduction in Indonesia. Although the magnitude of the cash transfer impact is lower than growth in several sectors, it is nevertheless highly significant. However, the cash transfer is not likely to change the incidence of poverty or behaviors associated with poverty, and the transfer amounts are usually not large enough for households to invest in productive opportunities (World Bank, 2012). To ensure a sustainable income in the future, the poor have to be able to increase their productivity. Thus the unconditional cash transfer is not a sustainable factor in alleviating poverty.

Conclusions

The role of economic growth in poverty alleviation, which has long been well established, cannot be used to draw the same conclusion on the role of sectoral growth. It was previously found that the impact of the secondary sector, while arguably a high-productivity sector, on poverty reduction is inferior to other sectors. However, in this study, it appears that sectoral growth has little effect on improving the condition of the poor in Indonesia. Nevertheless, this conclusion could be inappropriate. Perhaps a better conclusion regarding the sectoral growth–poverty linkage can be found if the characteristics of mining-driven and nonmining-driven provinces in Indonesia that are taken into account.

In nonmining-driven provinces, the secondary sector pales in comparison to services in alleviating poverty. The six-sector disaggregation of the economy (with or without controlling for the distributional effect through labor intensity) reveals that not all the subsectors within the secondary sector are significantly poverty-reducing. This supports the notion that aggregating the secondary sector into one massive category might obscure its real effect on the poor. The subsectors that significantly reduce poverty in nonmining-driven provinces are mining and construction. Construction exhibits labor-intensive characteristics. Infrastructure development, one of the main government programs since 2014 and, with a sizeable forward linkage, plays a major role in adding values from construction. Similarly, mining can be categorized as labor-intensive because of its low level in nonmining-driven provinces. In addition, the substantial contribution of quarrying in the mining sector, which requires large amounts of manpower, helps explain why mining in nonmining-driven provinces is labor-intensive.

Mining-driven provinces, however, do not display a sectoral growth–poverty linkage. Resource-based regions tend to rely on capital-intensive extraction activities, which do not appear to be strong in terms of income redistribution. In addition, mineral goods, mainly export commodities, are very sensitive to global demand, price, and exchange rate fluctuation. Agriculture is the only sector that appears to be poverty-reducing. This is because resource-rich regions also have a sizeable amount of agricultural output in their economy.

The importance of labor absorption indicated by the results of this study suggests that adopting policies that lean toward discouraging businesses from employing labor is inadvisable. In particular, the government needs to formulate policies that will effectively remove the bias against labor. In line with policies that induce labor employment, skill-development policies that ensure a correct response of the labor market to the demand from each sector are required for creating opportunities for labor to enter a more productive sector and realize higher income.

This study has two obvious limitations. First, regional proliferation limits the ability of this study to incorporate other channels of distributional effects such as the Gini ratio, the use of other poverty measurements, and the use of other socio-economic factors that may affect poverty since they involve recalculation processes from either socio-economic household surveys or national labor force surveys. Second, the use of the level of unskilled labor could be an argument against the actual effect of labor intensity. In future research, it may be instructive to use the share of wages of unskilled labor as a proxy.

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Appendix

Appendix 1. Regression Summary of Three-Sector Disaggregation

	Poverty Rate of Change		
	Indonesia	**Nonmining-Driven Provinces**	**Mining-Driven Provinces**
Growth of Primary Sector (Per Capita, Share Weighted)	0.100 (0.191)	0.0342 (0.227)	-0.519 (0.439)
Growth of Secondary Sector (Per Capita, Share Weighted)	-0.0638 (0.0849)	-0.289** (0.139)	0.0677 (0.110)
Growth of Tertiary Sector (Per Capita, Share Weighted)	-0.205 (0.146)	-0.435** (0.185)	0.178 (0.367)

	Poverty Rate of Change		
	Indonesia	**Nonmining-Driven Provinces**	**Mining-Driven Provinces**
2005 Unconditional Cash Transfer (Dummy Variable)	0.0368**** (0.0106)	0.0393*** (0.0121)	0.0136 (0.0222)
2008 Unconditional Cash Transfer (Dummy Variable)	-0.0842**** (0.0106)	-0.0813**** (0.0120)	-0.0952**** (0.0223)
2009 Unconditional Cash Transfer (Dummy Variable)	-0.0613**** (0.0106)	-0.0617**** (0.0120)	-0.0650*** (0.0222)
Constant	-0.0246**** (0.00441)	-0.0154** (0.00656)	-0.0299**** (0.00702)
Observations	480	384	96
R-squared	0.195	0.202	0.245
F-Stat	19.10	15.89	4.826
p-value	0.0000	0.0000	0.000262

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01, **** p<0.001

Appendix 2. Regression Summary of Six-Sector Disaggregation

	Poverty Rate of Change		
	Indonesia	**Nonmining-Driven Provinces**	**Mining-Driven Provinces**
Growth of Agriculture (Per Capita, Share Weighted)	0.0257 (0.197)	-0.101 (0.239)	-1.080* (0.623)
Growth of Mining (Per Capita, Share Weighted)	-0.0660 (0.0958)	-0.356** (0.157)	0.0939 (0.123)
Growth of Manufacturing (Per Capita, Share Weighted)	0.0560 (0.184)	-0.000940 (0.232)	-0.358 (0.369)
Growth of Utilities (Per Capita, Share Weighted)	-1.214 (2.908)	-2.188 (2.988)	29.22 (23.91)
Growth of Construction (Per Capita, Share Weighted)	-0.494* (0.253)	-0.555* (0.289)	1.279 (0.994)
Growth of Services (Per Capita, Share Weighted)	-0.262* (0.151)	-0.484** (0.188)	0.257 (0.536)
2005 Unconditional Cash Transfer (Dummy Variable)	0.0355**** (0.0107)	0.0392*** (0.0121)	0.0130 (0.0228)
2008 Unconditional Cash Transfer (Dummy Variable)	-0.0846**** (0.0106)	-0.0817**** (0.0120)	-0.0951**** (0.0223)
2009 Unconditional Cash Transfer (Dummy Variable)	-0.0619**** (0.0106)	-0.0622**** (0.0120)	-0.0679*** (0.0225)
Constant	-0.0206**** (0.00496)	-0.0124* (0.00696)	-0.0367*** (0.0108)
Observations	480	384	96
R-squared	0.203	0.213	0.268
F-Stat	13.27	11.24	3.500
p-value	0.0000	0.0000	0.000993

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01, **** p<0.001

Appendix 3. Regression Summary of Six-Sector Disaggregation for Nonmining-Driven Provinces with Labor-Intensity-Weighted Growth

	Poverty Rate of Change
Growth of Agriculture (Per Capita, Share Weighted)	-0.389 (0.447)
Growth of Mining (Per Capita, Share Weighted)	-1.481** (0.577)
Growth of Manufacturing (Per Capita, Share Weighted)	-0.0987 (0.460)
Growth of Utilities (Per Capita, Share Weighted)	-10.75 (6.552)
Growth of Construction (Per Capita, Share Weighted)	-1.651** (0.700)
Growth of Services (Per Capita, Share Weighted)	-0.134 (0.239)
Growth of Agriculture (Per Capita, Weighted by Labor Intensity)	0.308 (0.424)

	Poverty Rate of Change
Growth of Mining (Per Capita, Weighted by Labor Intensity)	-1.360** (0.650)
Growth of Manufacturing (Per Capita, Weighted by Labor Intensity)	-0.283 (0.796)
Growth of Utilities (Per Capita, Weighted by Labor Intensity)	-9.285 (8.016)
Growth of Construction (Per Capita, Weighted by Labor Intensity)	-2.156* (1.281)
Growth of Services (Per Capita, Weighted by Labor Intensity)	0.622 (0.423)
2005 Unconditional Cash Transfer (Dummy Variable)	0.0387*** (0.0122)
2008 Unconditional Cash Transfer (Dummy Variable)	-0.0809**** (0.0119)
2009 Unconditional Cash Transfer (Dummy Variable)	-0.0608**** (0.0119)
Constant	-0.0142** (0.00703)
Observations	384
R-squared	0.237
F-Stat	7.601
p-value	0.0000

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01, **** p<0.001

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Research Paper

Infrastructure and Income Inequality in Indonesia: 2009-2017

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ABSTRACT

In the economic development field, physical and social infrastructure have been argued to affect income inequality despite the mixed results. This study examines the impact of physical and social infrastructure (education and health) on income inequality in Indonesia using 34 provincial unbalanced panel data during 2009-2017. Infrastructure summary indices are constructed, and the impacts of infrastructure on income inequality are estimated by the Generalized Method of Moments (GMM). The findings conclude that physical and social (education) infrastructure contributes to income inequality increases in Indonesia though not robustly significant. Regarding health infrastructure, this study cannot definitely infer its nexus with income inequality since only the model of one-step different-GMM is significant. The result implies that the government needs to consider providing better distribution of infrastructure among income groups to improve income distribution.

Keywords: physical infrastructure, social infrastructure, income inequality, GMM

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1. Introduction

As a growing country, Indonesia experiences sustained economic growth during the past few years. Nevertheless, the benefits of economic growth have not yet been equally distributed across income groups. The level of income inequality measured by the Gini ratio in Indonesia was reported to nearly remain the same during 1975-2004, but increased to 41 points in 2014, and was the highest compared to its East Asian neighbors (e.g., Japan and China) (Hill et al., 2008; World Bank, 2016). A lack of access to infrastructure—leading to unequal education, health, and job opportunities—is claimed to be a major cause of large income gaps in Indonesia (Doumbia & Kinda, 2019; World Bank, 2016). The World Bank (2016) argues that reducing income inequality is important since it can hinder economic growth, foster poverty rates, and trigger social conflicts. Having the concern to reduce income inequality in Indonesia, the government has been increasing infrastructure development to improve opportunities distribution (e.g., education, health, and jobs). As a result, the government has been increasing its budget to improve physical and social infrastructure access for years, especially in lagging regions.

Theoretically and empirically, infrastructure is believed to be able to narrow income gaps (Calderón & Servén, 2004; Chong & Calderón, 2004; Kannan et al., 2018). Nevertheless, some empirical studies find that infrastructure may increase income inequality due to unequal distribution of returns (Bajar & Rajeev, 2016; Majumder, 2012). In accordance with these empirical results, Makmuri (2017) also finds that physical infrastructure like transportation, telecommunications, and electricity contribute to income inequality increases in Indonesia. The different impacts of infrastructure on income inequality in each country can be explained by the influence of the initial level of income inequality, stage of development, and level of infrastructure development (Tian & Li, 2019). Considering the previous mixed results and the Indonesian efforts to reduce income inequality by improving infrastructure development, the research question is whether infrastructure development can reduce income inequality in Indonesia.

Accordingly, this study aims to investigate the impact of physical and social infrastructure development on income inequality in Indonesia since the issue has not been commonly examined in Indonesia. This study contributes to the literature in Indonesia by investigating the impact of both social infrastructure (education and health) and physical infrastructure on income inequality. The relationship between social infrastructure and income inequality has not been generally explored in Indonesia since some studies only focus on physical infrastructure (Kannan et al., 2018; Makmuri, 2017). This study extends the Calderón & Servén (2004) model that focuses on physical infrastructure (e.g., transportation, telecommunications, electricity) on income inequality by adding social infrastructure (i.e., education and health). Social infrastructure is argued to be associated with human capital accumulation, which affects economic growth and improves income distribution (De & Halder, 2016; More & Aye, 2017). This study follows Calderón & Servén (2004) by creating a summary index of infrastructure quantity and estimating its impact using the Generalized Method of Moments (GMM). The analysis in this study is based on 34 provincial panel data in Indonesia between 2009 and 2017. In accordance with Makmuri (2017), the estimation results show that physical infrastructure development in Indonesia tends to increase income inequality. Similarly, the development of social infrastructure in Indonesia also leads to higher income inequality.

Physical infrastructure that refers to several kinds of infrastructure such as transportation, telecommunications, and electricity, directly affects economic growth (Torrisi, 2009). Generally, physical infrastructure is found to be able to indirectly affect income gaps through physical capital accumulation and economic growth (Calderón et al., 2014; Calderón & Servén, 2004; Jones & Llewellyn, 2019; Kannan et al., 2018). For instance, roads have been argued to be necessary for narrowing income inequality by enlarging markets, increasing productivity, promoting working opportunities, improving access to education and health services, and improving living (Charlery et al., 2016; Hooper et al., 2018; World Bank, 2016). Similarly, telecommunications and electricity have also been observed to improve income distribution through economic growth like information and technology sharing, production, and labor markets (Cook, 2011; Röller & Waverman, 2001). Numerous previous studies find contradicting results regarding the infrastructure-income inequality relationship. Calderón and Servén (2004) conclude that physical infrastructure in the long-term accelerates economic growth and has a significant inverse relationship with income inequality. Meanwhile, physical infrastructure is found to have a positive impact on income inequality increases in India (Bajar & Rajeev, 2016; Majumder, 2012) and Indonesia (Makmuri, 2017). It is argued that the positive physical infrastructure-income inequality is possibly due to unequal returns of physical infrastructure between the rich and the poor (Bajar & Rajeev, 2016; Makmuri, 2017). Compared to the poor, the rich might profit much more from physical infrastructure (Cook, 2011; United

Nations, 2016). Moreover, physical infrastructure development is argued to increase income gaps since it fosters "technological changes, globalization, and market-oriented reform" which may favor high-skilled laborers (Zhuang et al., 2014).

In addition to physical infrastructure, access to social infrastructure is also argued to be able to narrow income inequality distribution, indirectly through promoting better opportunities to have better education, health status, and participation in high-skilled labor markets (Hooper et al., 2018; United Nations, 2016). Social infrastructure (e.g., education and health) is reported to indirectly affects economic growth through promoting opportunities in improving human capital (Torrisi, 2009). Promoting opportunities for the poor to graduate from higher education is required for higher growth and lower-income inequality since it creates high-skilled laborers (De & Halder, 2016; Hasanov & Izraeli, 2011). Income inequality increases in Mexico are attributed to the different returns to education since the return to higher education is higher than primary education (Bouillon et al., 2003). Besides education, health infrastructure (e.g., hospitals, doctors) also matters in improving endowments, promoting opportunities in gaining higher income, and eventually reducing income inequality (Majumder, 2012; More & Aye, 2017). Majumder (2012) highlights the significant impact of providing better health services on improving income distribution and education services in India. In addition to health services (e.g., hospitals and doctors), some researchers consider water and sanitation to affect health and indirectly improve income distribution (Biller et al., 2014; Calderón & Servén, 2004; Straub & Fay, 2017). They argue that water and sanitation are associated with health externalities and indirectly impact welfare and quality of life. Improving sanitation and water efficiency is suggested to improve health conditions and reduce health expenditures; hence, disposable income and income distribution could improve (Mendoza, 2017).

This paper is divided into five sections. This section gives a brief overview of the background, the objective of the study, and the literature review. The second section explains the development of physical infrastructure and social infrastructure development in each province in Indonesia. The third section explains the empirical analysis, which contains the data and empirical strategies. In the fourth section, the empirical results of this study and discussions are presented. Lastly, conclusions are drawn in section five.

2. Provincial Physical Infrastructure and Social Infrastructure Development in Indonesia

In addition to estimating the impact of infrastructure on income inequality, it is important to picture the level of infrastructure development of each province in Indonesia. Therefore, it can generally show the gap in infrastructure development between provinces in Indonesia. The average value of physical infrastructure development level from 2009 to 2017 in each province can be seen in Figure 1, while the average value of social infrastructure development is shown in Figure 2. The average value of physical and social development is represented by the infrastructure summary indices constructed using methods as informed in the methodology section.

Figure 1 informs that generally, there is quite a significant gap in the physical infrastructure development level between provinces in Indonesia. In particular, DKI Jakarta province, where the capital city of Indonesia is located, has the highest index of physical infrastructure development (about 7.0) compared to other provinces. Moreover, the level of physical infrastructure development in some provinces in Java which are considered as developed regions is also generally above the other provinces in other islands. Conversely, the level of physical infrastructure development in less developed regions located in Eastern Indonesia (e.g., Maluku, Papua) is in general below zero and the smallest (-1.7) compared to other provinces. It probably reflects that the development of physical infrastructure in Indonesia has not been equally distributed. Moreover, it also shows that provinces with higher economic development and more policy support, mainly concentrated in Western Indonesia, tend to have a higher level of physical infrastructure development. Accordingly, it may explain that the different level of physical infrastructure in Indonesia is affected by economic development and policy support. In addition, it depicts the possible reverse causality between physical infrastructure development and economic development.

Figure 2 shows the distribution of the average value of the social infrastructure development index between 2009 and 2017 in Indonesia. Different from physical infrastructure, the gap level of social infrastructure development between provinces in Indonesia is not as large as the distribution of physical infrastructure. For example, other provinces such as Bali, Jawa Barat, Jawa Tengah, Jawa Timur, and D.I. Yogyakarta also have a quite similar level of social infrastructure to DKI Jakarta. In general, provinces in Java and Bali have a considerable high level of social infrastructure development (about 1 to 2.6 points).

Meanwhile, the average value of social infrastructure development in other regions (i.e., Sumatera, Sulawesi, Maluku, Papua) is generally lower than zero (about -0.5 to -1.5). Considering the social infrastructure development level, it seems that the government focused more on improving human capital development directly. Nevertheless, some provinces have a low average value of social infrastructure development, such as Bengkulu, Papua, Nusa Tenggara Barat, and Nusa Tenggara Timur. Previously, an infrastructure census conducted by World Bank in 2011 reports that some subdistricts in Papua have no health services (e.g., *Puskesmas*, public health center). Moreover, Mahendradhata et al., (2017) and World Health Organization (2017) find that safe water, sanitation, and health services such as *Puskesmas* are barely found in remote areas or remote islands in Indonesia.

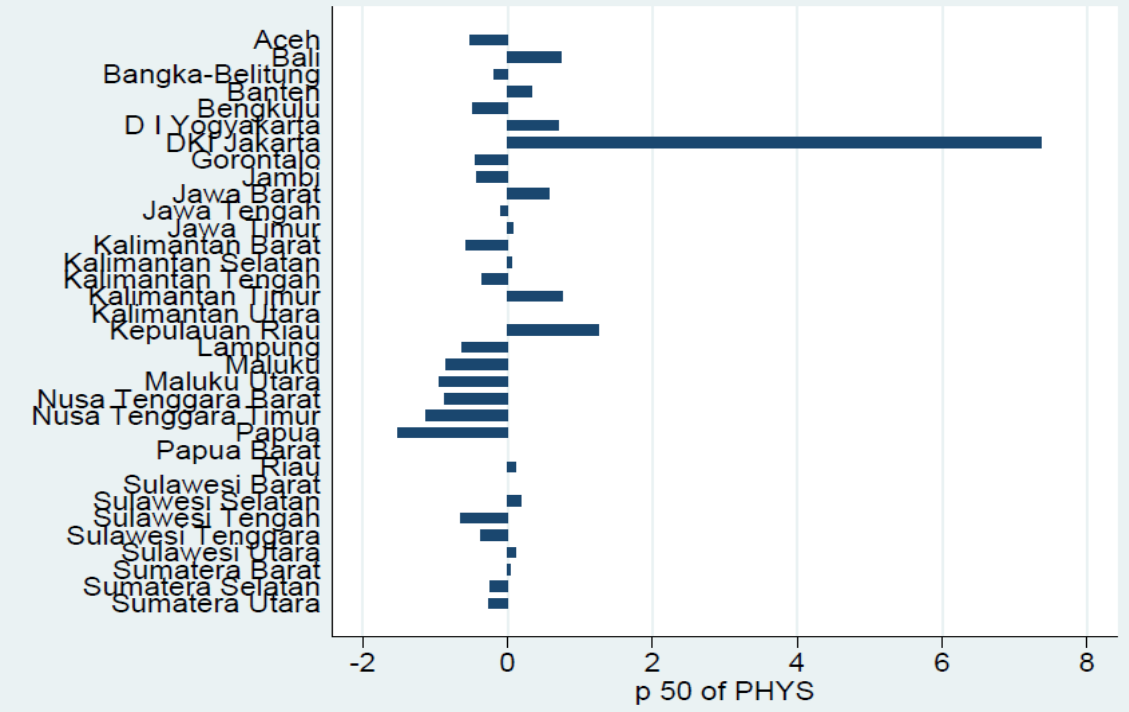

Figure 1. Average Value of Physical Infrastructure Index, 2009-2017 (Author's calculation, 2020)

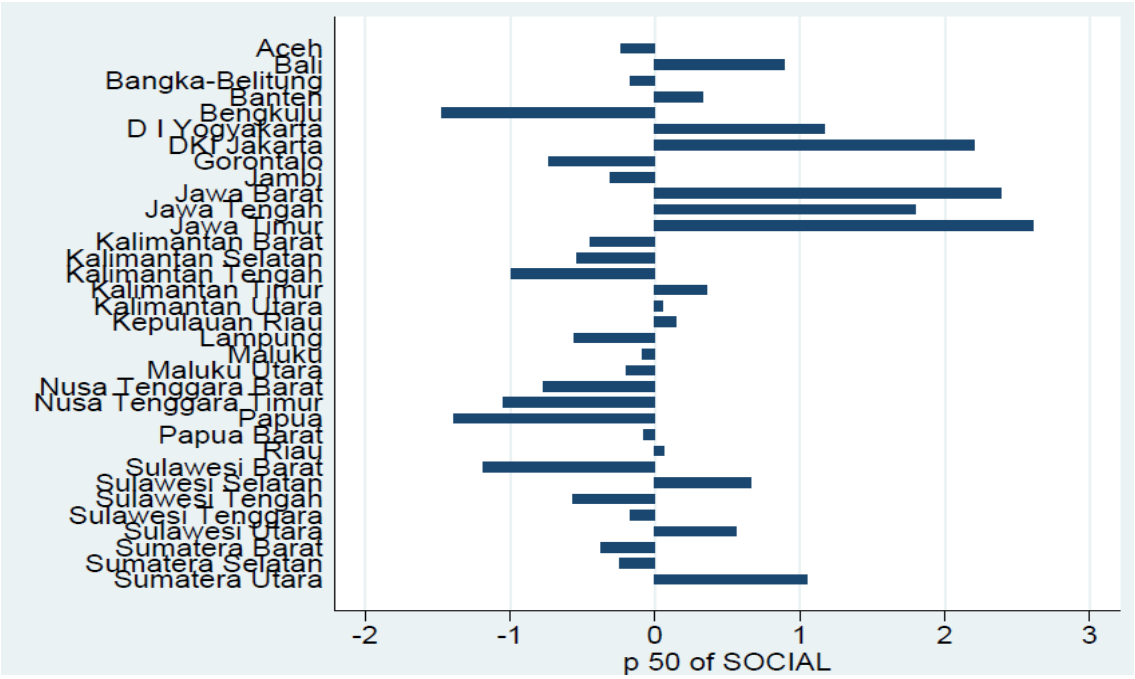

Figure 2. Average Value of Social Infrastructure Index, 2009-2017 (Author's calculation, 2020)

3. Methodology

3.1 Data

This study uses 34 provincial panel data in Indonesia from 2009 to 2017. Due to some missing data before 2009 (combined Gini ratio, electricity, telecommunications, education, health, safe water, sanitation, and some control variables), this study decides to use data from 2009 onward to minimize the missing data. Moreover, there are also missing data for the years after 2017, such as doctor ratio and hospital ratio taken from Indonesia Health Profile published by the Ministry of Health Republic of Indonesia. A similar case also applies to data of income inequality and some control variables, for instance, financial development and the modern sector. Accordingly, in order to minimize missing data, the author decides to use a certain period. The descriptive statistics of each variable are informed in Table 1.

Table 1: Descriptive Statistics

Variables	Obs.	Mean	SD	Min	Max
Gini ratio	300	0.366	0.040	0.27	0.46
Physical Infrastructure	279	-2.84e-10	1.500	-1.811	7.850
Education Infrastructure	301	-3.86e-09	1.397	-1.134	5.186
Health Infrastructure	300	-1.58e-09	1.472	-3.067	4.580
Income per capita (ln)	301	10.267	0.573	9.108	11.968
Income per capita sq (ln)	301	105.744	12.110	82.953	143.241
Financial development	297	0.277	0.352	0.020	2.330
Trade openness	297	35.515	34.450	0.150	194.770
Modern sector	297	0.126	0.097	0.000	0.450
Government spending	301	0.355	0.023	0.010	0.120

Sources: Author's calculation

3.1.1 Income Inequality

In order to employ a regression analysis, this study uses the data of income inequality as the dependent variable. The income inequality is represented by the combined Gini ratio (urban and rural), which is obtained from the Statistics Indonesia (BPS) and calculated based on the National Socioeconomic Survey (SUSENAS) every year.

3.1.2 Infrastructure Variables

Infrastructure variables as the main independent variables are measured by infrastructure summary indices consisting of physical and social infrastructure. Physical infrastructure contains transportation, telecommunication, and electricity which were mainly used by previous similar studies such as Calderón & Servén (2004), Majumder (2012), Li et al., (2015), Bajar & Rajeev (2016), and Makmuri (2017). Meanwhile, social infrastructure variables used data of education, health services, safe water, and sanitation which were utilized by previous studies such as Majumder (2012), Li et al., (2015), and More & Aye (2017). The data of infrastructure variables were mainly obtained from Statistics Indonesia (BPS). This study focuses only on the quantity of infrastructure for two reasons: first, the availability of provincial infrastructure quality data in Indonesia is void; second, infrastructure stocks in developing countries are argued to be more influential on income inequality than infrastructure quality (Chong & Calderón, 2004).

First, transportation data were taken from Statistics Indonesia (BPS) and published in Statistical Yearbook of Indonesia. Transportation quantity is represented by the ratio of road length and the land area (km/km^2). The road is generally believed to help enlarge the market, increase production, improve access to social infrastructure, which are essential for improving income distribution. In addition to the road, this study adds the number of buses per 10,000 people to represent the access provided by the

government for public transportation. Considering the characteristics of Indonesia as an archipelago country, sea and air transportation or railways are also as necessary as road and bus. However, due to limited data of provincial railways, seaports, or airports quantity data, the author decideed to use road and bus as indicators. The author realized that focusing on land transportation limits this study.

Second, telecommunications in this study are indicated by mobile phone (percentage of households with at least one mobile phone), internet (percentage of households who access the internet at least once at the last three months), and computer (percentage of households with a computer). The data were taken from Telecommunications Statistics of Indonesia published by Statistics Indonesia (BPS). Unlike previous studies that used data of conventional telecommunications such as fixed telephone, this study applies modern telecommunications associated with economic activities in this digital era. As widely argued, telecommunications are necessary to indirectly improve income distribution by generating economic growth due to their role in information sharing.

Third, this study indicates electricity using electricity distributed per capita (MWh/capita). The data on electricity were obtained from Statistical Yearbook of Indonesia, which was published annually by Statistics Indonesia (BPS). Electricity is necessary for the production process and information or technology sharing because it can generate economic growth and indirectly affects income distribution. Furthermore, electricity also gives more time to study and access modern telecommunication such as mobile phones, computers, and the internet that helps productivity and information sharing to promote opportunities in jobs and earning a higher income.

Fourth, education variables are constructed from primary education and higher education. Primary education is measured by the number of primary schools per 1,000 people and the number of junior high schools per 1,000 people. Higher education is indicated by the number of high schools per 1,000 people, vocational high schools per 1,000 people, and colleges per 1,000 people. The data were taken from Statistical Yearbook of Indonesia annually published by Statistics Indonesia (BPS). Yang & Qiu (2016) argued that primary education shows an important role in income inequality and intergeneration income mobility. Furthermore, higher education also plays an important role in income distribution since it creates high-skilled labor, as suggested by Hasanov & Israeli (2016) and De & Halder (2016).

Fifth, health variables are indicated by doctor ratio (number of doctors per capita times 1,000) and hospital ratio (number of doctors per capita times 1,000). The data were obtained from Indonesia Health Profile annually published by the Ministry of Health Republic of Indonesia. Health services such as doctors and hospitals improve endowments and promote opportunities to earn a higher income.

Six, the water variable is measured by the percentage of households with improved drinking water. The data were obtained from Statistical Yearbook of Indonesia annually published by Statistics Indonesia (BPS). Safe water is important to improve health and quality of life. Straub and Fay (2017) argue that water is associated with health externalities and indirectly affects welfare and quality of life. Hence, people with good health conditions are more likely to have more working hours and better opportunities to gain higher income.

Seven, sanitation variable is proxied by percentage of households with improved access to sanitation. The data was taken from Statistical Yearbook of Indonesia annually published by Statistics Indonesia (BPS). Similar to water, sanitation also plays a role in income distribution by improving health and quality of life. Straub and Fay (2017) also state that sanitation has an association with health externalities and may improve quality of life. Furthermore, good health conditions are achieved because good access to improved sanitation may reduce household health expenditure and indirectly generate better disposable income.

3.1.3 Control Variables

According to previous similar studies, Calderón and Servén (2004), Li et al., (2017), and Makmuri (2017), five control variables were included in the regression analysis. First, the income variable and its square, proxied by per capita Gross Regional Domestic Product (GRDP) in logarithm and its squared, to estimate a non-linear relationship between growth and inequality, depicted by Kuznet curve. The data were obtained from Statistical Yearbook of Indonesia published by Statistics Indonesia (BPS). If the non-linear relationship holds true, the coefficient of per capita income (log) should be positive, and the coefficient for its square should be negative, as previously shown by Calderón and Servén (2004). In other words, it implies that the level of income inequality increases in the beginning process of development and starts declining after reaching its peak level.

Second, financial development is argued to indirectly impact income inequality through economic growth (Zhang & Ben Naceur, 2019). Zhang and Ben Naceur (2019) argue that providing access to credits for the poor is believed to minimize financial constraints and induce them to invest in income-generating activities and human capital. Conversely, in Bangladesh, financial development can be harmful to the poor due to the increased debt level (Banerjee & Jackson, 2017). Considering these arguments, the sign of the influence of financial development on income inequality could be positive or negative. The proxy of this variable is the share of total private credits to GRDP and obtained from Financial Services Authority of Indonesia.

Third, trade openness indirectly influences income inequality through economic development and employment (Kai & Hamori, 2009). Some studies find the contribution of trade openness to be positive, but others find it to be negative. Kai and Hamori (2009) state that recent export-import industries require more high-skilled labor than low-skilled labor since they are related to high technology. Nevertheless, if there is a large labor skill gap, the intensive trade openness may risk income distribution. Therefore, the predicted sign of the trade openness variable cannot be clearly predicted. Trade openness is proxied by the ratio of total export and import to GRDP and obtained from Gross Regional Domestic Product of Province in Indonesia by Expenditure published by Statistics Indonesia (BPS).

Furthermore, the modern sector is also argued to influence income inequality (World Bank, 2016). It is explained that rising more productive and semi-skilled jobs may result in vast inequality due to rising wage gaps between high-skilled and low-skilled laborers. Moreover, The World Bank (2016) states that high-skilled worker's productivity in industrial sectors contributes 1% of higher real wage growth. Nevertheless, Zhuang et al., (2014) argue that it may increase income inequality if there is a large gap in labor skills since it mostly favors high-skilled laborers. Accordingly, this study includes the share of total value added of the industry to GRDP obtained from Gross Regional Domestic Product of Province in Indonesia by Expenditure published by Statistics Indonesia (BPS).

Fifth, this study includes the share of government spending to GRDP obtained from Statistical Yearbook of Indonesia published by Statistics Indonesia (BPS). Li et al., (2017) include this variable to examine the impact of local government intervention on economic development that also affects income inequality. The relationship between government spending and income inequality is ambiguous. It is found to be negative (Li et al., 2017), while it is also found to be positive (Bajar & Rajeev, 2016). The sign of the government spending variable cannot be predicted yet.

3.2 Constructing the Infrastructure Summary Indices

There are two different approaches in measuring infrastructure: monetary and physical (Torrisi, 2009). Commonly, the monetary approach uses the amount of money invested in developing infrastructure like government expenditure in infrastructures, whereas the physical approach uses the quantity of infrastructure, for instance, length of roads and number of schools or hospitals. In measuring infrastructures, this study uses a physical approach instead of a monetary approach. Torrisi (2009) argues that a monetary approach is less efficient because of corruption or inefficient investment and is only able to capture infrastructure developed by the public sector. Meanwhile, the physical approach is preferred since it can represent infrastructure development provided by both public and private sectors. Hence, this study uses the physical approach to measure infrastructure development.

Generally, empirical studies rely on specific indicators (e.g., transportation, telecommunications, electricity) to proxy infrastructures, such as Charlery et al., (2016) and Bajar and Rajeev (2016). Conversely, Calderón et al., (2014) argue that specific indicators are not sufficient to thoroughly depict the impact of physical infrastructures on income inequality and may result in misleading information. Consequently, constructing an infrastructure summary index from the combination of specific indicators (e.g., transportation, telecommunications, electricity) is reasonable to comprehensively portray infrastructure and estimate its impact on income inequality. Other subsequent studies (Chong & Calderón, 2004; Majumder, 2012; Makmuri, 2017; Raychaudhuri & De, 2010; Seneviratne & Sun, 2013) apply the same method to examine the relationship between infrastructure and income inequality.

Accordingly, this study applies the methods proposed by Calderón and Servén (2004), who constructed infrastructure indices using Principal Component Analysis (PCA), and followed by Makmuri (2017), who conducted a similar study in Indonesia. This study expands the methods by: estimating the impact of social infrastructure (education infrastructure/EDUC and health infrastructure/HEALTH) and

physical infrastructure (PHYS), employing more infrastructure indicators, applying annual within-country data to obtain less information loss, and using the advanced telecommunications indicators (mobile phone, internet, computers) instead of fixed telephone. In this study, physical infrastructure (PHYS) and social infrastructure (EDUC, HEALTH) are combined from several previously constructed components from some related indicators. Since education and health are weakly correlated, and PCA requires high correlation among variables to summarize the variation of the large interrelated variables, grouping education and health into one summary index seems unsuitable. Therefore, social infrastructure will be categorized into two variables called education (EDUC) and health (HEALTH). Education infrastructure (EDUC) consists of primary education (combined from primary school and junior high school) and higher education (combined from high school, vocational high school, and college). Public health services (e.g., doctors and hospitals), water, and sanitation are combined to construct a summary infrastructure index called HEALTH.

As for the physical infrastructure index, the first principal component of the three indicators (transportation, telecommunications, electricity) accounts for 74.59%. The physical infrastructure index (PHYS) is strongly correlated with transportation (0.89), telecommunications (0.71), and electricity (0.97). The physical infrastructure synthetic index can be expressed as:

$$PHYS_{it} = 0.5965TRANSPORT_{it} + 0.4765TELCOM_{it} + 0.6458ELEC_{it} \quad (1)$$

where *i* is province, *t* is years, $PHYS_{it}$ is the physical infrastructure index, $TRANSPORT_{it}$ is the transportation infrastructure index (road and bus), $TELCOM_{it}$ is the telecommunications infrastructure index (mobile phone, internet, computer), $ELEC_{it}$ is per capita distributed electricity to represent electricity.

As for the education infrastructure index, the first principal component of the two indicators, primary education (PEDUC) and higher education (HEDUC), account for 97.59%. The education infrastructure index (EDUC) is strongly correlated with primary education (0.99) and higher education (0.99). The education infrastructure synthetic index can be expressed as:

$$EDUC_{it} = 0.7071PEDUC_{it} + 0.7071HEDUC_{it} \quad (2)$$

where *i* is province, *t* is years, $EDUC_{it}$ is the education infrastructure index, $PEDUC_{it}$ is the primary education infrastructure index (primary school and junior high school), and $HEDUC_{it}$ is the higher education infrastructure index (high school, vocational high school, and college).

As for the health infrastructure index, the first principal component of the three indicators (PHEALTH – doctor and hospital, safe water, improved sanitation) accounts for 72.25%. The health infrastructure index (HEALTH) is strongly correlated with PHEALTH (0.77), safe water (0.87), and improved sanitation (0.90). The health infrastructure synthetic index can be expressed as:

$$HEALTH_{it} = 0.5257PHEALTH_{it} + 0.5937WATER_{it} + 0.6092SANIT_{it} \quad (3)$$

where i is province, t is years, $HEALTH_{it}$ is the health infrastructure index, $PHEALTH_{it}$ is the public health infrastructure index (doctor and hospital), $WATER_{it}$ is percentage of households with access to safe water, $SANIT_{it}$ is percentage of households with access to improved sanitation.

3.3 Econometric Model

This study estimates the impact of infrastructure on income inequality by applying a dynamic panel data regression model that includes the lagged dependent variable as a regressor. It follows previous similar studies such as Calderón and Servén (2004), Chong and Calderón (2004), Majumder (2012), Hasanov and Izreali (2011), and Raychaudhuri and De (2010). They argue that it is reasonable to apply GMM to overcome the potential endogeneity problem that is commonly found in infrastructure-inequality nexus. There is a possible two-way correlation between infrastructure and inequality or other observed and unobserved heterogeneity such as urbanization, government size, industrialization, and others. Moreover, different initial levels of inequality across regions may also influence the impact of infrastructure on inequality (United Nations, 2016). Therefore, conducting a dynamic panel data analysis is required by including a lag of the dependent variable as a regressor.

The general model to investigate the impact of infrastructure on income inequality is described as follows:

$$Gini_{it} = \alpha Gini_{it-1} + X'_{it}\beta + Z'_{it}\gamma + u_{it} \quad (4)$$
$$u_{it} = \mu_i + \varepsilon_{it}$$

where i is province, t is years, $Gini_{it}$ is income inequality level measured by the Gini ratio, $Gini_{i(t-1)}$ is the lag phase of the dependent variable (Gini ratio), X_{it} is a set of infrastructure-related measures (PHYS, EDUC, HEALTH), Z_{it} is a set of control variables (log of income, log of income squared, financial development, trade openness, government spending, and modern sector), μ_i is individual effect, and u_{it} is the stochastic disturbance term. This model implicitly includes a constant term.

In order to estimate the parameters, this study employs GMM (Generalized Method of Moments), which is common and broadly used in empirical studies. With the purpose of controlling the fixed effect (μ_i), Equation (4) needs to be modified by taking the first differences so that the fixed effect is eliminated. The first difference regression is expressed as:

$$\Delta Gini_{it} = \alpha \Delta Gini_{it-1} + \Delta X'_{it}\beta + \Delta Z'_{it}\gamma + \Delta u_{it} \quad (5)$$

Based on Equation (5), Difference GMM (Diff-GMM) estimates the parameters by using the lagged level of regressors as instruments. Specifically, the Diff-GMM uses the following moment conditions:

$$E(Y_{i,t-s}.\Delta u_{it}) = 0, for\ s \geq 2;\ t = 3, \ldots, T \quad (6)$$
$$E(\omega_{i,t-s}.\Delta u_{it}) = 0, for\ s \geq 1;\ t = 3, \ldots, T \quad (7)$$

where Y is income inequality (Gini ratio), ω is a set of the other regressors (i.e., infrastructure variables and control variables) of the level Equation (4), μ_i is the individual effect, and u_{it} is the disturbance term.

This study assumes that all regressors are predetermined, influenced by previous periods but not in the future, to support the employment of GMM. Therefore, all variables are instrumented by the first lag, which follows the moment conditions explained above. Due to the long period taken, it leads to instruments proliferation when using GMM estimators. Since instruments proliferation may cause failure in overcoming endogeneity and biased estimates, reducing the number of instruments is necessary (Roodman, 2009). To prevent instruments proliferation, this study reduces the number of instruments by two methods. First, collapsing the instruments as explained in Roodman (2009); second, using only the first two acceptable once-lagged levels of the regressors in Diff-GMM and as for System-GMM, using only the first acceptable once-lagged level of the regressors for Equation (5) and the lag zero of the instrument variables in differences for Equation (4) as the instruments.

In applying GMM, ensuring the validity of instruments and serially uncorrelated error terms are crucial. Hence, following Roodman (2009), two standard specification tests are required to support the use of GMM; first, over-identifying tests (Sargan and Hansen tests) that test whether the instruments are exogenous; and second, a specification test that examines the serial correlation of the error term. In order to provide valid instruments, the instruments used should not be correlated with the new error terms. Neither test is supposed to reject the null hypothesis to support the GMM model.

4. Results and Discussions

This section discusses the contribution of physical and social infrastructure to income inequality based on the estimation results. It will first discuss the distribution level of infrastructure development across provinces to depict the regional gap level of infrastructure development in Indonesia. Then, this study will discuss the contribution of physical and social infrastructure (education and health) to income inequality in Indonesia. Following previous studies such as Calderón and Servén (2004), this study employs several variants of Diff-GMM and System-GMM with one-step and two-step estimations to conclude the estimation results more comprehensively.

4.1 Physical Infrastructure, Social Infrastructure, and Income Inequality

The estimation results of the impact of physical and social (education and health) infrastructure quantity indices on income inequality in Indonesia are represented in Table 2 using different techniques. The results in Column [1] and [2] inform the estimation results of pooled OLS and time-effects models, respectively. Moreover, Column [3] and [4] report the results of one-step and two-step Diff-GMM, respectively. Column [5] and [6] report the estimates of one-step and two-step System-GMM, respectively. The discussion of this study will focus on the estimation results of the GMM estimators. Table 2 reports that none of the control variables is found to significantly affect income inequality in Indonesia.

Generally, except for the one-step System-GMM model in Column [5], the models applied and the estimation results in Table 2 satisfy the specification tests. Instrument variables in all models in Table 2 are serially uncorrelated with the error terms, which are showed by the AR test's coefficient (using a 5% significance level). Meanwhile, only the model in Column [5] violates the requirements regarding the over-identifying test (Sargan/Hansen test) due to its instrument variables' correlation with the error (using 5% significance level). Consequently, the estimates of Column [5], one-step System-GMM, is counted out from analysis, and analysis is based on the results of Column [3], [4], and [6].

Considering the estimation results, generally, physical and social infrastructure development is more likely to increase income inequality in Indonesia. It is inferred by the positive signs of physical infrastructure, education infrastructure, and health infrastructure. Considering all estimation results, the signs of physical infrastructure and education infrastructure are quite consistent, which is positive. The consistency also appears for the statistical significance of the estimation results, particularly for education infrastructure. Meanwhile, the estimates of health infrastructure do not show a consistent sign and significance across estimates. It can be inferred that education infrastructure may have a stronger significant impact on income inequality increases in Indonesia, followed by physical infrastructure. Conversely, health infrastructure probably has the least impact on income distribution in Indonesia.

Table 2: Physical Infrastructure, Social Infrastructure, and Income Inequality

Dependent variable: Gini ratio

Variables	(1) Pooled OLS	(2) Time-Effects	(3) one-diff	(4) two-diff	(5) one-sys	(6) two-sys
L.gini			0.5006***	0.5345**	0.4525***	0.3994**
			(0.1393)	(0.2458)	(0.1078)	(0.1361)
Physical Infrastructure	0.0039*	0.0092	0.0656**	0.0756***	0.0102	0.0101
	(0.0021)	(0.0073)	(0.0330)	(0.0242)	(0.0084)	(0.0129)
Education Infrastructure	0.0078***	0.0174*	0.0685**	0.0812**	0.0058	0.0131
	(0.0026)	(0.0094)	(0.0290)	(0.0348)	(0.0056)	(0.0089)
Health Infrastructure	-0.0010	0.0036	0.0221*	0.0188	0.0067	0.0106
	(0.0022)	(0.0030)	(0.0120)	(0.0135)	(0.0057)	(0.0077)
Income/capita (ln)	0.0915	-0.3925	-0.6772	-0.9505	-0.2453	0.1180
	(0.0891)	(0.2419)	(0.5965)	(0.6204)	(0.2810)	(0.5638)
Income/capita.sq (ln)	-0.0043	0.0230*	0.0308	0.0418	-0.0095	-0.0071
	(0.0042)	(0.0118)	(0.0263)	(0.0270)	(0.0127)	(0.0265)
Financial development	0.0317***	0.0280	-0.0276	-0.0552	-0.0048	0.0040
	(0.0050)	(0.0220)	(0.0485)	(0.0471)	(0.0102)	(0.0235)
Trade openness	0.0000	-0.0001	0.0001	0.0000	0.0004	0.0003
	(0.0001)	(0.0002)	(0.0005)	(0.0004)	(0.0003)	(0.0004)
Modern sector	-0.1346****	-0.1229**	0.3865	0.3904	-0.1277	-0.2593
	(0.0454)	(0.0527)	(0.2619)	(0.2892)	(0.1005)	(0.1746)
Government spending	-0.2623*	-0.1577	0.0173	0.3929	-0.1413	-0.1676
	(0.1370)	(0.2450)	(0.9053)	(0.9788)	(0.2836)	(0.8460)
N (number of observations)	279	279	217	217	248	248
J (number of instruments)			27	27	28	28
AR(1) p			0.000	0.004	0.000	0.001
AR(2) p			0.558	0.528	0.143	0.201
Sargan/Hansen p			0.305	0.248	0.050	0.192

*Standard errors in parentheses * p<0.10, ** p<0.05, *** p<0.01*

Sources: Author's calculation

Regarding the magnitude, the coefficients in Column [3] and [4] show that the development of physical and education infrastructure has a significantly higher impact on income inequality increases in Indonesia compared to health infrastructure. An increase in physical infrastructure development has increased income inequality by around 0.066 to 0.076 points at 1-5% significant level, ceteris paribus. However, Columns [5] and [6] report that the impact of physical infrastructure on income inequality loses its significance when system-GMM is applied to estimate the parameter. As for education infrastructure, the level of income inequality in Indonesia increased by around 0.069 to 0.081 points when education infrastructure development increased by one point at 5% significant level, other factors being constant. In general, physical and education infrastructure possibly has a similar meaningful impact on income inequality increases. Meanwhile, health infrastructure development has the least impact on income inequality increases in Indonesia compared to physical and education infrastructure. An increase in health infrastructure might increase income inequality in Indonesia by 0.02 at a 10% significant level, other factors being equal, according to the estimates in Column [3].

Regarding the impact of physical infrastructure (transportation, telecommunications, electricity), Table 2 reports a positive tendency of physical infrastructure and income inequality relationship. However, the result is not robustly significant since only the models in Column [3] and [4] show a significant effect of physical infrastructure on income inequality. The effect of physical infrastructure on income inequality in Indonesia remains unchanged after considering social infrastructure (education and health). It is in accordance with Makmuri (2017), who claims the tendency of the physical infrastructure to increase income inequality in Indonesia. Makmuri (2017) explains that the positive relationship between physical infrastructure, especially transportation and telecommunications, and income inequality may be caused by uneven returns received by the different income groups. Bricefio-Garmendia and Kyltchnikova (2006, as cited in Cook, 2011) find strong gaps of access to infrastructure between the two income groups in poorer countries.

As argued by Makmuri (2017), different returns received by the poor and the rich may explain the positive physical infrastructure-income inequality relationship in Indonesia. Specifically, he argues that improvement in transportation infrastructure is associated with higher sales of private cars and motorcycles by the middle-up income group, which can provide better access to economic productivity. Meanwhile, telecommunications are argued to be associated with technological bias, which mostly favors high-skilled laborers. Exploring the impact of telecommunications using ICT (information, communication, and technology) adoption ratio confirmed that telecommunications increase provincial income inequality in Indonesia (Patria & Erumban, 2020). Furthermore, Patria and Erumban (2020) state that the ICT adoption rate also has an inverted-U shape relationship with income inequality in which the income distribution could have better distributed as the ICT adoption rate gets higher. They also argue that the positive ICT adoption rate-income inequality relationship may be caused by the rich adopting and benefiting ICT earlier than the poor. Similarly, electricity in Indonesia may also benefit the middle-up income group more than the low-income group. It is reported that the poor in Indonesia obtain a smaller return from improvement in electricity compared to the rich (Balisacan et al., 2002).

In addition to the unequal returns to infrastructure, the fact that physical infrastructure may foster trade openness and industries that maintain technological progress and require high-skilled laborers probably explains the positive physical infrastructure-income inequality relationship, although it only shows a little evidence. As the economy in Indonesia becomes more open and industry comes to dominate the economy, the demand for high-skilled laborers may also increase. Statistics Indonesia (BPS) reports that compared to other economic sectors, the industry contributes the most (19.86%) to the total Indonesian national income in 2018. Therefore, it is likely that along with the tendency to be more open to trade and the domination of the modern sector in Indonesia, the impact of physical infrastructure in increasing income inequality is stronger when the skill gaps also remain large.

Similar to physical infrastructure, education infrastructure (primary and high education) seems to be positively associated with income inequality though not robustly significant. In contrast with Majumder (2012) and More and Aye (2017), this study finds that improved access to education infrastructure in Indonesia tends to increase income inequality. Meanwhile, supporting this finding, Chongvilaivan dan Kim (2016) finds that education gaps in Indonesia dominantly lead to income inequality increases. A positive higher education-income inequality relationship is also found in emerging developing countries (Coady & Dizioli, 2018) and Islamic countries (Shahabadi et al., 2018) like Indonesia. In addition, Wells (2006) mentions numerous studies that support the positive relationship between education and income inequality, including Barro (2000).

The positive relationship between education infrastructure and income inequality could be explained by unequal access, in particular to higher education, between the two income groups due to financial constraints of the poor (Chongvilaivan & Kim, 2016; Muttaqin, 2018; Wicaksono et al., 2017) and high educational cost (Shahabadi et al., 2018). Using data in 2007 and a Theil decomposition analysis, Chongvilaivan and Kim (2016) claim that education gaps in Indonesia dominantly lead to income inequality increases. Particularly, increases in higher education infrastructure in urban regions in Indonesia are found to foster education gaps and consequently contribute to increases in national income inequality (Akita, 2017; Akita & Miyata, 2013; Hayashi et al., 2014). Higher education has been found to contribute to income inequality increases when an economy shifts from agriculture to modern sectors in developing countries (Barro, 2000; Wells, 2006). Barro (2000) finds that the higher level of education attained, the greater income inequality will be. Furthermore, Wells (2006) explains that the role of higher education becomes more significant during the shift because labor demand for high-skilled laborers increases. If only the middle-up income groups can attain higher education, they will become richer while the poor remain poor. The income gap may remain large if there is still a large education gap.

Shahabadi et al. (2018) state that the poor are unlikely to have sufficient financial resources to achieve higher education because of the high educational cost, especially higher education. Family factors like financial resources are believed to be a determinant factor of the unequal access to education in Indonesia (Muttaqin, 2018). The World Inequality Database on Education reports that in 2012, in Indonesia, only 8% of the poor and 5% of the poorest aged 18 to 22 years old had attended higher education, and only 1% of the poorest and 5% of the poor aged 25 to 29 years old had completed tertiary education. Furthermore, the middle-up income group, especially in urban areas in Indonesia, prefers sending their children to private schools, including international schools, which cost substantially more than public schools. It proves the statement that differences in physical and human capital equipment used in schooling also contribute to unequal access to higher education (Orazem & King, 2007; Yang & Qiu, 2016). Private schools, especially at the higher education level, in Indonesia, are found to produce better-performing graduates in the labor market than public schools due to their management structure (Bedi & Garg, 2000). Private schools seem to have more authority to manage their schools and provide better physical and human capital resources to offer education programs.

Education infrastructure has different impacts in developing and developed regions in Indonesia (Saraswati, 2013). Saraswati (2013) explains that public education investment has less effect on human capital improvement in developed regions, whereas the impact is more significant for developing regions. Majumder (2012) shows that the impact of social infrastructure in India is significant in intermediate regions and insignificant in developed and lagging regions. Furthermore, the returns to education on income inequality in emerging countries are significant in the long-term but insignificant in the short-term (Chani et al., 2014; Checchi & van de Werfhorst, 2014; Qazi et al., 2018). Therefore, a longer period is probably needed to clearly depict the returns to education investment on income inequality in Indonesia.

As for health infrastructure (doctors, hospitals, water, sanitation), it seems that this study only gives little evidence that health infrastructure has an impact on income inequality. Probably due to the unstable variable of health infrastructure, implied by only one model in Column [1] that shows significant estimates, this study cannot definitely state that the two variables are associated. Despite the little evidence, the positive relationship is in contrast with previous studies, including Majumder (2012) and More and Aye (2017). In Indonesia, the positive relationship is possibly caused by uneven access to health services between the two income groups. There is a positive trend about the gaps of access to clean water and improved sanitation between the poor and the rich in Indonesia (Pitriyan & Siregar, 2013; World Health Organization, 2017). Moreover, people living in remote areas and remote islands still have difficulties in accessing health services (hospital and primary health service/*Puskesmas*), safe water, and improved sanitation (Benotti et al., n.d.; Mahendradhata et al., 2017; World Health Organization, 2017).

Conclusions

This study contributes to the infrastructure-income inequality literature in Indonesia by assessing the impact of social infrastructure (education and health) on income inequality and physical infrastructure. Moreover, this study obtains more infrastructure and modern telecommunications indicators that are more related to the modern economic era. Using 34 unbalanced provincial panel data, between 2009 and 2017, this study constructs infrastructure summary indices and applies a panel data regression analysis, GMM, to estimate the impact of infrastructure on income inequality.

The main finding of this study is that both physical and social infrastructures, specifically education infrastructure, appear to be positively associated with income inequality increases in Indonesia, although they are not robustly significant. Even after taking social infrastructure into account, physical infrastructure still seems to increase income inequality in Indonesia. Meanwhile, this study cannot definitely draw a conclusion regarding the nexus between health infrastructure and income inequality in Indonesia due to little evidence. The tendency of physical and social (education) infrastructure to increase income inequality is probably caused by uneven returns to infrastructure received between income groups, inadequate access to infrastructure for the poor, and insufficient financial resources of the poor to access higher education.

Taking everything into consideration, the author acknowledges some limitations of this study that need some improvements in further research. First, future studies could improve the data used by providing more balanced panel data with a more extended period applied. Second, future studies may improve this study by considering seaports and airports as indicators for transportation, in addition to land transportation. Third, considering the possibility of different returns to infrastructure development received between income groups, the impact of infrastructure may be various. According to previous empirical studies, the impact of education infrastructure is also different regarding the development level of the region and length of the period. Accordingly, investigating the impact of infrastructure on income inequality between those various different factors as the dependent variables may be advantageous to depict stronger evidence of the heterogeneous impact of infrastructure on income inequality in Indonesia.

In spite of the tendencies of infrastructure to increase income inequality, this study has no intention to neglect the role of infrastructure in improving income distribution. It seems that uneven access to infrastructure may lead to different returns to physical infrastructure between income groups. Particularly, price and financial resources tend to constrain the poor from accessing social infrastructure, especially education infrastructure. Therefore, it is suggested that the government provide more even access to physical infrastructure at an affordable price, especially for the poor, to promote opportunities in economic activities, labor market, and higher income. As for social infrastructure, it will be better if the government provides more equal access to social infrastructure with affordable costs, especially for the poor. Furthermore, improvement of the mechanism and distribution of financial support to the poor is necessary to enable them to achieve higher education, better health conditions, and eventually earn a higher income. By ensuring returns to physical infrastructure are well received by all income groups and narrowing the endowment gaps between different income groups, it is expected that income distribution will improve in Indonesia.

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Research Paper

The Implementation of Street Vendor Relocation Policy in the Pro-Environmental Era in Mojokerto City Square

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ABSTRACT

Street vendors are one of the informal sectors that often cause problems in urban areas, such as the street vendors in Mojokerto City Square. The presence of street vendors is considered to have disturbed the orderliness and cleanliness of the city environment. Therefore, based on the Local Government Regulation of Mojokerto City No. 5 of 2005 concerning the Arrangement and Development of Street Vendor Activities, the government implemented a policy of street vendor relocation. This paper aims to analyze the implementation of street vendor relocation policy in the area of Mojokerto City square. This research uses a descriptive qualitative approach involving six key informants with interviews and documentation as the data collection method. This study indicates that implementing the street vendors relocation policy in the square area of Mojokerto City is not entirely effective. Four factors influence the implementation of the policy, communication, resources, disposition, and bureaucratic structure.

Keywords: implementation policy, public management, street vendors, environmental arrangement

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1. Introduction

One of the social problems that the Indonesian government faces today is unemployment. Central Bureau of Statistics (2021) recorded that in February 2021, the open unemployment rate in East Java was 5,42% which was higher than in February 2020 at only 3,60%. The pandemic Covid 19 is the primary driver of the high unemployment rate. However, this rate was lower than the open unemployment rate at the National Level, which was 6,26 in February 2021. Many people lose their jobs because the company was bankrupt. Companies that lose money due to various reasons then terminate unilateral employment to their employees. This termination of employment increases the number of unemployed people in Indonesia.

The informal sector becomes high in demand due to the rise of the unemployment level. The public turns to the informal sector because the number of formal sectors is not proportional to the existing workforces. Some people prefer the informal sector because it does not require special skills or diplomas. The informal sector is a concept that emerges from the formal sector. Like two sides of a coin, the informal sector is inseparable from the formal sector. The informal sector is an implication of the formal sector. The concept of the formal sector is referred to paid or daily workers in permanent jobs, such as jobs in the industrial world, government offices, and other large companies. The formal sector refers to organized, registered, and protected economic activities. Economic activities that do not meet these criteria are classified as informal sectors (Manning & Effendi, 1996, p. 139).

One form of economic activity in the informal sector is street vendors. Street vendors are relatively important and typical types of work in the informal sector. They are often less organized small businesses. In several cities in Indonesia, including in Mojokerto City, one will easily find street vendors. Street vendors occupy public spaces intended for community activities. In some cases, the presence of street vendors often disrupts traffic and city structures and destroys the city's beauty. Many cities in Indonesia could deal with the common problems often caused by these street vendors. As one of the people's economies that engaged in the informal sector trading business, the street vendors need to be managed to help improve and develop its business. The number of street vendors is increasing rapidly and raises some problems, especially related to the availability of public space, urban planning, and the aesthetics of urban space.

Street vendors are complicated problems in urban planning. Shortcut handling through eviction often invites protests from various parties. This method departs from the assumption that street vendors are part of an urban problem that must be stopped. Such a solution does not lead to the improvement of urban planning. Therefore, it is considered necessary to look for another solution, a more humanized solution, where street vendors are viewed as the nation's economic assets (Limbong, 2006, p. 1).

Street vendors are informal economic sectors that do not have the rights legitimized by formal law in carrying out their work. Informal sector activities usually take in a limited public place. Sometimes, these street vendors have to share space with others. The limited ability of the informal sector as an actor in modern economic activities coupled with limited space to carry out activities make this sector suspected as being a contributor to uncleanness, disorder, and environmentally damaging. Limitations make the informal sector vulnerable to activities that can disrupt the sustainability of environmental functions. This is an interesting challenge to realize the practice of activities or businesses that are environmentally sound. Thus, government's intervention is necessary to push people to behave in a positive attitude toward the environment. The intervention is considered as a solution to ask people to act. It is like a study conducted by Afroz and Ilham (2020), people may have a high awareness level towards environmental sustainable goals, but practically they have a limited action to support pro-environmetal moverments. Wijaya and Ulum (2020, p. 384) say that "the prerequisite for achieving sustainable development is environmentally sound development."

The relocation of street vendors to a more conducive location to create a comfortable urban environment is the policy carried out by almost all big cities that experience street vendor problems, including small cities such as Mojokerto. The discourse of the local government of Mojokerto City to relocate street vendors emerges when the public space in urban areas is disturbed by the presence of trade activities carried out on the sidewalks. Relocation policy of street vendors is needed to make public spaces function properly, such as sidewalks, road bodies, and city parks. The policy is taken because of the initiative of the regional government to be assertive in determining the location for the informal sector of street vendors which are orderly and comfortable. The presence of street vendors in the city's public spaces already exists for a long time. The numbers are increasing and eventually allying with street vendors. The arrangement of street vendors in the Mojokerto City has been regulated in a legal source in

the form of local government regulation number 5 of 2005 concerning the arrangement and development of street vendor's activities.

Mojokerto City has Mojokerto City Local Government Number 5 Year 2005 (2005) concerning the Arrangement and Development of Street Vendors. One of the contents of the regulation is: to maintain orderliness and raciness, security, tranquility, cleanliness in the area of Mojokerto City. Citizens are prohibited from using public places, public roads, sidewalks, and public channels as a place for street vendors, except stipulated and permitted by the mayor or appointed officials (Article 2 paragraph 1). Based on these regulations, the policy taken by the government of the Mojokerto city is relocation.

The first relocation policy was carried out to *Benteng Pancasila* street in 2012. The relocation was intended for street vendors in the Mojokerto city square. Mojokerto City Square has been designated as a public place that must be free from street vendors. Therefore, the city government is trying to place and organize street vendors who sell around public spaces.

However, the relocation policy was still protested by 228 street vendors realocated from Mojokerto City Squared to Benteng pancasila Street in front of the Municipal House of Representatives' Building (Supriyatno, 2015).

In reality, the implementation of the relocation policy still has many problems. Some street vendors return to the city square in Mojokerto City. Based on direct interviews conducted by researchers towards some street vendors, they did not want to occupy the center for street vendors in *Benteng Pancasila* due to several factors:

1. Consumers looking for entertainment could easily reached the street vendors in Mojokerto City Square compared to *Benteng Pancasila*.
2. The space for each street vendor provided by the government is too small, so selling is adjacent to other sellers. Previously, the street vendors could use the place to sell according to their needs. However, after relocating to *Benteng Pancasila* the street vendors had to occupy according to the government quota, that is 1 (one) - 3 (three) square meters.

This article aims to analyze the implementation of the relocation policy of street vendors in Mojokerto City Square. Based on the above explanation, this paper seeks to answer the question, "how is the relocation policy is implemented by the Mojokerto City Government towards Street Vendors in the Mojokerto City Square?"

Literature Review:

A. Public Policy

Etymologically, the term policy comes from the Greek "*polis*" which means the city. Latin becomes "*political*" which means the state. The policy is used to designate an actor's behavior (functionary of a group or government) or some actors in a particular activity. Carl J. Federick (as cited in Agustino, 2008) defines policy as a series of actions/activities proposed by someone, group, or government in a particular environment where there are obstacles (difficulties) and opportunities for implementing policy proposals to achieve certain goals. According to Thomas Dye (as cited in Abidin, 2002) states that policy is the government's choice to do or not do something. According to Mustopadidjaja (2003), public policy is a decision intended for overcoming problems that arise in a particular activity carried out by government agencies in the framework of administering the government. James Anderson (as cited in Winarno, 2012) said that policy is a direction of action that has a purpose set by an actor in overcoming a problem or an issue. This policy concept is considered appropriate because it focuses on what is done and not on what is proposed or intended. In addition, this concept also distinguishes policies from decisions that are choices among various alternatives. Knill and Tosun (2012, p. 4) mention that "the analysis of public policy puts the content of policies center stage".

A decision-maker in solving public problems must pay attention to policy analysis. Three things make policy analysis more commonly known to the public sector. First, the public sector has more complexity than the private sector. That is, the public sector which consists of many actors and interests, requires a complete method to solve the problems faced. With its many actors, interests, and complexity of problems, the government requires more policy alternatives to better satisfy the public (stakeholders) of the problems faced by the private sector. Second, the public sector has a higher risk of facing

unpredictable problems. The public sector has more chance to get new problems from conditions that cannot be predicted. This kind of event is more likely to happen in the public sector than in the private sector. Third, the public sector has a wider scope of problems than the private sector. The government needs considerations that have a broader scope and more complex considerations by analyzing policies owned by the private sector (Indiahono, 2009, pp. 1-3).

Public policy in a substantial framework is all activities carried out by the government to solve public problems. By bringing public policy to solve public problems, public administration will be more colorful. The government directs public policy to solve public problems to fulfill the interests and administration of public affairs. As far as possible, public policy is oriented to the maximum benefit of public interest. Public policy involves many interested actors. Rational values developed in the analysis of public policy should bring closer to the public interest.

B. Public Policy Implementation

Implementation of public policy is a crucial stage in the public policy process. A policy program must be implemented so that it has the desired impact or goal. Mazmanian and Sabatier (as cited in Agustino,2008, p. 196) explain the meaning of implementation by saying:

Understanding what happens after a program is implemented or formulated is the subject of policy implementation. Those events and activities that occur from the external public policy directives, including the effort to administer and the subtitles, which impacts the people and event

So, implementation is a process that involves some sources, including human, funds, and organizational capabilities, carried out by the government or the private sector (individuals or groups). The process is carried out to achieve goals previously set by policymakers. Goals and objectives are measured through final impacts and outcomes as a consequence of output, process, and input (Wijaya, Hayat, & Sujarwoto, 2020, p. 7). As mentioned by Wijaya et al. (2019, p. 345) a balanced vertical performance arrangement in a hierarchical performance is needed to match between the upper and lower performance

It needs to be realized that implementing a policy does not always run smoothly. Implementation theories include the top-down and Bottom-up approaches, or the synthesizers of both (Hill & Hupe, 2002). Many factors can influence the success of policy implementation. Models of policy implementation will be used to clearly describe the variables or factors that have an important influence on public policy implementation and simplify understanding. According to George Edward III in (as cited in Widodo, 2010, p. 96), 4 factors influence the success or failure of policy implementation, (1) communication, (2) resources, Mojokerto City Local Government Number 3 Year 2013 (2013) disposition, and (4) bureaucratic structure, as described in Figure 1 below.

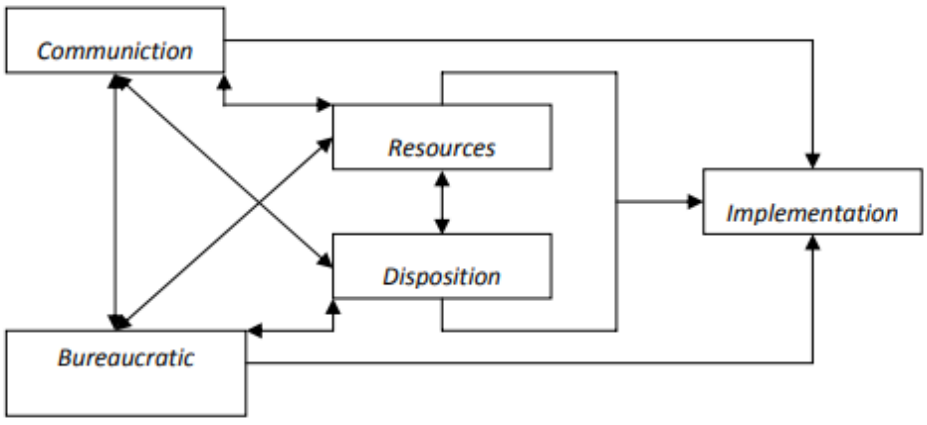

Figure 1. Implementation model

C. Street Vendors

According to McGee and Yeung (1977, p. 25), street vendors have the same meaning as "hawkers", which are defined as people who sell goods and services to be sold in a public space, especially on roadsides and sidewalks. Because urban informal space for street vendors is unavailable, they use public spaces, such as road bodies, sidewalks, city parks, over drainage channels, and riverbanks to carry out their activities. In Rachbini's view (as cited in Alisjahbana, 2006, pp. 1-2), the street vendors who sell their merchandise in various corners of the city are marginal and powerless groups of people. It is said to be marginal because they are, on average, excluded from the flow of city life and even twisted by the city's progress. It is said to be helpless because they are usually unreachable and not protected by law. Their bargaining position is weak and often becomes the object of curbing and structuring the city, which often acts repressively.

The term street vendor originated from the reign of Raffles, the Dutch colonial governor-general. It derives from the word five feet, which meant that the pedestrian path on the roadside was five feet wide. The space is used for selling small traders, so that it is called street vendors (Widjajanti, 2000, p. 26). Street vendors are part of the informal sector that grows together with the changes in urban structure both economically and socially. Therefore, the discussion of street vendors can not be separated from the informal sector discussion. The concept of the informal sector was born in 1971 pioneered by Keith Hart based on his research in Ghana. In 1972, the concept was later included in a report by the ILO team to find solutions to the labor problem in Kenya.

Based on this understanding, it can be concluded that street vendors are everyone who conducts trade or service business activities, serving the needs of goods or food consumed directly by consumers. They tend to move in carrying out such business using simple equipment and have locations in public places informally (especially on sidewalks or part of road bodies). The street vendors are arranged by the local public policy and its implementation. It is described as a theoretical framework as mentioned below:

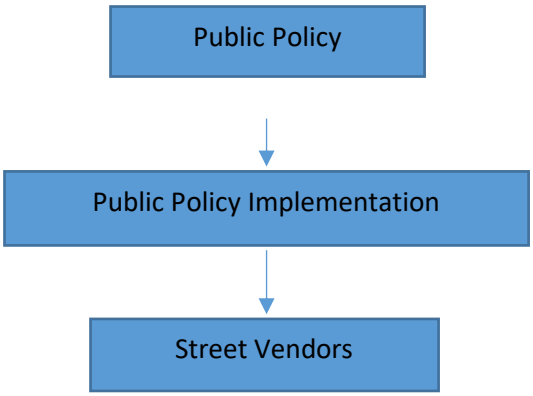

Figure 2. A Theoretical Framework

2. Methodology

The research uses a qualitative approach. This type of research is selected because it involves direct interactions between the researcher and the respondents and in-depth inquiry of problems, patterns of values, and mutual influence. It is qualitative research because it analyzes the implementation of the street vendor relocation policy in Mojokerto City Square. A qualitative approach is a research carried out on a natural condition. It is also called a naturalistic research method and a qualitative method because the data and the analysis are qualitative (Sugiyono, 2017, p. 8). This approach was chosen for two reasons. First, the problems related to street vendors require some actual and contextual field data. Second, this choice is based on the characteristics of qualitative approaches, high adaptability allowing researchers to adjust to the changing situations encountered in this study constantly.

This research is conducted in Mojokerto City, East Java Province. The location is selected because Mojokerto is a small city near Surabaya city. It is in the process of development and the government keeps regulating the city through its policies. The research site is part of the location of the research where the

study is conducted to obtain valid data. Research sites in this study are the Street Vendor Center at *Benteng Pancasila* Street, the Department of Industry and Trade, and *Satuan Polisi Pamong Praja*. The researchers took the research site in several places because some of these places are related to the relocation policy implemented.

One of the basic rules of qualitative research is always to use primary data sources and secondary data sources. Primary data is collected through interviews with informants who are purposively selected. Thus, in the current study, six informants were purposively selected for interview. Two informants are from the Department of Industry and Trade. They are Mr. GPK as Head of trade division and Mrs. ADS as Head of Business Development Division. Two other informants are From *Satuan Polisi Pamong Praja*, Mr. HDM as Head of this Department, and Mr. HA as Head of Peace and Order Division. Two informants are from street vendors who were relocated, including Mr. SR (a grilled fish seller) and Mr. S (a cloth seller). Moreover, the secondary data source used documentation. Documentation is a data collection technique that searches, records, and studies data from archives, photographs, and official documents relevant to this research.

2.1 Analysis

Data analysis is the process of compiling and combining data into patterns, themes, categories, while interpretation is the process of giving meaning to analysis, explaining patterns or categories, and looking for relationships between several concepts. Interpretation describes the perspective of the researcher. Analysis and interpretation of data in qualitative research does not go together (Nasution, 2007, p. 43). Data analysis is a process of simplifying data into a form that is easier to read and interpret.

Data obtained from interviews, observations, and documentation require analysis and interpretation to meet research objectives and other information demands. The researcher made field notes that were further simplified or refined and then coded into problems to obtain accurate data. Data coding is done based on the results of the criticism made. The appropriate data is separated from the specific code from the data that is not addressed by the research problem. Data analysis is carried out qualitatively, repetitively, and continuously between data collection and analysis, both during and after data collection (Bogdan & Biklen, 2007).

3. Results and Discussions

The researchers will explain and describe some of the findings in the implementation process of Street Vendors Relocation Policy by Mojokerto City Government. The relocation policy of street vendors around the Mojokerto City square comes from Mojokerto City Local Government Number 5 Year 2005 (2005) concerning the Arrangement and Fostering of Street Vendor Activities, which was further regulated in Mayor Regulation Number 19 Year 2012 (2012) concerning the Center for Street Trading (PPKL) of Mojokerto City. Immediately after the mayor's regulation was issued, street vendors in the town square of Mojokerto were relocated to a new place, on Jalan Benteng Pancasila. However, the traders often were returned to Mojokerto square. Then in 2013, Mojokerto City Local Government Number 3 Year 2013 (2013) concerning the implementation of Public Order was issued. The regulation instructs that the plaza must be free from street vendors.

Implementation of Mojokerto City Local Government Number 5 Year 2005 concerning the Arrangement and Development of Street Vendor Activities should solve the problems of street vendors. Article 2 paragraph 1 of the regulation states that to maintain order and beauty, security, peace, cleanliness in the area of Mojokerto City, street vendors are prohibited from using public places, public roads, sidewalks, and above public channels as a place of trade activities except in the designated area and permitted by the mayor or appointed official.

Mojokerto City Local Government Number 5 Year 2005 about Arrangement and Development of Street Vendors Activities is an effort to guide street vendors in the Mojokerto City, includes guiding the technical unit that deals with it in the form of guidance, regulation, and counseling. The guidance is carried

out by the Department of Industry and Trade of Mojokerto City as an agency with an interest in trade and industry in Mojokerto City. In this case, The provision of street vendor guidance also involved *Satuan Polisi Pamong Praja*, as a supporting agency in handling street vendors in Mojokerto City.

Further regulation, a Mojokerto Mayor Regulation Number 19 of 2012, provides a more detailed explanation for relocating street vendors from the public area, including Mojokerto City square. The government of Mojokerto City issued this policy to create a clean, healthy, neat, and beautiful area of Mojokerto City by implementing spatial planning according to its functions and uses. The increased number of street vendors in the area has affected the disruption of traffic, aesthetics, and cleanliness of the city and the function of environmental infrastructure. So with this policy, it is necessary to set the location of a strategic sidewalk trading center. The purposes of Mayor Regulation Number 19 Year 2012 (2012) concerning the Mojokerto City Street Trade Center in article 2 are:

To create a new business area as an effort to improve the economy of the community, especially small traders and the Micro, Small, and Medium Enterprises (MSME) sectors;

- Returning the functions of the city road and infrastructure;
- Realizing order and beauty of the world;
- Supporting the community's economic growth and at the same time as an option in the supply of merchandise needed by the community at a relatively affordable price.

The street vendors who want to get permission must apply and fulfill the stipulated requirements. In Mojokerto City Local Government Number 5 Year 2005, Permits are not only in the form of business licenses but also in terms of the use of public facilities to sell by street vendors. Mayor Decree further regulates this application. Street vendors who become the target groups in the Mojokerto City Square are recorded.

The Mojokerto City Government has tried to bring order to the street vendors through relocation. The place provided has taken into account the social, economic, order, cleanliness, and health of the surrounding environment. The Mojokerto City Government provides a new business place or *kids* aimed for street vendors to occupy the *kids*. These regulations arrange the rights, obligations, and prohibitions for street vendors. This regulation is regulated in the Mojokerto Mayor Regulation number 19 of 2012 concerning the Street Vendor Center of Mojokerto City. Every trader has the rights to:

- Occupy the permitted location;
- Conduct business activities in locations permitted by applicable regulations;
- Obtain legal protection against the use of permitted locations.
- Every street vendor/license holder for Street Vendor Center placement has an obligation to:
- Comply with the provisions of laws and regulations which regulate order, security, health, cleanliness, beauty, and functions of public facilities;
- Maintain cleanliness, beauty, order, security, and health of the environment in business places;
- Place business facilities and arrange merchandise in an orderly manner;
- Occupy one place of business according to the license for the Street Vendor Center Placement;
- Empty the place of business if the City Government has other policies on the location of the PPKL without asking for compensation;
- Pay legal taxes, levies, and other fees based on applicable provisions;
- Comply with all provisions stipulated in the license for placement of a street vendor.
- Every trader / Street Vendor Center placement permit holder is prohibited from:
- Using *lapak* exceeding the permitted conditions;
- Establishing permanent / semi-permanent buildings at street vendor locations;
- Using the place of business as a place to live;

- Selling and/or promoting goods/services that are contrary to the applicable laws and decency norms;
- Conducting business activities at the street vendor center location other than those specified in the street vendor center placement license;
- Transferring the right to street vendor center land to other parties in any form.

According to George C. Edwards III, the implementation of public policy includes four factors: communication, resources, dispositions, and bureaucratic structures. The four classifications are used to analyze the implementation of the relocation policy of street vendors from Mojokerto City Square by the Department of Industry and Trade of Mojokerto City as an implementer.

3.1 Communication

The first factor influencing the successful implementation of the policy is communication with three dimensions (transmission, accuracy, and consistency). The transmission or process of delivering the first information occurred between policymakers (including the Mayor of Mojokerto) and the implementers of the policies (including the Department of Industry and Trade and the Civil Service Police Unit). The message is delivered in stages by the organizational structure of the Department of Industry and Trade. This first communication in the transmission is good enough. The second communication between the policy implementer and the street vendors in Mojokerto City square was not enough because it was held just once. Then, the clarity dimension is unclear because the street vendors do not accept the message conveyed to all street vendors. Relocation policy is only distributed traditionally by the local government through socialization which is not effective. It is necessary to have the right media, both print and electronic such as newspapers, the internet, brochures, leaflets which circulate in various media. This can provide information to the public about the purpose and intent of this policy. The information on relocation policy information has not been carried out consistently. Socialization has not been carried out routinely by the employees of the Trade Sector who are appointed to do the duties from the Department of Industry and Trade of Mojokerto City. In addition, there is no consistency in the implementation of socialization carried out by employees in the field. In addition, the socialization schedule is not neatly arranged or non-existent. Thus, it can be concluded that the practice has not followed what Edward said that the communication of a policy must be consistent and clear to be established or implemented. Three indicators can be used to measure the success of communication variables. suggests three variables:

- Transmission. A good communication channel will produce a good implementation. There are often problems in channeling communication, such as misunderstanding (miscommunication) caused by many levels of bureaucracy that traverse the communication process.
- Clarity. Communication received by street-level bureaucrats must be clear and not confusing or unambiguous.
- Consistency. The orders given in the implementation of communication must be consistent and clear to set or run. If the given order often changes, it can confuse the implementer in the field.

In terms of communication, the relocation policy of the street vendors of Mojokerto City Square has been effective. The municipal government and members of the House of Representatives make the street vendor relocation policy. The executor or implementer of this policy is the Department of Industry and Trade. The objects of this policy are street vendors who occupy the area of Mojokerto City square. The flow of communication between the three parties is as follows:

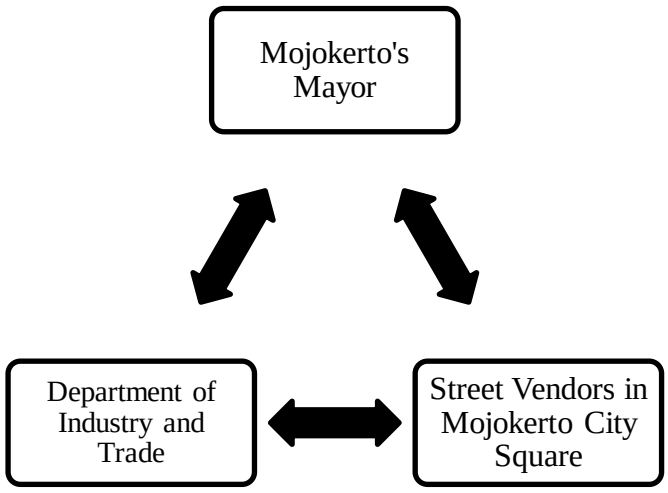

Figure 3. Three Parties Communication
Source: Created by Authors, 2019

The chart above shows three communication flows that occur when public policy is applied. The first communication occurred between policymakers (Mayor of Mojokerto's city) with policy implementers (Department of Industry and Trade of Mojokerto city). The second communication occurred between the policy implementers with the object of policy or street vendors in the Mojokerto City Square. At the same time, there was communication between policymakers and street vendors as policy objects.

The policymakers communicate the policies they made to the implementers reciprocally. They also issue certain orders relating to handling street vendors. Suppose the implementer has difficulty understanding the direction in handling street vendors. In that case, the implementer can (and is open to possibilities) ask questions or ask for an explanation directly to the policymaker. Two-way communication between policymakers and policy implementers reduces the possibility of message distortion. The Department of Industry and Trade successfully translated the policies made by the City Government of Mojokerto, in this case, the Mayor of Mojokerto and the House of Representatives (DPRD) of the Mojokerto City.

The Department of Trade and Industry's success in translating the Mayor's policy was also influenced by the participation of the department in the preparation of the policy. When constructing the policy, the Mayor of Mojokerto (and DPRD of Mojokerto City) received input from the Industry and Trade Office as a field implementer. Bottom-up policymaking enables the creation of down-to-earth policies, meaning that they touch on the problems at the implementing level. However, it is important to note that the bottom-up referred to above only applies limitedly to government agencies, which is limited to the relationship between policymakers and implementing policies.

The second communication occurs between implementers and the street vendors as the object of the policy. The potential for communication failures between policy implementers and street vendors is quite large because of a striking difference in interests. The differences in interests are large enough not to interfere with communication between the two. The first part is an officer who has the authority to commit violence in the name of public order. The second part is a street vendor who does not have any bargaining position in dealing with officials, except for physical strength and words.

Communication between city government officials (implementing policies) and street vendors is one-way. The policy executor conveyed (and implemented) the policies he made without being accompanied by the emergence of feedback from street vendors who were the subject of control. The absence of feedback makes it difficult for policy implementers whether the policies implemented are in line with the interests of street vendors. Feedback shows how street vendors perceive and respond to the

treatment they receive. Thus, the importance of receiving feedback from street vendors is one way to assess the success of the policies being implemented.

The concept of communication in general only analyzes whether the message sent by the communicator can be received and understood well by the communicant. If the message sent can be received in full, then communication is called effective. The development of communication science today states that communication is said to be effective when the message conveyed by the communicator is not only clearly accepted by the readers but also influenced and carried out by the communicant. The message to be conveyed by communicators is not to sell in public spaces, especially the city square of Mojokerto. Some of the street vendors stated that they knew that the Department of Industry and Trade do not want them to occupy the Mojokerto City Square as a public place that should be free from disorder.

In terms of delivery transmission, the message regarding the policy was conveyed to two parties. The first party is the implementer of the policy, and the second party is the street vendor as subject to the policy. Messages to the implementing apparatus were delivered in stages according to the organizational structure of the Mojokerto City Government. the Mayor of Mojoketo made the general policy while The Department of Industry and Trade and the *Satuan Polisi Pamong Praja* carry out the policies.

Delivery of messages carried out by the Department of Industry and Trade is to conduct socialization to street vendors in the city square area of Mojokerto only once after the regional regulation No.5 of 2005 was passed. Edwards III said, lack of clarity in policy may not only inhibit intended change; it also may lead to substantial unanticipated change ". The unclear message conveyed not only resulted in not achieving the desired change; can also result in unwanted changes. This clarity is obtained through explanations in coordination meetings and policy implementers can also ask questions to policymakers if there is a lack of clarity in the message.

The message delivered to street vendors is unclear. The clear claim here cannot be interpreted that the message has been delivered to all street vendors and also cannot be interpreted that the message has been understood. The "clarity" claim cannot be interpreted in general because there are differences in the understanding of street vendors who are present and who are. So, it means that the policy is not delivered effectively, because many street vendors can not understand the purpose of the policy.

Some street vendors still choose to be around the city square of Mojokerto. They still choose to be there to continue selling rather than moving to a new place. If the failure of the message is assumed to be policy information obscurity, it is important to examine it from the viewpoint of Edwards III. He pointed out that several factors cause unclear information such as the complexity of policymaking, public opposition, competing goals, the need for consensus, unfamiliarity of new programs, and accountability avoidance.

It was found that there are complexities in relocation policies. Relocating a street vendor turns out not just to move the place of trading/selling. It must pay attention to its economic sustainability, whether being moved will further improve its economy or vice versa. The Department of Industry and Trade was formed with one aim: to control the economic level of relocated street vendors. However, the department was incapable of carrying out the ideal of the purpose of their existence.

Another factor that causes information obscurity is the existence of public opposition. This community is divided into two groups, the people who are the object of the policy because they are directly affected by the implementation of the policy and those who are not directly affected.

Street vendors in Mojokerto City Square already have their economic system. Even though it was small, the economic activities carried out by street vendors are quite comfortable and stable. The government needs to give special consideration when making and implementing a street vendor relocation policy in Mojokerto City Square. In general, the community did not reject the policy to relocate street vendors in Mojokerto City Square. They even strongly support this policy because it would restore comfort, beauty, and order in the City Square of Mojokerto. However, the street vendors around Mojokerto City Square feel that this policy deserves rejection because it already started and does not provide a bright future for improving their economy.

3.2 Resources

Based on the research results, the second factor influencing the successful implementation of the policy is resources with four dimensions (staff, information, authority, and facilities). The shortage of human resources is an obstacle in conveying policy output to the target group. This shows that the implementer lacks human resources in carrying out their duties and functions. Next, the information specified in the relocation policy is sufficient as reference materials for implementing the policy. Information about policies must be clear, so that policy executives know what they will do and know whether the people involved know about this policy. Then, the authority was not equally distributed because there were complaints made from the implementing policy. The last dimension of resources is facilities. The facilities used to implement the policy are said to be sufficient, but it is not yet effective.

According to Edward III (as cited in Agustino, 2008, pp. 158-159), resources are important in implementing good policies. The indicators used to see how far resources affect policy implementation consist of: staff, information, authority and facilities.

The first resource is staff. The main resources in implementing policies are street-level bureaucrats. Failures that often occur in policy implementation are caused by staff or employees who are insufficient orInsufficient and incompetent employees trigger failures that often occur in policy implementation. Adding more staff and implementers is not enough to solve the problem. It requires an adequate staff with the necessary skills and abilities (competent) at implementing the policy.

The second resource is information. In policy implementation, information has two forms. First is information relating to how to implement policies. Second is information about data compliance from the implementers of government regulations and regulations that have been set.

The third resource is authority. In general, the authority must be formal so that orders can be carried out effectively. Authority is the authority or legitimacy of the implementers in implementing politically determined policies. When authority does not exist, the power of the implementers in the public eye is not legitimized, so that it can frustrate the implementation of public policy. However, in another context, when formal authority is available, errors often occur in looking at the effectiveness of the authority. On the one hand, the effectiveness of authority is required in policy implementation. On the other hand, effectiveness will recede when authority is distorted by executors for their own or groups' interests.

The last resource is facilities. Physical facilities are an important factor in policy implementation. The implementer may have sufficient, capable staff, but without supporting facilities (facilities and infrastructure), the implementation of the policy will not succeed

What Edwards III means by resources include staff, information, authority, and facilities. These four components of resources are considered to have the most significant influence on the implementation of public policy. According to Edwards III, resources have a significant position in the success of policy implementation. Without sufficient resources, what is planned will not be the same as what was finally implemented.

3.2.1 Staff

The discussion of staff is directed at discussing the quality of employees who will be involved in making and implementing policies. Edwards III said, "We must evaluate the bureaucracy, not only absolute numbers but also in terms of capabilities to perform desired tasks."

From the statement, it can be seen that the discussion on dealing with staff is not only about the amount. Because the success of policy implementation is also strongly influenced by the ability (quality) of the implementing staff. Based on this, Edwards III suggests two main quantities in analyzing the resources needed for public policy implementation, analyzing size and skills.

Staffs in charge of implementing the policy on street vendor relocation in Mojokerto City Square involve four people, the head of the trade division and three staff of the trade division. Moreover, Satuan Polisi Pamong Praja staff were not certain because they do not have a clear system of operating procedures in implementing this policy, which consisted of demolition and patrol (sterilization). Thus, the implementer has not been sufficient in carrying out the processes. The shortage of human resources is an obstacle in conveying policy output to the target group. The implementer lacks human resources in carrying out their duties and functions.

The implementation of the street vendor policy in Mojokerto City Square is weak in terms of resources. Employees directly involved in the relocation of street vendors are from the trade division at the Department of Industry and Trade. The Division of Trade only has five people, and one of them is the division chief. So if the Section Head does not count as a field implementer, then the relocation of street vendors in Mojokerto City Square is only handled by four people.

Due to the shortage of implementing staff, the Section Head, at the same time, acted as the field implementer in each sterilization operation in the Mojokerto City Square. The lack of energy was also carried out in collaboration with the Civil Service Police Unit. However, the Civil Service Police Unit also does not have a special schedule of sterilization/patrol activities to ensure that the area is truly sterile from street vendors.

In terms of skills or abilities of policy implementers, the Department of Industry and Trade has no substantive complaints. Complaints about skills arise from street vendors. The training was provided so that the economic street vendors increased their activities, but it did not provide alternatives. The skills and training provided by officers are only for dropping obligations. However, this lack of skills can be overcome by working with other parties in conducting training. Several government agencies now tend to carry out technical cooperation with other parties to hold certain activities.

3.2.2 Information

Two important notions discussed regarding the information as the second influential factor in the context of resources related to how policies should be carried out. Further information relates to legal rules that must be understood regarding the implementation of the policy. Discussion of communications in the previous subchapter also includes a discussion of information. Thus, information analysis will not be discussed in this subsection so as not to repeat the discussion.

3.2.3 Authority

The Kamus Besar Bahasa Indonesia defines authority as the right and power to act, power to make decisions, govern, and assign responsibility to others. The homeless handling policy has a multilevel implementing structure. This means that several levels of agencies are interconnected, both vertical accountability relationships and horizontal coordination relations. The policy will not be implemented if it is not accompanied by a delegation of authority to the executor. Each stage of street vendor relocation activities can be explained as follows:

At the planning stage, authority is given to the Department of Public Works (*Dinas Pekerjaan Umum*) of Mojokerto City. During the implementation phase, several parties were given different authorities. The Department of Industry and Trade has the authority to relocate street vendors and carry out data collection, while *Satuan Polisi Pamong Praja* has the authority to relocate street vendors to the street vendor center in Benteng Pancasila.

At the stage of fostering street vendors, the authority to carry out data collection, sorting, and guidance for street vendors is handled by the Department of Industry and Trade. There were complaints from the implementing policy regarding the lack of equal authority given. At the monitoring and evaluation stage, the authority is not shared.

3.2.4 Facilities

The most striking weakness of implementing the street vendor relocation policy is that the relocation facility is far from adequate. The place used to relocate street vendors in Mojokerto City Square is in the center of the street vendor, *Benteng Pancasila* street, which is considered less strategic. The selection of this place is considered to have not made sufficient observations because it is far from the city center.

3.3 Disposition

The implementer has a good disposition. It can be seen that the policy implementers and the community strongly support the implementation of relocation policy of street vendors from area Mojokerto City Square to Benteng Pancasila street. This policy was issued to make Mojokerto city square looks clean, beautiful, useful, and comfortable.

Factors that are of concern to Edward III (as cited in Agustino,2008, pp. 159-160) concerning dispositions in policy implementation consist of: appointment of bureaucracy and incentives. The first factor is an appointment of bureaucracy. Disposition or the attitude of the executor impedes the implementation of the policy if the existing personnel does not implement the policies as desired by the higher-ranking officials. Therefore, the appointment and selection of personnel implementing the policy must be people who are dedicated to the policies and, more specifically, to the interests of citizens.

The second factor is incentives which are one of the techniques suggested to overcome the attitude problem of the policy implementers by manipulating incentives. People move based on their interests. Policymakers may give incentives to influence the actions of policy implementers. Adding certain benefits or costs might be a motivating factor for executors to carry out orders well. This is done to meet personal or organizational interests. Implementers of policies have tangible values that can be different from one another. The difference of value creates differences in policies or assessments of existing policies. Suppose the difference in values between policymakers and implementing policies is quite large and tends to be in the opposite direction. In that case, friction will appear and hinder the implementation of the policy.

Disposition in implementing street vendor relocation policies in Mojokerto City is character and attitudes of the implementer such as commitment, honesty, and democratic nature. If the implementer has a good disposition, he will be able to run the policy as desired by policymakers. When the implementer has different characteristics or perspectives from policymakers, the policy implementation process also becomes ineffective. Thus, the government needs to involve the main actor who can drive the policy implementation to improve participation. It can come from the community, like woman participation, as in the case of village development planning (Wijaya, Andriyanto, & Wike, 2020).

3.4 Bureaucratic Structure

Based on the data display, the implementation of this policy is appropriate in terms of roles, tasks, and coordination between the implementing parties. The division of roles is intended to facilitate the implementation of this policy. However, even though each policy implementing apparatus has different duties, coordination between the policy implementing apparatus is needed to achieve the policy's goal.

According to Edwards III, the most critical point to discussed when discussing bureaucratic structures in the implementation of public policy is standard operating procedures and fragmentation. However, several other points also need to be considered. Officially, the Department of Industry and Trade does not have an SOP. So far, the Department of Industry and Trade relocate street vendors used the guideline stipulated in the Regional Regulation of the City of Mojokerto No. 2005 concerning structuring and fostering the activities of street vendors, with several additions and deductions.

To guide the Trade Officers, the department developed procedures for handling street vendors in the Mojokerto City Square. However, these procedures are not written but only delivered verbally in the team briefing. It can also be said that the work guide of the Department of Industry and Trade is a convention / collective agreement. It was also found that the implementation of the relocation policy to the street vendors in Mojokerto City Square does not exhibit any fragmentation. In implementing this policy, there is no adjustment to break down the bureaucratic structure into small units. It is also critical to establish an independent and professional institution (Laksana et al., 2020) to handle the street vendors.

Conclusions

Factors influencing the implementation of the street vendor relocation policy include communication, resources, disposition, and bureaucratic structure. Firstly, communication has run well among agencies, but communication between the apparatus and the street vendors is not effective. The process of socialization is only conducted through indirect communication. The second factor is resources. The number of employees from the Department of Industry and Trade and *Satan Polisi Pamong Praja* of Mojokerto city involved during the implementation is limited, resulting in failure to achieve the objectives of the relocation policy. The third facto is disposition. The apparatus acted based on the existing mechanism. Finally, the Department of Industry and Trade does not have a standard operating procedure. The procedures are not written but delivered verbally in the team briefing like a convention or collective agreement. Fragmentation is also not implemented.

There are several suggestions that the stakeholders need to consider. Firstly, in implementing a policy, the government must maximize the delivery of information about the existence of the policy so that all street vendors can easily find out the policy information. In implementing the socialization mechanism, Mojokerto City Government is expected to have more innovative ways so that the interests of the government and street vendors can run in harmony without harming either party. Secondly, the government should provide counseling and training in work skills, business development, and customer service based on street vendors' abilities, background, and character. Thirdly, the government must provide capital assistance to street vendors in collaboration with third parties (private, cooperatives, rural banks, and NGOs) For business development and to participate in business development programs. Finally, the government should make the street vendor locations a hawker and culinary center to attract visitors/tourists from outside of the area and pay attention to the surrounding environment.

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Research Paper

The Impact of Negative Investment List (NIL) Introduction on Investment Decisions of Foreign and Domestic Investors in Indonesia

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ABSTRACT

As an investment intervention policy, NIL is present to grant legal certainty to investors and invite more investment. Its existence has possible impacts on investment decisions. However, the studies of its effect are limited, focusing only on specific NIL versions and sectors. To fill this gap, the present paper investigates the impact of NIL introduction on the investment decisions of foreign and domestic investors in Indonesia by utilizing all NIL versions and business field-level data of the planned-investment values from 2005 to 2018. The analysis shows, first, the NIL introduction may generate the investment inflows from both FDI and DDI. Second, there was a parallel movement of crowding-in effect between foreign and national firms responding to the investment opportunities open to both parties. This study suggests that more detailed and transparent information should be provided in the NIL to guarantee its effectiveness.

Keywords: negative investment list, investment decisions, crowding effect, foreign direct investment, domestic direct investment

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1. Introduction

In the past two decades, the movement of emerging economies towards the open-market type has been significantly increased. The globalization process has resulted in the opening up of trade barriers and facilitated multinational companies to invest in developing countries (Hayakawa et al., 2012). However, this liberalization process has not yet been consistently developed due to some changes and uncertainties in the regulation territory (Genthner & Kis-Katos, 2017). Although the manufacturing sector has played a vital role in Indonesia's economy, the government has limited the involvement of FDI in this sector through the so-called negative investment list (NIL) to protect the national industries (Genthner & Kis-Katos, 2017; Simanjuntak, 2010).

First released in July 2007 as a presidential regulation, the NIL compiles business fields that are closed or conditionally open to direct investment. It is the first essential document to be reviewed by an investor who wants to do business in Indonesia (Magiera, 2011). The business fields listed in the NIL are classified based on the most disaggregated level—5-digit coding—of *Klasifikasi Baku Lapangan Usaha Indonesia* (KBLI) or Indonesian International Standard Industrial Classification (ISIC) (Aisyah, 2018). The 5-digit KBLI codes that are not listed in the NIL are 100% allowed for both Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI) ownership. Moreover, the NIL was subsequently amended four times in December 2007, May 2010, April 2014, and May 2016, totaling five versions of the NIL (Simanjuntak, 2010). The amendments addressed investors' concerns about the legal certainty and government targets to attract more investments in the country, leading to further relaxing of restrictions (Dewi et al., 2017; Magiera, 2011).

As an investment intervention policy, the introduction of the NIL has possible impacts on investment decisions and inflows. First, the NIL introduced the degree of openness to investment—fully open, conditionally open, and prohibited. For foreign investors, the conditionally open term might result in lower FDI inflows due to its restrictive or limiting nature (Genthner & Kis-Katos, 2017; Liu et al., 2018; Magiera, 2011), while for domestic investors, the fully open term is favorable as it indicates a greater opportunity for investment activities (Aisyah, 2018; Dewi et al., 2017). Second, the NIL might indirectly introduce crowding effects to investment inflows as the NIL may become one of the determinants of investment decisions (Magiera, 2011; Sunarwibowo, 2018). The presence of foreign entities might result in crowding effects on DDI decisions and vice versa (Göçer et al., 2014; Paolino, 2009; Prastomo, 2017).

Indonesia presents a relevant issue for studying the effects of investment policies. With its growing domestic market, rich natural resources, and abundant labor supply, the nation has long been a favored investment destination (Lindblad, 2015). Furthermore, the NIL offers an interesting government intervention to give legal certainty to investors (Aisyah, 2018; Magiera, 2011). By providing a clear and transparent NIL framework, the government has targeted more investment inflows into the country (Dewi et al., 2017).

Studies on the introduction of the NIL are limited. Dewi et al. (2017) utilized Cumulative Abnormal Return (CAR) to measure the market reaction to the announcement of the 2016 NIL amendment. The study acknowledged that the 2016 NIL offers a more liberalized investment opportunity to foreign investors, and the introduction of this policy impacted the increase in the stock price index (IHSG). Magiera (2011) evaluated the introduction of the 2007 and 2010 NIL amendments on service sectors. He concluded that the NIL's purpose of providing legal certainty to investors was not achieved because it is no longer listing all the restrictions on investment and obligating other policies to be reviewed, particularly sectoral-related ones. A recent study by Genthner and Kis-Katos (2017) explored the effects of 2007, 2010, and 2014 NIL introductions on investment performance, productivity, and employment of the manufacturing sector. Focusing only on the FDI restrictions, they found a negative relation between the NIL and those variables. They concluded that restrictions in the NIL could lead to a decrease in firms' performance.

While previous studies have increased the knowledge concerning the introduction of the NIL, they have merely examined specific versions of the NIL, focusing primarily on selected sectors. Furthermore, little has been studied to evaluate the effects of the NIL introduction on investment decisions. Therefore, to fill this gap, this study aims to analyze its impact by utilizing all NIL versions and all business fields in the economy.

This paper used the planned-investment value along with the information related to "whether or not the NIL is already introduced at a certain year," "the degree of openness to investment," and variable controls, which consist of factors affecting investment decisions. It employs a quantitative method to

answer questions: How does introducing the NIL affect the investment decisions in Indonesia? How does its implication differ between FDI and DDI decisions? Thus, the study proposes the following hypotheses:

H1 : The introduction of the NIL has a positive impact on both FDI and DDI inflows
H2 : The FDI favors conditionally open term rather than the other terms
H3 : The DDI favors open term rather than the other terms
H4 : There is a crowding-in effect of FDI on DDI and vice versa as an indirect impact of the introduction of the NIL

The unit analysis of this research is a business field categorized at 5-digit KBLI codes. Finally, the study shows that first, NIL introduction may generate investment inflows. Second, the FDI and DDI's decisions differed in response to the introduction of the NIL: the fully open term may increase FDI more than the other terms; in contrast, the conditionally open term may boost DDI more than any other terms. Third, FDI may create a crowding-in effect to the decisions of DDI, vice versa, since the increase in FDI aligns with the increase in DDI of selected sectors. Forth, the investments in Indonesia are mostly financed by the FDI, implying that the crowding-in effect of FDI on DDI is more than the crowding-in effect of DDI on FDI. Fifth, in the manufacturing, electricity, and real estate sectors, a parallel movement of crowding-in effect between foreign and national firms exists to respond to the investment opportunities open to both parties. Sixth, the NIL introduction may generate the crowding-in effect in the electricity sector. In general, the introduction of the NIL in one way or another possibly contributes to investment decisions and investment inflows improvement in Indonesia.

The present paper is structured as follows. The first section contains the introduction and literature review, while the second section explains the methodology and analysis. The third section discusses the results and discussion, and the fourth concludes the study.

2. Literature Review

2.1 Investment Policy and its Performance in Indonesia

Over the decades, Indonesia has performed investment liberalization. The stipulation of Law No. 25 of 2007 on Investment marked the government's efforts to improve the investment climate to encourage more investment into the country (Magiera, 2011). This law replaced separate laws on DDI and FDI from 1967 and 1968, respectively, and became a legal basis in stipulating investment-related provisions (Magiera, 2011). Adopting this law, the government stipulated a presidential regulation on the NIL in July 2007, revising the old vague negative list that was issued in 2000 (Genthner & Kis-Katos, 2017).

In the meantime, the global financial crisis in 2008 deteriorated the investment performance in Indonesia. Ministry of Investment or the Indonesia Investment Coordinating Board (BKPM, 2020) recorded that the FDI and DDI realization fell by about 28.4% in 2009 and 39.75% in 2008, respectively. Even though a relative upsurge happened in the following years (Table 1), it was still a struggle to recover investments due to the adverse effects of insufficient infrastructure, inadequate education, corruption, and unclear regulations (BKPM, 2020; Duggan et al., 2013; Magiera, 2011). Identical conditions were also reflected in the planned-investment value. In 2009, both the FDI and DDI immediately went down by 49.7% and 9.6%, respectively. The value was successfully recovered in 2012, with an increase of 40.3% and 36.5% for FDI and DDI, respectively. From these figures, it can be concluded that global shocks and national issues might possibly weaken the investment flows.

Table 1: Investment Realization and Planned-investment in Indonesia in 2005 – 2018

Year	Investment Realization		Investment Planned	
	FDI	DDI	FDI	DDI
2005	8.985348073	2.078997174	8.1959028	0.002241403
2006	6.063885703	1.599794089	9.7744663	0.009052674
2007	10.40908319	2.444450768	21.5033461	0.009184078
2008	17.56105999	1.472900453	24.0856734	0.007421915
2009	12.57451613	2.889908468	12.1150906	0.00670767
2010	16.21477071	4.041753799	18.2020379	0.002995102
2011	19.44225822	5.066712967	16.6359	0.007777364
2012	24.56467144	6.145467641	23.3321053	0.010613589

Year	Investment Realization		Investment Planned	
	FDI	DDI	FDI	DDI
2013	28.61750341	8.543385658	72.3830655	0.028883924
2014	28.52969683	10.40841042	91.9048479	0.020920518
2015	29.27593406	11.964391	108.2696726	0.041982999
2016	28.96406851	14.41538969	111.9243197	0.046030632
2017	32.23973752	17.49003609	145.5611584	0.064091154
2018	29.30790141	21.90699398	28.7740006	0.055152331
Total	**292.7504352**	**110.4685922**	**692.6615871**	**0.313055353**

Source: BKPM, 2020 (proceed by the author)

During Joko Widodo's regime, the efforts to alleviate the investment bottlenecks have been strengthened. The efforts consist of opening up more business fields to both FDI and DDI and simplifying the procedures through a framework named the Economic Policy Package (Aisyah, 2018; Hendra & Firdaus, 2019; Wijaya et al., 2020).

The Indonesian government has also undertaken a few sectoral deregulations to attract more investment (National Development Planning Agency [Bappenas], 2020). The government proposed a new tax incentive to the labor-intensive industry in the manufacturing sector and simplified its starting business procedure in 2016. In 2015, Joko Widodo offered plenty of potential projects in the electricity sector, specifically renewable energy projects, to achieve the target of "35,000 MW for Indonesian." In the real estate sector, the government relaxed the percentage of FDI shares on the luxury flat project and imposed income tax deductions to encourage investment in housing construction for low-income residents in 2015. In the following year, the government initiated the plan to enhance the Indonesian Special Economic Zones (SEZs) by improving the existing SEZs, establishing 11 new SEZs, and imposing additional fiscal and non-fiscal incentives for investors located in SEZs. The stipulations were proposed in order to indirectly encourage investment in the real estate sector. Lastly, the government applied the Indonesia National Single Window (INSW) to streamline the licensing procedure in the transportation and logistics sector.

The investment approvals by sectors show interesting figures. A large number of planned-investment value flowed into "manufacturing," followed by "electricity, gas, steam and air conditioning supply," "real estate activities," "wholesale, retail trade, and repair of vehicles," "mining and quarrying," and "agriculture, forestry, and fishing" (see Appendix).

Despite the government's efforts to relax the economy, Indonesia still faces challenges improving the investment climate. Schwab (2019) in The World Economic Forum (WEF) Report recorded that Indonesia's Global Competitiveness Index dropped five places to 50th out of 141 countries in 2019, as well as the EODB Index in 2019, which shows stagnancy at 73rd out of 190 economies (World Bank Group, 2020). Additionally, The Organisation for Economic Cooperation and Development (OECD, 2019) reported that although many business fields have been relaxed, Indonesia's economy is still more restricted than other ASEAN countries. With a total FDI Restrictiveness Index of 0.313 in 2018, Indonesia was ranked third in terms of having relatively higher restrictiveness. These figures represent most of the investors' concerns regarding legal uncertainty in Indonesia (Aisyah, 2018; Genthner & Kis-Katos, 2017; OECD, 2019).

Overall, the Indonesian government has taken various measures to open up its economy, one of which is introducing the NIL. However, with the fluctuating figures of FDI and DDI value in those years (BKPM, 2020), along with the global shocks and national issues that occurred in the past decades, the impact of the introduction of the NIL on investment decisions could not be estimated directly (Genthner & Kis-Katos, 2017). Therefore, a quantitative method was proposed for this study.

2.2 The Negative Investment List (NIL)

The provision of the NIL is basically a government measure to provide legal certainty to investors and invite more investment. It provides investors with information on business fields that are prohibited or conditionally open to investment at 5-digit KBLI codes (Aisyah, 2018). Long before the first NIL was released, an older and vague negative list was introduced to the market in 2000. However, the list did not use KBLI codes, resulting in confusion in the investment policy, but it showed that the "restriction" already existed

(Genthner & Kis-Katos, 2017). Whether or not the NIL has already been introduced in certain years can be obtained from this information.

The five versions of the NIL have their own stories. First, Presidential Regulation (PR) No. 77 of 2007 was considered a protectionist measure against the FDI because it added more business fields and proposed more conditions than the 2000 list (Genthner & Kis-Katos, 2017). Second, PR No. 111 of 2007 overlapped with sectoral provisions formulated by ministries, raising many uncertainties between investors and legal authorities (Lindblad, 2015; Magiera, 2011). Third, PR No. 36 of 2010 comprised a new implementing language and reorganized the list by adding and removing some business fields to and from the NIL (Genthner & Kis-Katos, 2017; Magiera, 2011). Fourth, PR No. 39 of 2014 remained unwelcome to the FDI because more business fields were restricted to foreign investors. Fifth, PR No. 44 of 2016 dismissed many business fields from the list and signifying a more liberalized economy (Genthner & Kis-Katos, 2017). Overall, the number of business fields listed-in and listed-out from one NIL amendment to the next fluctuates. It describes that the 2010 and 2014 versions are more restricted to investment, while the 2007B version and 2016 version are more liberalized (see Table 2 for more detail).

Table 2: Composition of Listed-in and Listed-out 5-Digit KBLI Codes by the Degree of Openness to Investment

Number of 5-digit KBLI Codes Listed-in and out	Listed out from 2007A	Newly listed into 2007B	Listed out from 2007B	Newly listed into 2010	Listed out from 2010	Newly listed into 2014	Listed out from 2014	Newly listed into 2016
Total	13	15	170	77	22	60	92	29
FDI								
Fully open	0	0	0	0	0	0	0	0
Conditionally open	9	7	17	52	16	13	75	21
Prohibited	4	8	153	25	6	27	17	8
DDI								
Fully open	10	15	167	74	22	58	91	28
Conditionally open	0	0	0	2	0	1	1	0
Prohibited	3	0	3	1	0	1	0	1

Source: Ministry of Law and Human Rights (Kemenkumham) (2016) (proceed by the author)

The body of the NIL consists of three appendices, but in general, it is structured by two main outlines. First is the list of business fields prohibited from investment. The list is determined based on concern for health, morals, culture, environment, national defense and security, and national interest. Second is the list of business fields opens to investment with conditions, including capital ownership limitations, partnership obligation, designated locations, special permits, and reserved-for-DDI. The "capital ownership limitation" describes how many percentages of investment ownership are allowed, ranging from 25% to 100% of ownership. The "partnerships obligation, designated locations, and special permits" represent some sort of condition that the investors should fulfill. Meanwhile, "reserved-for-DDI" depicts specific business fields designated to be fully open to DDI and prohibited to FDI. Since two main outlines structure the NIL, a single 5-digit-code can be specified multiple times depending on whether it has two or more binding conditions (Kemenkumham, 2016). In this context, the 5-digit KBLI code is not the main classifier but one of the complementary information. Therefore, the investors would need to explore the entire NIL content to capture the whole condition. With these conditions, the degree of openness to investment can be obtained. This degree implies that most of the content of the NIL offers a fully open term to the investors, primarily for DDI.

Based on sector classification, the NIL stipulates 18 sectors. The most stipulated sectors are manufacturing, followed by agriculture, forestry, and fishing; transportation and storage; wholesale, retail trade, and vehicle repair; and construction (Kemenkumham, 2016). During the implementation of the NIL, agriculture, forestry, and fishing, and manufacturing sectors are increasingly stipulated, whereas construction and wholesale, retail trade, and vehicle s sectors were decreasingly regulated in NIL (Kemenkumham, 2016).

The introduction of the NIL has possible impacts on investment decisions as well as investment inflows. According to Genthner and Kis-Katos (2017), Liu et al. (2018), and Magiera (2011), the NIL might hinder improvement in FDI inflows because once a business field is listed in the NIL, some conditions may be applied to it, resulting in two degrees of openness for foreign investors, conditionally open and prohibited. Nevertheless, Aisyah (2018) and Dewi et al. (2017) concluded differently. During the implementation of the NIL, the government deregulated investment procedures and requirements,

including relaxation of the allowed percentage of foreign ownership. Therefore, the conditionally open term might offer legal certainty to foreign investors who might in turn improve the FDI inflows. Slightly different from FDI, the NIL introduced three degrees of openness for DDI: fully open, conditionally open, and prohibited. Dewi et al. (2017) implied that the fully open term is preferable for domestic investors since it can provide greater investment opportunities.

2.3 Investment Performance: A General Information

Any analysis of investment policy cannot be separated from the factors determining investment decisions. Those factors are spread over some aspects, such as economic, institutional, and political factors. The economic aspect consists of market size proxied by the real Gross Domestic Product (GDP), the stability level in the host country represented by the real effective exchange rate (REER), and other macroeconomic factors (Fernandez et al., 2020; Tsaurai, 2017). The "Real GDP" has a positive correlation with investment flows because the increasing real GDP may generate more employment and keep the business cycle going (Azam & Lukman, 2010). In contrast, "REER" is found to be negatively correlated with investment flows because when the REER depreciates, the input price from the market of the host country may be lower and more competitive, which may, in turn, boost the investment value (Nainggolan et al., 2015). The institutional aspect consists of government indicators proxied by the Control Corruption Index and legal certainty proxied by the Regulation Quality Index (Sunarwibowo, 2018; World Bank, 2020b). "Regulation Quality" is estimated to positively affect investment inflows because it reflects good governance that will attract more investment value. Meanwhile, the political factor contains Political Disputes that might have a negative coefficient on investment growth (Tsaurai, 2017).

Investment decisions can take many forms. Nuradi and Fatimah (2015) imply that the decisions mainly appear in the form of investment value, workforce numbers, and project numbers. Among those forms, the investment value became the most utilized measure to investigate investment decisions (Nuradi & Fatimah, 2015). Based on Law No. 25 of 2007 on Investment, the investment value is divided into two categories. The first is investment planning. This is the value investors plan to invest in and is recorded in a legal document called the *Izin Prinsip* (Investment Principle License), or today was named as *Nomor Induk Berusaha* (Business Identification Number). The second is investment realization. This is the value that investors have realized in Indonesia and is recorded in the *Laporan Kegiatan Penanaman Modal/* LKPM (a quarter and semester investment activities report). The value of these two types of investment could differ greatly following the investor's project development in the fields and their financial situation.

High investment value is an indicator of a favorable investment policy. In this sense, the investment policy succeeds in providing legal certainty to investors; thus, it manages to boost investment inflows (Aisyah, 2018). There are at least two principles of legal certainty that have emerged from the analysis of investment policy (Portuese et al., 2014): First, legal certainty endures reliance cost, meaning that if the regulation keeps changing, the investors may not be interested and, therefore, may end up in an economic loss to the host country. Second, legal certainty constitutes risk costs, which are the costs of predicting unforeseen changes. The investors may not invest in the destination country when the risk cost is too high. These principles support the idea that when the host countries cannot provide legal certainty to the investors, the investment will not be drawn.

Legal certainty in investment policy has various definitions. The World Bank Group (2020) interprets it as the government's ability to offer clear information regarding investment procedures and investment opportunities (World Bank Group, 2020). In addition, the OECD (2019) translates legal certainty as "the degree of openness to investment" using the FDI Restrictiveness Index that takes values between 0 and 1, wherein 1 is the most restrictive or closed to investment. Thus, the indicators of the degree of openness to investment can be used to analyze the introduction of investment policy on investment decisions.

Furthermore, investment decisions can also be measured by the crowding effect phenomenon. When legal certainty is achieved, multinational firms might be attracted to invest in the host country (Sunarwibowo, 2018). The presence of these firms might result in crowding-in effects on the DDI inflows due to enhanced positive externalities, which are knowledge spillovers, specialized labors, and intermediate inputs (Göçer et al., 2014; Prastomo, 2017; Sunarwibowo, 2018). On the contrary, the crowding-out effect implies the opposite conditions. Similarly, the existence of national entities might also introduce a crowding effect to foreign entities (Paolino, 2009). By adopting this theory, the effect of introducing investment policy can also be explored through the viewpoint of the crowding effect.

3. Methodology

In this paper, the hypotheses were tested by measuring the effect of the NIL introduction on investment decisions in Indonesia, investigating its effect differences between FDI and DDI decisions, and exploring the crowding effect phenomenon between foreign and national firms. This study heavily relies on secondary data at the business field level, taken from the BKPM between 2005 and 2018. A quantitative method consisting of regression and descriptive analyses will be employed in this research.

Several steps were taken before finalizing the data. The first step was to extract the data by defining the business field classified in 5-digit KBLI codes. This step was taken because the most disaggregate level of business field classification available in BKPM data is the 4-digit KBLI codes. The information about 5-digit KBLI codes was extracted from the Investment Principle License of each firm that had invested during the analysis period. The total number of firms involved in this study is 82,456, comprising 29,372 foreign and 36,351 domestic entities. The second step was to analyze all NIL versions to capture the information, whether the NIL is already introduced in a certain year or not, and the degree of investment openness to each business field. Finally, the result of data extraction and NIL analysis were incorporated to finalize the data collection.

This paper employed two methods, regression analysis and descriptive analysis. The regression analysis uses the fixed-effect model explored by Genthner & Kis-Katos (2017) and Sunarwibowo (2018). The two regression models, the FDI Model and DDI Model, were estimated using this method. The descriptive analysis by sector utilizes BKPM data, the NIL analysis results, and the government policies during the implementation of the NIL. The reason behind adopting this method was to capture a broader picture of the effect of the NIL introduction on investment decisions and the crowding effect between foreign and local entities in a sectoral manner.

The unit analysis of this study is a business field that is classified in 5-digit KBLI codes, following the business field categorization in the NIL. The total number of business fields analyzed in this paper is 886, consisting of 697 foreign investors and 820 domestic investors. The 886 business fields are the entire number of business fields recorded in BKPM in 2005–2018 (14 years), except for FDI; the data used for the present study is only from 2005 to 2017, considering the incomplete data of planned-investment value in 2018. The business fields used in this research are classified into 20 sectors, with a significant number incorporated in manufacturing, wholesale and retail trade; repair of motor vehicles and motorcycles; agriculture, forestry, and fishing; transportation and warehousing; and construction (Kemenkumham, 2016).

The variables utilized in this paper consist of dependent and independent variables. The dependent variable is the planned-investment value of FDI and DDI, whereas the independent variables consist of: (1) "Dummy of whether or not the NIL is already introduced at a certain year" to capture the effectiveness of NIL's introduction in boosting more investment flows before and after the NIL was introduced (Genther & Kis-Katos, 2017); (2) "Dummy of the degree of openness to investment" to gain both foreign and local investors' decisions when they are about to invest in Indonesia (Aisyah, 2018; Dewi et al., 2017); (3) "The FDI-planned and DDI-planned value" to estimate the crowding effect that could possibly induce the investment inflows (Göçer et al., 2014; Prastomo, 2017; Sunarwibowo, 2018); (4) Control variables in the form of market size and institutional proxy, including Real GDP, REER, and Regulation Quality, that were estimated having either directly or indirectly correlated to the investment inflows (Azam & Lukman, 2010; Nainggolan et al., 2015; Sunarwibowo, 2018; World Bank, 2020b). The description of the variables and the distribution of observations and business fields (5-digit KBLI codes) used in the study are provided in the Table 3 and 4

For the dependent variable, this paper applied the logarithm-form. This form is adopted to avoid the heteroscedastic issue since the data has outliers and increasing patterns of the regression residuals (Wooldridge, 2012). Meanwhile, because the variation of investment-value data is dominated by zero (0), the study proposed the "Log (1 + Investment Value)" to avoid "missing observations." Finally, to interpret the log transform, the present paper followed the formula addressed by Wooldridge (2012).

Furthermore, in the dummy of the degree of openness to investment, this study acknowledged three types of investment circumstances. They are "fully open" if the investment is allowed for 100% of ownership (specifically for DDI, but for FDI, meaning that the business field is not listed in the NIL), "conditionally open" if the investment is allowed for up to 100% with conditions to be fulfilled, and "prohibited" if the investment is restricted for both FDI and DDI.

The present paper utilized planned-investment rather than investment realization. It is because, based on Law No. 25 of 2007 on Investment, the planned-investment shows the first intention of investors, which may be viewed as their investment decisions.

Moreover, the planned-investment in the BKPM data consists of three types: new, changing, and expand. The "new" type means the planned-investment comes from the new investors in a specific year, while the "changing" and "expand" types mean the planned-investment comes from the existing investors who want to change or upgrade their business activities in Indonesia in a specific year. For the purpose of analysis, the paper only exercised the "new" type of planned-investment. This is because the amount of the "changing" and "expand" types was a recalculation or improvement of the initial investment value.

Finally, the equations for the regression model are specified as follows, while the description of its denotation is provided in Table 3.

FDI Model:

$$ln1FDIvalue_{it} = \alpha_{it} + \beta_1.dIntro_t + \beta_2.dOpen_{it} + \beta_3.ln1DDIvalue_{it} + \beta_4.lnRGDP_t + \beta_5.REER_t + \beta_6.RQ_t + \epsilon_{it}$$

DDI Model:

$$ln1DDIvalue_{it} = \alpha_{it} + \beta_1.dIntro_t + \beta_2.dOpen_{it} + \beta_3.ln1FDIvalue_{it} + \beta_4.lnRGDP_t + \beta_5.REER_t + \beta_6.RQ_t + \epsilon_{it}$$

Table 3: Description of Tables

Dependent Variable	**Denoted by**	**Description**	**Expected Sign**	**Definition**
Planned-investment	*ln1FDIvalue*$_{it}$ and *ln1DDIvalue*$_{it}$	Continuous (in logarithm)	N/A	The planned-investment value of FDI or DDI operating in a business field *i* in the year *t* (BKPM, 2020).
Independent Variables	**Denoted by**	**Description**	**Expected Sign**	**Definition**
NIL Introduction	*dIntro*$_t$	Categorical dummy: 1. No = 0 (base category) 2. Yes = 1	N/A +	The information on whether or not the NIL is already introduced in year *t* (Kemenkumham, 2016).
The degree of openness to investment	*dOpen*$_{it}$	Categorical dummy: 1. Prohibited = 0 (base category) 2. Conditionally open = 1 3. Fully open = 2	N/A + +	The information on the degree of openness of business field *i* to investment in year *t* (Kemenkumham, 2016).
FDI-planned value	*ln1FDIvalue*$_{it}$	Continuous (in logarithm)	+	The FDI-planned value operating in a business field *i* in the year *t* (BKPM, 2020).
DDI-planned value	*ln1DDIvalue*$_{it}$	Continuous (in logarithm)	+	The DDI-planned value operating in a business field *i* in the year *t* (BKPM, 2020).
Real GDP	*lnRGDP*$_t$	Control variable (in logarithm)	+	GDP (constant 2010 USD) in year *t* (World Bank, 2020a).
REER	*REER*$_t$	Control variable	-	Real Effective Exchange Rate in year *t* (Bruegel, 2020).
Regulation Quality	*RQ*$_t$	Control variable	+	The ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development in year *t*. It ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance (World Bank, 2020b).

Note: proceed by the author

Table 4: The Distribution of Observations and Business Fields (5-Digit KBLI Codes) in the Study

Distribution of the Observations	**FDI Model**		**DDI Model**	
	Total	**Frequency**	**Total**	**Frequency**
Period analysis (in year)	13 years (2005–2017)		14 years (2005–2018)	
Number of observations	9.061		11,480	
Introduction of the NIL				
Not yet introduced	7,671	84.7%	9,685	84.4%
Already or being introduced	1,390	15.3%	1,795	15.7%
The degree of openness to investment				
Fully open	8020	88.5%	10,160	88.5%
Conditionally open	853	9.4%	894	7.8%
Prohibited	188	2.1%	426	3.7%
Total observed business fields (5-digit KBLI codes)	697		820	
Non-NIL	419	60.1%	461	56.2%
NIL	278	39.9%	359	43.8%

Note: proceed by the author

4. Results and Discussions

4.1 Regression Results

The empirical model is estimated for 886 business fields for 2005–2017 (FDI Model) and 2005–2018 (DDI Model). The results obtained are significant and acceptable on the basis of *p* value, *prob > f*, and *r*-square. Furthermore, the multicollinearity and heteroscedasticity in the model are also solved, while the Hausman test result shows that the value of *prob > chi2* is less than 0.5, which means that the fixed effect model is the proper estimation method to be used in this study. Finally, the regression results are given as follows.

Table 5: Estimation Results

		(FDI Model)	**(DDI Model)**
Dependent Variable		Log (1 + FDI-planned Value)	Log (1 + DDI-planned Value)
Regressors	**Expected Sign**		
Introduction of the NIL = Not yet Introduced[1]		0	0
		(.)	(.)
Introduction of the NIL = Already or Being Introduced	+	0.391*	0.427*
		(0.376)	(0.190)
The Degree of Openness to Investment = Prohibited[1]		0	0
		(.)	(.)
The Degree of Openness to Investment = Conditionally Open	+	3.889***	12.24**
		(0.448)	(4.109)
The Degree of Openness to Investment = Fully Open	+	4.140***	5.617***
		(0.510)	(1.630)
Log Real GDP	+	4.637***	16.92***
		(0.745)	(0.643)
REER	-	-0.142***	-0.151***
		(0.0113)	(0.0105)
Regulation Quality	+	6.409***	3.919***
		(0.970)	(0.880)
Log (1 + FDI-planned Value)	+		0.133***
			(0.0128)
Log (1 + DDI-planned Value)	+	0.0865***	
		(0.0107)	
Constant		-109.0***	-447.2***
		(20.22)	(17.60)
5-digit KBLI Codes Fixed Effect		Yes	Yes
Year Fixed Effect		Yes	Yes

		(FDI Model)	(DDI Model)
Dependent Variable		Log (1 + FDI-planned Value)	Log (1 + DDI-planned Value)
Regressors	**Expected Sign**		
Observations		9061	11480
R-square		0.494	0.458

Notes: Standard errors in parentheses.
* p < 0.05, ** p < 0.01, *** p < 0.001
[1]Base category.

The result implies that the introduction of the NIL, ceteris paribus, may generate an investment value for approximately 47.8% and 53.3% for FDI and DDI, respectively, from the state or period when the NIL was not introduced yet, meaning that H1 is accepted. It has been acknowledged that the government imposed the NIL on the market to give legal certainty to potential investors, who were then expected to attract more investments (Aisyah, 2018; Magiera, 2011). Therefore, the introduction of this policy may be considered a legal certainty in the Indonesian regulatory system and a more liberalized market.

The estimated result of the introduction of the NIL is parallel to the BKPM data. Both investment realization and planned-investment value portray an increasing pattern in the years after the NIL was introduced. As described in the Literature Review, the investment improvement seemed a little bit late and to have fluctuated, given some shocks—for instance, the financial crisis and the hike of world oil prices—that took place during the implementation of the NIL that might have influenced the investment decisions.

A more profound observation of the degree of openness to investment shows that the estimation for the FDI and DDI Model reverse each other. This implies that ceteris paribus, a business field that is fully open (or not listed in the NIL), is preferable to foreign investors than a conditionally open field; thus, H2 is rejected with this finding. In contrast, for domestic investors, the opposite condition applies. It has been acknowledged that the NIL has a restrictive nature to FDI. Even though the government has relaxed some sectors during the NIL implementation, the effect of this policy seems less significant in boosting more FDI into the country. However, given the positive sign of the coefficients of both fully open and conditionally open, those terms can together improve the FDI inflows. Therefore, the introduction of the NIL by any chance is able to generate investment value. Meanwhile, for the DDI Model, the results indicate that domestic investors prefer the business field to be conditionally open (or reserved-for-DDI) than fully open, ceteris paribus; therefore, H3 is rejected. This implies that conditionally open may be regarded as legal certainty for local investors as it ensures their investment activities will run smoothly. Furthermore, given some requirements obliged by the NIL, for instance, “partnership obligation,” national entities are possibly more interested in coping with FDIs as it may offer more opportunities in terms of technology and knowledge transfer. The other obligations, such as “location,” may provide additional information about the potential investment location as the government has already carried out feasibility studies on certain regions.

The estimation results for control variables, Real GDP, REER, and Regulation Quality, display a significant result with the signs that match expectations. The increase in Real GDP, ceteris paribus, may boost more investment as it signals a good economy of the host country (Azam & Lukman, 2010). The depreciation of REER, ceteris paribus, may attract investment since it creates lower input prices and a competitive market (Nainggolan et al., 2015). Further, the increase in Regulation Quality, ceteris paribus, may improve investment inflows. This may also be translated as a more open market since the government has performed a series of deregulations and relaxations in the investment policy, one of which is the NIL provision. The estimation of Regulation Quality strengthens the results of the introduction of the NIL and shows that both foreign and local entities favor legal certainty in the regulatory system.

Furthermore, the regression results of variables of FDI-planned and DDI-planned value proves the hypothesis (H4), which suggests that the rise of FDI value might cause the DDI value to go up, known as the crowding-in effect. Correspondingly, the crowding-in effect of DDI on FDI might also exist, as shown by the positive sign of coefficient in the estimation result. Moreover, the coefficient comparison between the crowding-in effect of FDI on DDI and the effect of DDI on FDI portrays that the former is bigger than the latter as the FDI inflows during 2005 – 2018 significantly exceeded the DDI inflows mostly in all sectors (see Table 1). In general, from the estimation result, it can be concluded that the NIL introduction might create a

crowding-in effect of FDI on DDI decisions and vice versa. A thorough analysis in a sectoral manner is provided in the descriptive analysis.

4.2 Descriptive Analysis by Sector

The planned-investment value data released by BKPM (2020) reveals interesting stories. First, the investments in Indonesia are mainly financed by the FDI. A huge amount of FDI inflows were observed during 2005 – 2018 compared to DDI inflows (see Table 1). This fact also implies that foreign firms are likely to introduce the most crowding-in effect to domestic firms, with 10 out of 21 sectors showing this tendency (see Appendix). Second, a considerable investment of the NILs compared to the Non-NILs in some sectors implies that the introduction of the NIL might affect the investment inflows to increase (see Appendix). Third, both FDI and DDI have similar top-nine sectors that experienced the highest performance out of the 21 sectors in the economy (see Appendix). Forth, a more profound analysis of the selected sectors from the top-nine sectors and the government efforts in giving legal certainty to the investors represent the results as follow (the following discussions refer to the information in Table 1 and Appendix):

In the manufacturing sector, both FDI and DDI elevated significantly after the government imposed the new tax incentive to the labor-intensive industry and simplified the investment procedure in 2016 (Bappenas, 2020) by approximately 110% and 67.4% for FDI and DDI, respectively. However, the extensive gap between the performance of the NILs and the Non-NILs, with the latter being way too large, depicts that the NIL introduction effect in this sector was not visible. Additionally, the same pattern that appeared in FDI and DDI inflows during 2008 – 2013 and 2016 – 2017 implies that there was a crowding-in effect of FDI on DDI and the effect of DDI on FDI in this sector. This finding agrees with the regression result above and research conducted by Sunarwibowo (2018) and Paolino (2009), implying that as FDI increases, DDI follows and vice versa. Take an example of the automotive industry. Multinational companies in Indonesia have allowed the national firms to take part in the global production network, leading to knowledge transfer and innovation from foreign to local firms (Aswicahyono & Kartika, 2010). The growth of the Indonesian automotive industry has also enhanced the development of its supporting industries that local manufacturers mostly run, for instance, auto-parts manufacturing, showing a crowding-in effect of FDI on DDI (Aswicahyono & Kartika, 2010). A considerable market share in auto-parts industries and a potentially large market has attracted foreign companies to invest in this country, showing a crowding-in effect of DDI on FDI (Aswicahyono & Kartika, 2010). Therefore, there was a parallel movement of the crowding effect between foreign and domestic entities.

In the electricity sector, the FDI value improved by 85.3% from 2014 to 2015 as the government introduced the "35,000 MW for Indonesia" program and offered some potential projects in renewable energy plants (Bappenas, 2020). The same condition also occurred in the DDI value, which increased by about 9.3 times from the previous year. Meanwhile, considerable investment value in the NILs, compared to the Non-NILs indicates that the impact of the NIL introduction in this sector was noticeable. Moreover, similar patterns in the FDI and DDI value during 2005 – 2018, except in 2008, 2013, and 2014, indicates that the crowding-in effect existed. However, in this sector, the crowding-in effect of FDI on DDI might be bigger than the crowding-in effect of DDI on FDI. First, the electricity projects require huge funds; and the government is seeking advanced and environmentally friendly technology (Budiono & Purba, 2019). Second, the promising source for electricity projects to meet those requirements is the FDI. It can be seen from the government policy intention to relax the percentage of ownership for "power plant projects above the 10 MW" to become 100% allowed for foreign shares in order to achieve "35,000 MW for Indonesia" program goals (Bappenas, 2020). Thus, the existence of foreign firms in this sector—for instance, in the renewable energy projects—might enhance the performance of domestic entities as it offered technology spillovers and other added values (Aissa & Hartono, 2016).

In the real estate sector, the FDI and DDI immediately rose by about 25% and 20%, respectively, from 2015 to 2016 and continued to increase in the subsequent years. A more open market might contribute to this rise. The government relaxed the allowed foreign ownership on the business of luxury flats' construction and imposed income tax deduction for housing construction (Bappenas, 2020). Additionally, the initiation of government plans to enhance the Indonesian SEZs—including improving the management of existing SEZs, establishing 11 new SEZs, and adding privilege incentives—has encouraged the development of industrial estates in SEZs, such as the improvement of the existing Sei-Mangkei SEZs in North Sumatera Province (Tarigan, 2019). However, the extensive amount of investment value in the Non-

NILs compared to the NILs reflects that the impact of the introduction of the NIL on investment inflows was not evident in this sector.

Meanwhile, the increase in DDI inflows aligns with the FDIs. It shows that there was a possibility of crowding-in effect in this sector. It is acknowledged that the government has intended to provide livable housing and promote the development of industrial estates (Bappenas, 2020). Since business activities in the real estate sector require the involvement of many parties or suppliers, the crowding effect was likely to move parallelly between foreign and national firms responding to investment opportunities open to both parties.

In the transportation and logistics sector, the value of FDI and DDI considerably improved as stipulated by the government in the INSW system to streamline the licensing procedure in 2015 (Bappenas, 2020). Even though in the subsequent years the value declined, the performance was still better than the years before 2015. Moreover, substantial investment in the NILs compared to the Non-NILs depicts that the introduction of the NIL had some influence on the inclination of investment value in this sector. Finally, the investment flows between FDI and DDI could not confirm the crowding effect phenomenon as it shows a random pattern.

Overall, the estimation results above could answer two out of the four hypotheses of this study. H1 is accepted because the introduction of the NIL, ceteris paribus, may increase FDI and DDI inflows. H2 and H3 were rejected because, ceteris paribus, fully open term may boost more FDI than conditionally open term. In contrast, conditionally open may attract more DDI than fully open term. H4 is accepted as the regression implies the increase of DDI is associated with the increase in FDI and vice versa. Ceteris paribus, there is a possibility of parallel movement of crowding-in effect between foreign and domestic entities responding to the investment opportunities open for both parties. Furthermore, from the descriptive analysis, four conclusions can be drawn. First, the investment value might improve after deregulation or relaxation—one of which was the NIL provision—was introduced. Thus, it can be implied that the NIL might provide legal certainty to the investors. Second, the effect of the NIL introduction on investment decisions was evident in the electricity, transportation, and logistics sectors, as the investment value of the NILs exceeded the Non-NILs. Third, there was a crowding-in effect possibility in the manufacturing, electricity, and real estate sectors as the increase in DDIs aligns with the rise in FDIs. In other words, foreign and national firms might share the crowding-in effect parallelly. Forth, the NIL introduction might contribute to generating the crowding-in effect in the electricity sector. In general, the introduction of the NIL in one way or another possibly contributes to affecting the investment decisions in Indonesia in the form of investment inflows improvement.

Conclusions

As the main reference for investors who wish to do business in Indonesia, the NIL presents an interesting view of government interventions regarding giving investors legal certainty. Using business field-level data of the planned-investment value from 2005 to 2018, this paper attempts to analyze the impact of the introduction of the NIL on investment decisions in Indonesia by exploring all versions of the NIL and all business fields in the economy. Subsequently, the study shows that, first, the NIL introduction may affect the investment decisions in Indonesia with a positive sign, meaning that the NIL is likely to generate investment inflows. Second, holding everything constant, the fully open term is preferable for FDI inflows to be improved. In contrast, the conditionally open term is favorable for DDI inflows to be increased. Third, there is a parallel movement of crowding-in effect between foreign and national firms responding to the investment opportunities open to both parties. Forth, since the investments in Indonesia are mostly financed by the FDI, the crowding-in effect of FDI on DDI is most likely to happen. Fifth, in the manufacturing, electricity, and real estate sectors, foreign and national firms may share the crowding-in effect with one another since the increase in DDIs aligns with the rise in FDIs. Sixth, in the electricity sector, the NIL introduction may generate the crowding-in effect. All in all, the introduction of the NIL in one way or another possibly contributes to affecting Indonesia's investment decisions in the form of investment inflows improvement.

The present paper contributes to the literature on the analysis of the introduction of investment intervention policy at the most disaggregated level. In this light, as a policy implication, the study suggests the policymaker consider the provision of Positive Investment List (PIL), which employs the 5-digit codes as the main classifier followed by “conditions” as complementary information. Even though the government

has just recently replaced the NIL with PIL under the name of "Priority Investment List," the main outline of the PIL is not much different from the NIL (Kemenkumham, 2021). Therefore, by arranging the 5-digit-codes as the main classifier, the investors may get the clearest and most transparent picture as they need only to look for KBLI codes to get comprehensive information without having to explore the entire contents of the NIL. In addition, since this study acknowledged that the investment decisions are possibly affected by the provision of the NIL and the macroeconomic factors, including Real GDP, REER, and Regulation Quality, the government should focus on improving the investment climate as these variables correlate to the investment decisions.

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Appendix

Table A. Planned-investment Value by Sector in 2005 – 2018

Planned-investment by sector (in USD billion)		FDI	DDI
Accommodation and food service activities*	Total	14.0556952	0.006382352
	Non-NIL	12.5986093	0.003791362
	NIL	1.4570859	0.002590990
Activities of extraterritorial organizations and bodies	Total	0	0
	Non-NIL	0	0
	NIL	0	0
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	Total	0	0.000000267
	Non-NIL	0	0.000000267
	NIL	0	0
Administrative and support service activities	Total	0.7758567	0.001139858
	Non-NIL	0.3767	0.000296717
	NIL	0.3991567	0.000842458
Agriculture, forestry, and fishing*	Total	26.0963756	0.020682496
	Non-NIL	4.5445429	0.003340900
	NIL	21.5518327	0.016928642
Arts, entertainment, and recreation	Total	2.3644341	0.002679238
	Non-NIL	0.5495628	0.001675351
	NIL	1.8148713	0.001003821
Construction*	Total	13.3089683	0.008144085
	Non-NIL	9.9601284	0.005683207
	NIL	3.3488399	0.002280685
Education	Total	0.1865279	0.000470456
	Non-NIL	0.0753806	0.000213383
	NIL	0.1111473	0.000257074
Electricity, gas, steam, and air conditioning supply*	Total	150.309523	0.068602538

Planned-investment by sector (in USD billion)		FDI	DDI
	Non-NIL	20.2995001	0.017653856
	NIL	130.010023	0.050489494
Financial and insurance activities	Total	0.0014505	0.000184975
	Non-NIL	0.0014505	0.000160663
	NIL	0	0.000024312
Human health and social work activities	Total	0.3594334	0.003132441
	Non-NIL	0.0553009	0.000684154
	NIL	0.3041325	0.002448194
Information and communication	Total	9.3557341	0.000887887
	Non-NIL	2.0736003	0.000462524
	NIL	7.2821338	0.000402930
Manufacturing*	Total	330.151185	0.109278127
	Non-NIL	246.518164	0.083774925
	NIL	83.6330212	0.018189383
Mining and quarrying*	Total	40.234797 8	0.010864291
	Non-NIL	31.575297 8	0.008888935
	NIL	8.6595	0.001964709
Other service activities	Total	0.266396	0.000045217
	Non-NIL	0.1826991	0.000031210
	NIL	0.0836969	0.000013736
Professional, scientific, and technical activities	Total	2.4584001	0.000181339
	Non-NIL	1.2800285	0.000147210
	NIL	1.1783716	0.000033384
Public administration and defense; compulsory social security	Total	0	0.000007327
	Non-NIL	0	0.000007327
	NIL	0	0
Real estate activities*	Total	41.687777 9	0.060109142
	Non-NIL	41.402797 9	0.059816224
	NIL	0.28498	0.000286098
Transportation and storage*	Total	18.434898 2	0.011506260
	Non-NIL	9.0420194	0.001608134
	NIL	9.3928788	0.009873694
Water supply; sewerage, waste management and remediation activities	Total	2.051189	0.000934885
	Non-NIL	1.5414842	0.000487754
	NIL	0.5097048	0.000447132
Wholesale and retail trade; repair of motor vehicles and motorcycles*	Total	40.562944 9	0.007822175
	Non-NIL	39.944472	0.003994889
	NIL	0.6184729	0.003801099
Total		**692.661587**	**0.300795725**

Source: Kemenkumham, 2016 (proceed by the author)
Notes: Sector category is based on KBLI classification.
*The top-nine sectors

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Policy Paper

Food Security and Insecurity Analysis in Jambi Province

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ABSTRACT

This study analyzed food security and insecurity using FSVA (Food Security and Vulnerability Atlas) mapping approach. The FSVA map presents district distribution based on food security and insecurity indicators. Current issues on food security include a drop in production and productivity due to land conversion, low adoption of technology at the farmer level, price fluctuation and ineffective price management, inefficient commerce system, low quality and quantity of public food consumption, failure to implement Diverse, Nutritious, Balanced and Safe Food Consumption Pattern (B2SA). This study aims to determine the vulnerability level of each district and propose countermeasures to reduce its rate. The results of FSVA mapping show that the 139 districts in Jambi could be grouped into the following categories: vulnerable (4 districts), quite vulnerable (18), sufficiently resistant (34), resistant (61), and very resistant (22). No districts fall under very vulnerable categories. Based on the ratio of per capita normative consumption of cereal production, 36 districts (25.90%) are vulnerable to food. Based on the toddler stunting prevalence, 78 districts (56.12%) are vulnerable to food, while based on the indicators of life expectancy, 48 Districts (34.53%) are food vulnerable.

Keywords: Food, Food Security, Food Insecurity, FSVA, Resilience Level

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1. Introduction

According to Food Act No. 18 (Law of the Republic of Indonesia, 2012), food derives from biological sources of agriculture, plantation, forestry, fishery, livestock, water, and water products. It can either be processed or unprocessed and designated as food or beverage for human consumers. These include food additives, raw food, and ingredients used in preparing, processing, and making food or beverages. According to the Food and Agriculture Organization (FAO, 2002), food security is a condition of food availability that meets the public demand both in quantity and quality at any time for them to live a healthy, active and productive life. According to Hanani (2012), food security consists of four main aspects: food availability, food access, food utilization, and food stability. Food stability could only be achieved once the three aspects of food security (food availability, food access, and food utilization) are well-realized and integrated.

The main problem of food security is closely related to poverty and hunger. This assumption is very reasonable considering the food is a human's basic need and right protected by law. The government, business, and society are all responsible for its availability. In the past few years, food security has been challenged with fundamental and complex problems resulting from economic globalization, trade, and world climate change (Nainggolan, 2008). As one of the provinces in Sumatra, Jambi is famous for its tropical climate, rich in natural resources and biodiversity, but still vulnerable to climate change. Symptoms of climate change, such as temperature rise, changes in rain intensity and periods, shifts in rainy or dry seasons, and sea-level rise, will threaten the capacity of the environment and the activities of all development sectors. Economic, social, and environmental factors strongly influenced food security realization. In general, several food security problems in Jambi Province can be identified: 1) decreased production and productivity due to land conversion of food to non-food; 2) decreasing land quality and fertility due to environmental damage; 3) climate change, disease, and low technology application among farmers; 4) Institutional Management of Government and Community Food Reserves is not optimal; 5) Price fluctuations and low efficiency of the product marketing system; 6) quality and quantity of food consumption in part of the community is still low and only fulfills calories; Diverse, Nutritious, Balanced and Safe Food Consumption Pattern (B2SA) has not been implemented while the level of rice consumption is still high; 7) Empowerment of food barns has not been maximized; 8) yard utilization is not optimal; 9) limited fresh and processed food safety management.

Food security is a multidimensional and very complex issue. Both internal and external factors equally contribute to this issue. It would be challenging for people to achieve, maintain, and improve food security in the next ten years. The challenges would come from both supply and demand. Supply challenges include competitive use of natural resources, the impact of global climate changes, the dominance of small-scale farming. Demand challenges include ongoing population growth, dynamic demographic characteristics, changing consumer tastes, and competition for food commodity demand, feed, and industrial raw materials. Three components must be fulfilled to achieve household food security. They are adequacy of food availability, sufficient consumption needs, and even food distribution. The availability aspect relates to the capacity of natural resources. Currently, the capacity of potential natural resources continues to decrease in size and quality. The conversion of agricultural land to non-agricultural land continues to increase due to building construction. In the last five years, land conversion in Indonesia has occupied an area of approximately 600,000 hectares. In particular, for Jambi Province, no less than 5,000 hectares of agricultural land have changed functions every year. These changes can be observed in Table 1.

In relation to the reasoning as mentioned above, it is necessary to learn the current food security and insecurity in Jambi Province. The level of vulnerability and its causes need to be identified so that strategic steps and policies can be taken to prevent and overcome this vulnerability.

Table 1. Rice Field Area by Regency / City in Jambi Province, 2015 – 2019

No	*Regency / City*	Year				
		2015	**2016**	**2017**	**2018[1)]**	**2019[2)]**
1	Kerinci	20.780	17.742	18.042	14.907	12.876
2	Merangin	8.658	9.584	12.633	11.038	5.787
3	Sarolangun	5.177	5.621	5.629	4.850	3.835

No	*Regency / City*	Year				
		2015	**2016**	**2017**	**2018[1)]**	**2019[2)]**
4	Batanghari	8.645	8.940	8.145	8.269	7.287
5	Muaro Jambi	10.613	10.617	10.865	9.562	6.371
6	Tanjung Jabung Timur	16.068	17.421	17.145	28.523	10.523
7	Tanjung Jabung Barat	9.837	9.491	7.792	19.197	7.819
8	Tebo	4.979	7.537	7.511	4.398	4.939
9	Bungo	4.909	5,436	5.705	5.383	4.439
10	Kota Jambi	974	1.006	1.029	1.096	520
11	Full River City	4.095	3.194	3.194	3.923	3.952
	Jambi	**94.735**	**96.588**	**97.690**	**111.147**	**68.349**

Source: BPS (2015-2017) and ATR / BPN Ministry (2018-2019)

1.1 Literature Reviews

1.1.1 FSVA

FSVA mapping is made based on the interpretation of food and nutrition security and vulnerability. This conceptual framework is built on the three pillars of food security, availability, access, and utilization, into which nutrition is integrated. Thus, food availability is interpreted as food readiness based on domestic production, food reserves, and food entry (including imports and food aid). Food availability can be calculated at the national, regional, sub-district, and community levels.

Food access is the ability of a household to obtain adequate and nutritious food through its own production and supplies, purchases, bartering, gifts, loans, and food aid. Food may be available in an area, but some households cannot access it if their physical, financial, or social abilities cannot provide sufficient food diversity.

Food utilization refers to the use of food by households and the ability of individuals to absorb and metabolize nutrients. Food utilization also includes storing, processing, and preparing food, water safety for drinking and cooking, hygiene, dietary habits (individuals with special food needs), food distribution in households according to individual needs (growth, pregnancy, and breastfeeding), and the health status of each household member. Given the significant role of a mother in increasing the nutritional profile of the family, especially for babies and children, maternal education is often used as a proxy to measure household food utilization.

1.1.2 Food Security

According to the Food Act No. 18 (Law of the Republic of Indonesia, 2012), food is anything that comes from biological sources of agriculture, plantation, forestry, fisheries, livestock, and water, both processed and unprocessed, designated as food and beverage for human consumption. Food includes food additives, food raw materials, and other materials used to prepare, process, and make food or beverages. Nutrients are substances or compounds found in food consisting of carbohydrates, proteins, fats, vitamins, minerals, and their derivatives beneficial for human growth and health. Nutritional status is the health condition of a person or group of people caused by the consumption, absorption, and use of food nutrients which can be assessed through anthropometry, food consumption, biochemistry, and clinical assessment. Nutritional status is influenced by food consumption and disease infection, in which a two-way interaction exists between malnutrition and infection (Suhardjo, 1996). A high level of community nutrition problems indicates that their economic capacity has the most dominant influence on nutrition problems, in addition to a lack of nutrition awareness, poor environmental sanitation conditions, and limited access to health services for unfortunate people (Karyadi & Santoso, 1996).

Three components must be fulfilled to achieve household food security. They are adequacy of food availability, sufficient consumption needs, and even food distribution. The availability aspect relates to the capacity of natural resources. Food availability guarantees food supply to meet the population's needs in terms of quantity, quality, diversity, and safety. The availability component includes the stability and sustainability of the food supply. Food availability is also related to appropriate management of

production, stock, reserves, and balance of food imports and exports. Thus, even though some food production is seasonal, limited, and spread out across regions, the food is available for families in terms of volume, type, and stability. The distribution component includes efforts to accelerate food distribution across regions. Improved distribution would increase people's access to adequate food. Food surplus at the regional level does not guarantee food adequacy at the community level. Food access is also associated with physical, economic, and social accessibility to food over time. Access to food is thus defined as the ability of a household to periodically fulfill a sufficient amount of food through various sources of food reserves, food production, and food aid. While, physical access can be interpreted as infrastructure, conditions of natural resources, and the environment.

The food consumption subsystem helps direct food utilization to meet the principles of quality, diversity, balanced nutrition, safety, *halal,* and efficiency. The consumption component is closely linked with public education to possess sound knowledge of nutrition and health. Such knowledge would help them in managing individual consumption according to their needs. Without paying attention to adequate and balanced nutritional intake, food consumption will not be effective in developing healthy, immune, intelligent, and productive individuals (Thaha et al., 2002).

1.1.3 Assessing Food Security

Assessing household food security could be carried out using qualitative and quantitative methods. The qualitative method is a relatively new approach, but it is more practical and easier to analyze and interpret compared to quantitative methods. This method explores and measures household perceptions about food security, the severity of food shortages, and the coping strategies employed by households in dealing with food shortages (Kennedy, 2002). On the other hand, the measurement of food security using quantitative methods can be done using the household expenditure survey method and individual food intakes. Four variables are often used to measure food security in household expenditure surveys, household energy consumption, energy adequacy, food diversities, and expenditure on food(Smith & Subandoro, 2007). Household food security can be measured through several indicators. These indicators are divided into two groups, process indicators and impact indicators. Process indicators describe the food situation that is apparent from food availability and access, while the impact indicators can be used to reflect food consumption.

The Food Security and Counseling Agency for Bandar Lampung City (2012) states that the city of Bandar Lampung uses Principal Component Analysis (PCA) and Cluster Analysis (CA) to map food security and vulnerability. The mapping analysis utilized three composite indicators. First, food availability was observed from the number of stalls and shops as an indicator of whether the food provider is available. Second indicators include access to food and livelihoods, the percentage of the population living below the poverty line, adequate access to food distributors, and households' percentage without access to electricity. Third, food utilization is determined through the number of health facilities, malnourished patients, and mortality rates of children under five years old and pregnant mothers.

In the current analysis, the vulnerability to food insecurity is shown in composites based on priorities. These priorities imply the vulnerability conditions of each region (district), caused by a combination of various dimensions of food insecurity. Based on the PCA and CA results, these districts can be grouped into six priorities. Priority 1 is the main priority sitting at the highest vulnerability table, while districts in the Priority 6 category are relatively more food resilient. In other words, districts in the Priority 1 have a greater risk of food insecurity than other sub-districts. Thus, they are in need of immediate attention. Jonsson and Toole's (1991) indicators adopted by Maxwell et al. (2000) use a cross-classification between two indicators of food security, food expenditure, and household energy consumption and energy adequacy (kcal). The following table shows that the limit of 80 percent of energy consumption (per adult equivalent unit) is combined with the food expenditure of > 60 percent of total household expenditure.

Table 2. Degree of Household Food Security

energy consumption per adult equivalent unit	Share of Food Expenditure	
	Low (< 60 % total expenditure)	High (≥ 60 % total expenditure)
Adequate (> 80 %) energy adequacy)	Food Secure	Food Vulnerable
Inadequate (≤ 80 %) energy adequacy)	Food Less Secure	Food Insecure

Source: Johnsson and Toole (1991 as cited in Maxwell, 2000)

Based on the table Table 2, food security can be classified into four categories. First, a household is considered food secure if the proportion of food expenditure is low (< 60% of household expenditure) while energy consumption is sufficient (80% of energy adequacy). Second, a household is said to experience food less secure if the proportion of food expenditure is low (< 60% of household expenditure) while energy consumption is sufficient (≤ 80% of energy adequacy). Four, a household is considered food vulnerable if the proportion of food expenditure is high (≥ 60% of household expenditure) while energy consumption is sufficient (80% of energy adequacy). Fourth, households are categorized as food insecure if the proportion of food expenditure is high (≥ 60% of household expenditure) while the level of energy consumption is less (≤ 80% of energy adequacy).

Approximately 60 - 70% of the human energy intake is obtained from carbohydrates, while the rest comes from protein and fat. The primary source of carbohydrates is obtained from rice and its processed products, corn and sweet potatoes. Hardinsyah and Napitupulu (2012) argued that protein derived from plants and animals is also very important for consumption. The human body needs protein as a source of growth. It maintains damaged tissue and regulates the body's resistance to certain diseases. The primary sources of protein come from plants and animals (meat, milk, and processed products).

Furthermore, Soekirman (2000) posits that households tend to spend less on food when their income increases. Conversely, if their income decreases, their food expenditure increases. Statistics Indonesia (2012) divided households into five groups according to their food expenditure. The non-poor group is households whose monthly expenditure per person is more than Rp 350.61. The almost non-poor group has monthly expenditures per person between Rp. 280,488 and Rp. 350,610. The Nearly poor households are those whose monthly expenditure per head is between Rp. 233,740 and Rp. 280,488. The poor group is households whose monthly expenditure per person is below Rp. 233,740. The very poor (chronic) group has no criteria for daily expenditure per person. Food expenditure negatively relates to household expenditure, while food security negatively relates to food expenditure. This means that the lower the food expenditure of a household, the higher its food security.

1.1.4 Food Insecurity

Suryana (2003) argues that if the three subsystems of food security are not realized, it is impossible for the government to achieve food security and otherwise cause food insecurity. Food insecurity is the inability of households to obtain sufficient and proper food to live a healthy life. Chronic food insecurity is a permanent insufficiency of food due to the inability of households to obtain the food they need from the market or their inability to produce their own food. This condition is often rooted in poverty. Transient or transitory food insecurity is the temporary decline in access to food needed by households. These conditions are usually triggered by natural disasters, riots, irregular seasons, and other unexpected events that disrupt the stability of harvest prices, production, or income (Baliwati, 2044). In order to alleviate food insecurity at the district level, it is necessary to have indicators and maps of food insecurity as a means to monitor and analyze food insecurity. Policymakers can later use these results in planning a better, targeted, effective, and efficient program to overcome temporary and chronic food insecurity problems (Pramoedyo, 201).

1.1.5 Factors Contributing to Food Security

According to Rachman and Suhartini (1996), besides the availability and distribution of food at the district level, food security at the household level is also influenced by several other factors such as rice surplus, purchasing power (seen from the level of income per capita), accessibility to food (reflected in food prices at the household level) and crop failure due to pests, plant diseases and natural disasters. Fatimah (2004) claim that the higher the education of a mother, the higher the percentage of household expenditure on food. Mothers with higher education tend to seek as much information as possible to make their family prosperous, including information about food and nutritional knowledge. On the other hand, mothers with low education level mean tend to have poor nutritional knowledge. Income level also determines the type and amount of food to be purchased and how much money a household plans to spend on food. The purchasing power and the family's ability to buy food are influenced by family income and food prices. Therefore, changes in income can directly affect changes in family dietary consumption.

Households with better income tend to buy food more quality food. Conversely, low-income families tend to buy more low-quality food. Insufficient family food supply indicates that households experience food insecurity. If this happens, they may fail to fulfill the nutrition need of the whole family in terms of quantity and quality. Increased income will increase the diversity of food consumption and result in increased consumption of fat, animal protein, and sugar. These families may also eat out more often. Conversely, a household with low income consumes cheaper foods such as starchy staples and vegetable protein (Soekirman, 2000).

There are differences in food consumption patterns between rice and non-rice consumption areas and rural and urban areas. The higher the income, the lower the consumption of grain carbohydrate food sources and the higher the consumption of animal protein sources such as meat, eggs, milk, and processed foods and beverages. Food security can be achieved with sufficient income and food production(Soetrisno, 1995). In line with Soetrisno, Suhardjo (1996) also argues that household food security is influenced by income, nutritional knowledge, and socio-cultural aspects. Likewise, low-income households with many household members will find fulfilling their food and nutritional needs more challenging. On the other hand, households with a few members can effortlessly provide food to meet their nutritional needs.

Rose (1999) states that date houses with more family members require greater food consumption to meet their food needs. Family members are a good predictor of calorie adequacy, total per capita expenditure, and per capita income. Family size will affect a family's nutritional status and health because it will affect the area per occupant in a house. Culture, education, and lifestyle are also the determinant in food consumption, but sometimes the prestigious factor becomes very important and prominent in dietary choice (Martianto & Ariani, 2004). High consumption of luxury food in cities compared to rural areas is often driven by education level and the variety of food and beverages in the city. A family's nutritional status is strongly influenced by income, nutritional knowledge, and local culture. If not balanced with sufficient nutritional knowledge, high income will only cause a person to be consumptive in their daily diet. As a result, the selection of a food ingredient is based more on taste instead of nutritional considerations.

The pattern of food selection is also influenced by ethnicity. Handayani (2012) explains that culture can influence dietary habits and food choices. There is an assumption that one cannot be said to have eaten in Javanese culture if one has not consumed rice and its side dishes. Even though they may have eaten a plate of boiled cassava and are full because of it, people will consider them as empty-stomach if they have not had rice. In Melayu ethnic eating habits, the side dishes will not be perfect if they do not come with rice. Rice is often served with various side dishes and traditional Indonesian salads. The ingredients used in Malay cuisine range from chilies, shrimp paste, and coconut milk.

Another factor that affects food security is expenditure. The Statistics Indonesia (BPS) classifies expenditures into food and non-food expenditures. The composition of household expenditures can determine the level of community welfare. The lower the percentage of food expenditure compared to total expenditure, the better the economic level of the community (Statistics Indonesia, 2006). At a certain income level, households will allocate their income to meet these two needs. Naturally, the quantity of food a person needs will reach a saturation point, while non-food needs, including food quality, are not limited in the same way. Thus, the amount of income can be proxied by the total expenditure spent on food from a household. In other words, the higher the food expenditure (> 60%),

the less prosperous the household is. Conversely, the smaller the food expenditure (< 60%), the more prosperous the household is (Purwantini & Ariani, 2008).

2. Methodology

This study used Food Security and Vulnerability Atlas (FSVA) method. The FSVA is a thematic map illustrating geographic visualization of the food insecurity vulnerability. FSVA is compiled using nine indicators representing three aspects of food security: food availability, affordability, and utilization. The government can use this FSVA-based data in formulating policies and intervention programs by looking at the leading indicators that trigger vulnerability to food insecurity in Jambi Province. The study was conducted in Jambi Province.

2.1 Data Collection

This study used secondary data related to food access indicators to determine food-resistant areas. The sub-district level of FSVA data is obtained from Bappeda, the Agriculture Office, and other related offices. Only the secondary data from the last three years are used in the study.

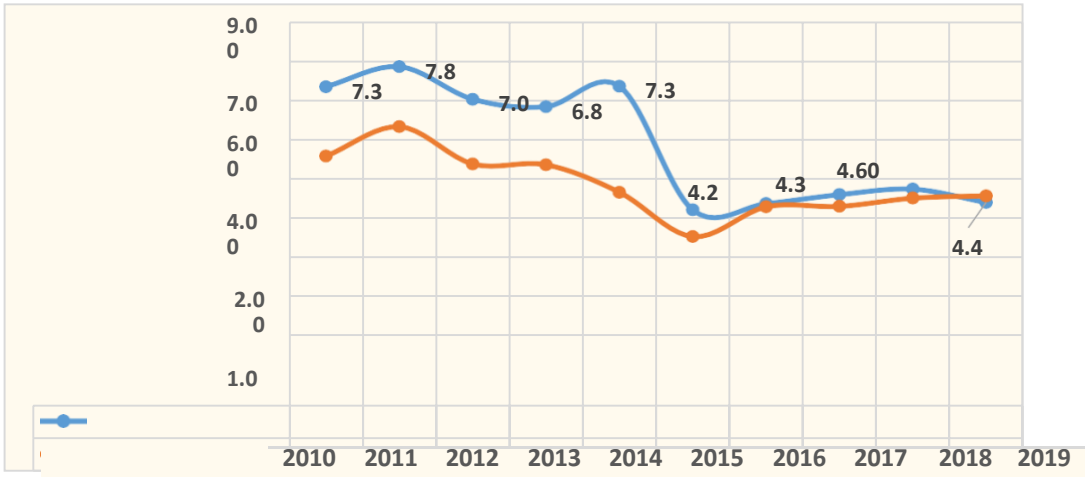
2.2 Scope of Study

The scope of this study consists of two areas, as follows:

1. Exploring the fact of the food security and insecurity at the sub-district levels in Jambi Province.
2. Examining regional food security based on FSVA.

3. Results and Discussions

Jambi Province consists of 9 districts and 2 administrative cities with a total area of 53,435 km2, 50,160.05 km2 of land, and 3,274.95 km2 of water, and a population of 3,515,017 people. Based on the type of occupation, the people in Jambi work in agriculture (47.35 percent), the processing industry (13.38 percent), and services (39.27 percent)(Statistics Indonesia, 2018). This shows that the agricultural sector and its derivatives still dominate Jambi Province. The economic condition of Jambi Province tends to fluctuate. When compared to the Sumatra island, Jambi province's economy is in fifth place. As an illustration, it can be observed in the following diagram.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
GRDP Jambi (%)	7.35	7.86	7.03	6.84	7.36	4.21	4.37	4.60	4.74	4.40
GRDP Sumatera (%)	5,58	6.33	5.38	5.36	4.66	3.53	4.29	4,3	4.51	4.57

Source: Statistics Indonesia (2020)

GRDP based on the business sector, in 2016-2019 shows that the contribution of GRDP in the agricultural sector has decreased. A detailed comparison can be observed in Table 3

Table 3. ADHB GRDP Distribution by Business Sector in Jambi Province (in percentage)

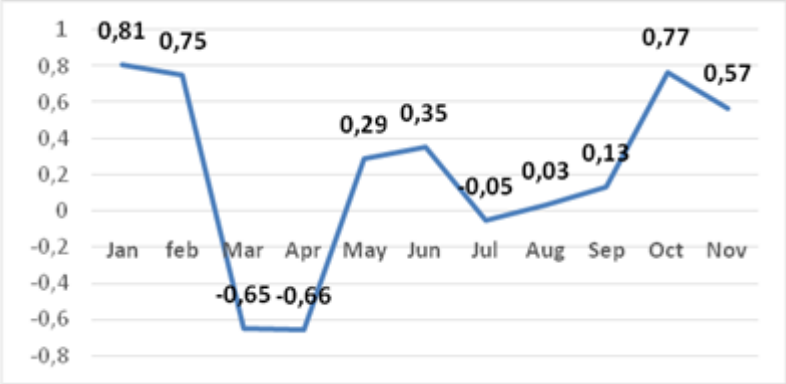
PDRB Sectors	[2010 Series] ADHB GRDP Distribution by Business Sector in Jambi Province (in percentage)				
	2020	2019	2018	2017	2016
A. Agriculture, Forestry and Fisheries	30.85	27.88	27.85	29.68	30.05
B. Mining and Excavation	12.21	18.44	19.84	17.79	16.64
C. Processing Industries	10.83	9.83	9.94	10.31	10.54
D. Electricity and Gas Supplies	0,07	0,07	0,06	0,06	0,06
E. Water Supply, Waste Management, Waste and Recycling	0.15	0.14	0.14	0.14	0.14
F. Construction	7.94	7.43	7.09	7.01	7.05
G. Wholesale and Retail Stores; Car and Motorcycle Repair Shop	12.63	12.14	11.77	11.63	11.84
H. Transportasi dan Pergudangan	2.71	3.23	3.22	3.29	3.36
I. Accommodation, Food, and Beverages	1.18	1.21	1.19	1.21	1.19
J. Information and Communication	4.42	3.9	3.79	3.74	3.65
K. Financial Services and Insurance	2.61	2.32	2.33	2.46	2.53
L. Real Estate	1.72	1.63	1.55	1.56	1.59
M Company Services	1.25	1.23	1.2	1.21	1.21
N. Mandatory Government Administration, Defense, and Social Security	5.25	4.89	4.59	4.51	4.72
O. Educational Services	3.83	3.51	3.37	3.32	3.35
P. Health Services and Community Services	1.35	1.18	1.12	1.1	1.1
Q. Other RSTU Services	0,99	0.97	0.96	0.97	0.97
GROOS REGIONAL DOMESTIC PRODUCTS	100	100	100	100	100

Source: Statistics Indonesia (2021), Jambi Province

The composition of PDRB support distribution in Jambi Province is still dominated by the Agriculture, Forestry, and Fisheries sector at 30.85 percent, followed by Mining and Excavation at 12.21 percent, and Transportation and Warehousing at 2.71 percent.

3.1 Inflation

In addition, Jambi Province also witnesses fluctuations in inflation. Inflation in Jambi City and Muara Bungo are shown in the following figure



Source: Statistics Indonesia (2012)

In November 2020, Jambi City experienced an inflation of 0.57 percent. Inflation in Jambi City occurred due to an increase in the price index for 3 producer groups: (i) processed food, beverages, and tobacco (2.07%), (ii) household appliances, equipment, and routine maintenance (0.08%), and (iii) health (0.08%).

Source: Statistics Indonesia (2021)

In November 2020, Muara Bungo City experienced an inflation of 0.44 percent. Inflation in Muara Bungo City occurred due to an increase in the price index for four producer groups, (i) processed food, beverages, and tobacco (1.66%), (ii) housing, water, electricity, and household fuels (0.15%) (iii) information, communication and financial services (0.18%), (iv) recreation, sports and culture (0.05%). According to price fluctuations, the food, beverage, and tobacco group were the highest sources of inflation in the two cities.

3.2 Poverty

The number of poor people in March 2019 was 274.32 thousand people (7.60 percent), decreasing from 281.69 thousand people in March 2018 (7.92 percent). From March 2018 to March 2019, the poverty rate in urban and rural areas declined, with a drop of 3.54 thousand people and 3.83 thousand people, respectively. The number of poor people in Jambi Province in March 2018 was 281.69 thousand people (7.92 percent). It was down from March 2017 which was 286.55 thousand people (8.19 percent). Between March 2017 and March 2018, the poor population in urban and rural areas also decreased by 2.0 thousand people and 2.86 thousand people, respectively. The pattern of changes in the number of

poor people is in line with the pattern of changes in the percentage of poor people. Both in urban areas and in rural areas, the percentage of poor people has decreased. The decline in the number of poor people in rural areas, higher than the decline in the number of poor people in urban areas, was followed by a decrease in the percentage of poor people in rural areas, higher than in urban areas.

3.3 FSVA

The results of FSVA mapping show that the 139 districts in Jambi could be grouped into the following categories: vulnerable (4), quite vulnerable (18), sufficiently resistant (34), resistant (61), and very resistant (22). No district falls under very vulnerable categories. This indicates that all sub-districts in Jambi are in food-resistant categories. The results of the FSVA analysis of regencies in Jambi based on food security indicators are as follows.

1. About 53 districts (38.13%) are vulnerable to food based on the indicator of the population living below the poverty line;
2. Less than 30% of households without access to electricity are vulnerable to food;
3. Based on the average length of schooling for girls over 15, 97 districts (69.78%) are food vulnerable;
4. Based on the toddler stunting prevalence, 78 Districts (56.12%) are food vulnerable.
5. Based on the indicators of life expectancy, 48 Districts (34.53%) are food vulnerable.

Conclusions

According to the aforementioned analysis, it can be concluded that:

1. From 139 districts in Jambi, 4 districts are vulnerable, 18 are quite vulnerable, 34 are sufficiently resistant, 61 are resistant, 22 are very resistant, and no district falls under very vulnerable categories.
2. Based on the ratio of per capita normative consumption of cereal production, 36 districts (25.90%) are vulnerable to food. About 53 districts (38.13%) are vulnerable to food based on the indicator of the population living below the poverty line. Based on the percentage of households without access to electricity, less than 30% of households experience food vulnerability. Based on the average length of schooling for girls over 15, 97 districts (69.78%) are food vulnerable. Based on the toddler stunting prevalence, 78 districts (56.12%) are vulnerable to food. Based on the indicators of life expectancy, 48 Districts (34.53%) are food vulnerable.

Recommendation

Following the result of the analysis, the following recommendations should be considered to address the root of the problems:

1. Accelerate and strengthen the strategic programs through coordination, integration, and synchronization across related sectors.
2. Improve the implementation of integration programs and partnerships between the government, businesses, and community.
3. Provide maximum budget support from existing funding sources.
4. Increase the Expected Food Patterns (PPH) score by increasing public knowledge about the importance of consuming diverse, nutritious, balanced, and safe foods (B2SA) through B2SA socialization activities and training on food consumption pattern analysis.
5. Introduce food-independent village development activities and develop local-based agricultural businesses by allocating regional budgets to the districts in priority 1, 2, and 3 based on the results of FSVA mapping.
6. Increase food production through improved infrastructure, intensification, knowledge, technology, and innovation in agricultural land management; optimize the use of renewable energy resources to meet energy needs in Jambi Province.
7. Record and track regional food reserves every year to comply with national targets.

8. Establish a Food Task Force Team in Jambi Province to monitor and stabilize food prices so as not to experience a significant increase and contain regional inflation.
9. Control food circulation in the community, especially fresh vegetables (PSAT), to maintain certified food quality according to Prime 3, Prime 2, and Prime 1.

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Policy Paper

12-Years Compulsory Education Policy and Education Participation Completeness

Evidence from Indonesia

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ABSTRACT

Indonesia is facing a problem with education outcomes, both in access and quality. To increase education access and participation, the President of Indonesia committed to implementing a 12-years compulsory education policy. As a result, upper secondary education's completion rate has increased significantly in districts that implement 12-years compulsory education rather than in districts that did not implement it. Strategies attached to the policy also considerably affect the completion rate, except for providing community learning centers. However, in every model, the implementation of 12-years compulsory education always significantly affects upper secondary education's completion rate. The district government that implemented 12-years compulsory education has achieved this condition because of the innovative effort to reach this target.

Keywords: 12-years compulsory education policy, education conditional cash transfer (KIP), increasing school classrooms, policy, strategies

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1. Introduction

Indonesia is a developing country that still faces challenges in education performance. The challenges come from two sides, low education quality and lack of education access. In Indonesia, 3.8 million school-age children are not attending school, reflecting the lack of access to education. This is a significant number compared to the 58 million school-age children globally who are not in school (UNESCO, 2015).

Education participation is not a straightforward problem because it is associated with a country's other developmental issues. For example, Hayami and Godo (2005) wrote that the critical sector that needs to increase to accumulate intangible capital is a formal schooling system. Formal schooling systems have been shown to boost economic growth by increasing formally educated individuals' opportunities to earn an income. Therefore, the Indonesian government needs to take serious action to improve formal education completion.

Education performance is fundamental to developing the country (Wicesa & Setyanti, 2021); therefore, the President of Indonesia is concerned about this issue. After being elected President in 2015, Joko Widodo quickly committed to implementing a 12-year compulsory education policy. He promised that everyone in Indonesia could complete at least an upper secondary level of education. The President's commitment is relevant to the spirit of Sustainable Development Goal 4, which is that no one is left behind regarding access to quality education.

1.1 Compulsory Education Policies History in Indonesia

Indonesia declared independence in August 1945. Only seven presidents have led the country since then: President Soekarno (1945–1967), President Soeharto (1967–1998), President BJ Habibie (1998–1999), President Abdurahman Wahid (1999–2001), President Megawati Soekarnoputri (2001–2004), President Susilo Bambang Yudhoyono (2004–2014), and the current leader, President Joko Widodo. Since becoming independent, Indonesia has been committed to ensuring that its people are educated by providing access to quality education (preamble to the constitution of Indonesia, 1945). However, it is difficult for developing countries to catch up with developed countries on education participation. The government needs to take specific actions to increase education participation in Indonesia.

In 1950, President Soekarno committed to trial a six-year compulsory education policy in some regions. However, education participation did not significantly increase because there was no significant increase in the number of schools. In 1984, the succeeding President, President Soeharto, committed to implementing six-year compulsory education for all regions. The Indonesian government subsequently implemented the Sekolah Dasar INPRES program, which was developed to increase the number of primary schools. This resulted in a significant expansion in education participation (Duflo, 2001). In 1994, President Soeharto declared that Indonesia needed more commitment to implementing a 9-year compulsory education policy.

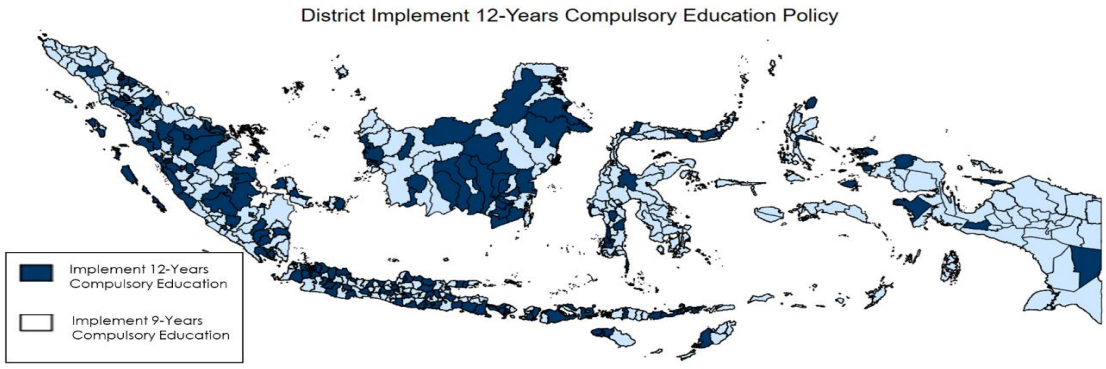
1.2 12-Years Compulsory Education Policy in Indonesia

The government maintained its commitment to education until President Susilo Bambang Yudhoyono's era. Although the results were good in that the policy increased education participation, especially in primary and lower secondary education, the policy did not significantly impact upper secondary education completion. This non-significant effect is plausible because the Government of Indonesia focused more on primary and lower secondary education access and less on upper secondary education. However, labor market demand began to focus on people who finished upper secondary education and above. Therefore, to boost the national wealth, the Indonesian government needed to improve human resources, especially with regard to education.

President Joko Widodo realized the importance of improving human resources to develop the country, which led him to commit to a 12-year compulsory education policy. However, there are still many education achievement disparities between districts. Based on the Law of The Republic of Indonesia (2014), districts have the right to choose their preferred policy. Thus, President Joko Widodo allowed district governments the flexibility to select a 12-year or a 9-year compulsory education policy, depending on their capacity. Figure 1.2.1 shows the distribution of districts that implemented 9-year (light blue) and 12-year (dark blue) compulsory education policies. Our analysis categorized districts that implemented 12-year compulsory education as the treatment group and districts that implement 9-year compulsory

education as the control group.

Figure 1.2.1. Distribution of District Implemented 12-Year Compulsory Education Policy



Source: Regional Midterm Development Planning

In most countries, 12-year compulsory education means that everyone can access free education through the upper secondary education level. The government guarantees this condition and punishes families whose children do not attend school. However, these conditions are not fully applied in Indonesia, even in districts that implemented a 12-year compulsory education policy. Families of children who do not attend school are not punished by the district government, but the central government punishes the district government leader if the district does not perform well. Therefore, district governments work hard to achieve the target by accelerating access to education and encouraging families to ensure that their children attend school.

President Joko Widodo took serious action to achieve equal education access for all children by committing to Midterm National Development Planning 2015–2019 and encouraging district leaders to include it in their midterm Regional Development Planning with optimistic targets. This required ensuring that everyone in Indonesia had free access to upper secondary education, especially in districts that implemented this policy.

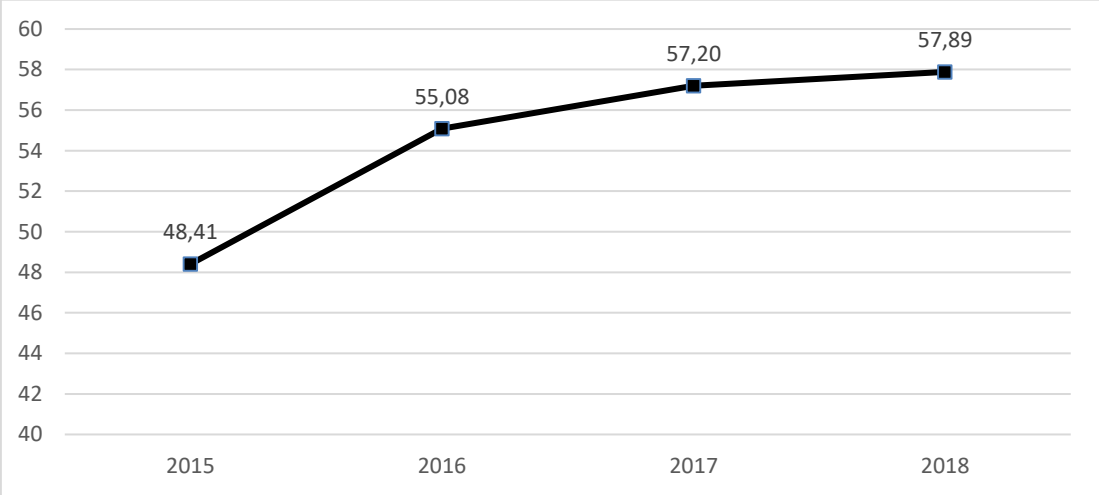
Strategies to implement a 12-year compulsory education policy as described in the Mid Term National Development Planning 2015–2019 (BAPPENAS, 2014) included:

1. Providing Education Conditional Cash Transfer (Kartu Indonesia Pintar/KIP)
   Kartu Indonesia Pintar (Indonesia Smart Card) provides school-age children in the 40% poorest income condition with cash transfers to eliminate education barriers faced by the poor because they lack school equipment and transportation to the school. This strategy is relevant with the recent study that found conditional cash transfer give significant impact on schooling (Behrman et al., 2009) as relevant as a study in Indonesia about the effects of remittances on children educational outcomes (Hapsari, 2019)
2. Providing Community Learning Centers
   Community learning centers are the center of education at the village level and provide adult literacy programs and informal education, especially for adults. This informal education helps to equalize education for adults and people in rural areas who were left behind. This strategy is relevant to the recent study about the significant contribution of CLCs to personal and community centers (Le, 2018)
3. Constructing a New School Program
   Constructing a new school program is an acceleration program for building new schools, especially in rural areas, which aims to provide enough schools to cover educational access for all children in that area. This strategy is relevant with the study of Duflo in 2001, which conclude that acceleration of building primary education school (INPRES Program) have increase education participation in Indonesia.
4. Constructing New Classrooms in Existing Schools
   Constructing new classrooms in existing schools is an acceleration program for building new classrooms in schools that lack sufficient classrooms to cover all children in the area. The objective is to provide access to people who could not be accommodated in the previous cohort. This strategy is relevant with the recent study about the effect of building classroom increase education participation (Berlinski et al., 2009)

1.3 Completion Rate in Upper Secondary Level of Education

The Indonesian government needs to measure the success of its 12-year compulsory education policy. Upper secondary education completion rates were measured. The completion rate was calculated as the percentage of individuals who were 3 to 5 years above the intended age for the last grade of the upper secondary education level who completed that grade (UNSECO, n.d.). In Indonesia, the final upper secondary education grade is typically completed by age 18, so the included age group was 19–23 years old. The upper secondary education completion rate is the best outcome to represent the impact of the policy, which aimed to elevate education completion from nine years (lower secondary education level) to twelve years (upper secondary education).

Figure 1.3.1 Upper Secondary Level of Education Completion Rate



Source: Statistics Indonesia (2015-2018)

As shown in Figure 1.3.1, the national completion rate for upper secondary education rapidly increased after the government implemented the policy in 2015 (the policy's effect began in 2016), jumping from 48.41% in 2015 to 55.08% in 2016. The upper secondary education completion rate continued to increase until 2018 but less dramatically. The initial rapid increase may have been affected by district governments' eagerness to prove their capabilities to the President. The government might further improve informal education access by providing package C (an assessment that allows individuals to obtain an upper secondary certificate). However, the possible effects of providing package C have not yet been statistically tested.

Figure 1.3.1 also shows that the completion rate increased year by year, but whether this was driven by the effects of business as usual intervention trends or the 12-year compulsory education policy has not been tested. We need to carefully distinguish between natural trends and trends driven directly by the 12-year compulsory education policy. Fortunately, as mentioned in the previous chapter, Indonesia has a decentralization policy (Law of The Republic of Indonesia, 2014) that allows each district to determine its education policy. Since some districts committed to a 9-year compulsory education policy and some committed to a 12-year compulsory education policy, we can examine outcome differences in these two groups to determine whether the 12-year compulsory education policy enhanced education participation more than the 9-year policy. This study also examined which policy strategies had a significant impact on Indonesia's education completion rate.

1.4 Contribution of the Study

Several studies have examined the impact on education participation of education cash transfers, increasing the number of classrooms and schools, and providing community learning centers. For example, Ersoz and Kasa (2016) analyzed the pros and cons of 12-year compulsory education but focused on the system and how teachers responded to the policy. No previous research has discussed the effects of implementing a 12-year compulsory education policy on upper secondary completion rates. Therefore, this study examined the impact of 12-year compulsory education on education participation and completion while controlling for the strategies attached to the policy.

Zhang (2018) analyzed the impact of a 9-year compulsory education policy on education attainment. However, strategies attached to a 9-year compulsory education policy may differ from strategies associated with a 12-year policy because the policy targets differ. Zhang focused on trends that changed after policy implementation compared to before the policy was implemented, but our study analyzed a different factor, potential interactions between strategies and policy.

1.5 Research Objective

This study focused on the impact of 12-year compulsory education on education completion in Indonesia while controlling for strategies attached to the policy. In exploring multicollinearity and relevance among independent variables, I expected the total number of classrooms to correlate with the total number of schools. This is plausible because when the government builds a school, the number of classrooms increases. Therefore, in addition to investigating the impact of the 12-year compulsory education policy on education completion, I also examined:

- the effect of the Indonesia Education Cash Transfer Program on education completion in Indonesia
- the impact of adding a new classroom to an existing school on education completion in Indonesia
- the impact of community learning centers on education completion in Indonesia

2. Data and Methodology

2.1 Data Source

The relevant data needed to analyze the impact of the 12-year compulsory education policy, including the Social and Economic Survey 2015–2018, Village Potency Data 2014 and 2018, and Basic Education Data 2015 and 2018. In addition, Midterm Regional Development Planning also facilitated examining compulsory education's commitment at the province/district level.

2.1.1 Social Economic Survey

The Social Economic Survey is conducted annually by the National Statistics Office of Indonesia to capture geographical conditions, family members, educational information, health situation, household economic situation, and individual access to ICT. The sample size is approximately 300,000 households, and results are released in March of the following year. The survey contains individual-level data that can be aggregated at the district, province, and national levels.

I used the Social Economic Survey from 2015 to 2018, which spans from the beginning of 12-year compulsory education until the latest available data. I calculated the upper secondary education completion rate and the percentage of education cash transfer recipients at the district level. The amount of the education cash transfer is the same among districts or socioeconomic conditions. In the case of upper secondary education, each student got Rp.1.000.000 per year.

2.1.2 Basic Education Data

Basic Education Data is updated by school administrations and reported annually by the Ministry of Education and Culture in Indonesia. The data set contains information on all schools in Indonesia, including geographical conditions, school conditions, teacher conditions, classroom conditions, and laboratory conditions.

I used the Basic Education Data from 2015 to represent the pre-12-year compulsory education era and Basic Education Data from 2018 to represent the era from three or four years after 12-year compulsory education was implemented, calculating the number of schools and the number of classrooms between 2015 and 2018 at the district level.

2.1.3 Village Potency Data

The Village Potency survey is conducted every four years by the National Statistics Office of Indonesia, and the data contain information about village conditions, such as geographical information, general information, demography and employment, housing and environment, disaster and disaster mitigation, education, and health.

We used Village Potency Data from 2014 to represent the beginning of the 12-year compulsory

education policy and Village Potency Data from 2018 to represent the era after the policy was implemented. We used geographical information and education information to obtain information about access to community learning centers.

2.1.4 Midterm Regional Development Planning

Midterm Regional Development Planning is five-year regional planning developed by Indonesian district or province governments to set the policy direction for the district government's agency to perform their tasks. The plan is approved by the Mayor or the regent and legislation system in the district. Midterm Regional Development Planning contains policy, strategies, and targets, including the budget estimation for every strategy planned by the government.

I read nearly 500 Midterm District Development Plans and 34 Midterm Province Development Plans to obtain information about a district/city or province's policies in that period, especially policies pertaining to implementing 12-year compulsory education or 9-year compulsory education. This information was used to construct the intervention and control groups.

2.2 Methodology

2.2.1 Variable Calculation Method

Two indicators/variables needed to be calculated to analyze this topic: upper secondary education completion rate and percentage of education cash transfer recipients at the district level. The variables were calculated as follows:

Calculation of upper secondary education completion rate

$$\text{Completion rate} = \frac{\text{people age 19– 23 who finished upper secondary education}}{\text{all people age 19– 23}}$$

Calculation of percentage of education cash transfer recipient

$$\text{Education Cash Transfer Recipient} = \frac{\text{children 16– 18 who received cash transfers}}{\text{all children age 16– 18}}$$

2.2.2 Estimation Model

The analysis used the district level as a unit analysis. Indonesia comprises 514 districts/cities (416 districts and 98 cities). Therefore, this level of data is sufficient to be analyzed as a normal distribution. We used data from 2015 and 2018 to examine the impact of policy implementation on education completion. The main coefficient of interest was from the dummy variable (d1i), where d11 = 1 means that the local government committed to a 9-year compulsory education policy, and d11 = 0 otherwise; and d12 = 1 means that the local government committed to a 12-year compulsory education policy, and d12 = 0 otherwise. Therefore, these two variables represented the control group (9-year policy) and the intervention group (12-year policy).

We used several models to analyze the data. 2015 represented the before implementation time frame, and 2018 represented the after implementation time frame. We used a fixed-effect model to analyze the data.

$$Y_{jt} = \delta_1 d_{1jt} + \alpha j + \lambda t + \varepsilon j \quad \text{.....(1)}$$

In Model (1), the independent variable of interest was d1jt, representing a 12-year compulsory education policy in district-j at time-t, where 1 meant the district implemented a 12-year compulsory education policy and 0 meant the district implemented a 9-year compulsory education policy. The dependent variable was upper secondary education completion rate in district-j at time-t. To control for endogeneity, I used district fixed effects and time fixed effects.

$$Y_{jt} = \delta_1 d_{1jt} + \alpha j + \lambda_t + \sum_{i=1}^{3} \beta_i X_{ijt} + \varepsilon_j \quad \text{.....(2)}$$

The Model (2) analysis was the same as that used for Model (1), except that I controlled for one of the strategy variables represented by X1jt, which denoted the percentage of people who received education cash transfers in district-j at time-t. X2jt represented the logarithm of the total number of upper secondary classrooms in district-j at time-t. X3jt represented the percentage of villages with community

learning centers in district-j at time-t. This model included the impact of the policy's strategies because it could be the most affected variable in the model, surpassing the dummy variable representing the 12-year compulsory education implementation.

$$Yjt = \delta 1d1jt + \alpha j + \lambda t + \sum_{i=1}^{3} \beta_i X_{ijt} + \beta 4d1jt * X1jt + \beta 5d1jt * X2jt + \beta 6d1jt * X3jt + ujt \ldots\ldots\ldots\ldots (3)$$

Model (3) examined the impact of an interaction between 12-year compulsory education policy implementation and the strategy. d1jt * X1jt represented the interaction between the policy and the education cash transfer strategy. d1jt * X2jt represented the interaction between the policy and the strategy to increase the number of classrooms. d1jt * X3jt represented the interaction between the policy and the strategy to provide community learning centers. This model has been used by Card and Krueger (1994) to analyze the impact of minimum wage on employment.

2.2.3 Summary Statistics

As mentioned before, the summary statistics' unit of observation was the district/city level. However, some data were not available for some districts; therefore, 484 of the original 514 districts/cities were included in the analyses. The total district reduction resulted from area expansion or incomplete data in a district.

Table 2.2.1. Summary Statistics of 2015 District Data

Variables	Obs.	Mean	Std. Dev.	Min	Max
Upper secondary education completion rate	484	47.58	15.18	10.99	88.16
District implemented 12-year compulsory education	484	-	-	-	-
Percentage of children in the district who received education cash transfers	484	-	-	-	-
Total upper secondary classrooms	484	298.3	323.5	6	2879
Percentage of villages in the district with community learning centers	484	24.19	16.15	-	96

Source: Statistics Indonesia (2015-2018), (Statistics Indonesia, 2014-2018) and (Ministry of Education and Culture of Indonesia, 2015-2018)

Table 2.2.1 shows the 2015 district summary statistics. On average, the completion rate in Indonesia was 47.58%, with a standard deviation of 15.18, indicating significant variability between districts, with some showing good performance and others showing less optimal performance. Between-district variability was also evident in the minimum and maximum completion rates (10.99% and 88.16%, respectively).

Table 2.2.1 also shows that no districts implemented 12-year compulsory education in 2015, which is plausible because the central government first announced the policy in 2015. This condition also applies to the percentage of children receiving an education cash transfer because Joko Widodo announced this program as a president's promise.

The variability in the number of classrooms and the percentage of villages with community learning centers by the district is also shown in Table 2.2.1. The minimum number of classrooms was six, and the maximum was 2879, demonstrating extreme variability across districts. The minimum percentage of villages within a district with community learning centers was 0%, and the maximum was 96%, reflecting a huge gap. The disparity in the number of classrooms and access to community learning centers indicates that some districts had deficient access to both formal and informal education.

Table 2.2.2. Summary Statistics of 2018 District Data

Variables	Obs.	Mean	Std. Dev.	Min	Max
Upper secondary education completion rate	484	57.19	14.28	13.6	91.54

Variables	Obs.	Mean	Std. Dev.	Min	Max
District implemented 12-year compulsory education	484	0.38	0.49	-	1.00
Percentage of children in district who received education cash transfers	484	15.00	8.60	-	60.16
Total upper secondary classrooms	484	334	369	6	3286
Percentage of villages in the district with community learning centers	484	21.20	14.78	-	93.15

Source: Statistics Indonesia (2015-2018), (Statistics Indonesia, 2014-2018) and (Ministry of Education and Culture of Indonesia, 2015-2018)

Table 2.2.2 shows that the completion rate increased on average in 2018 compared to 2015, from 47.58% to 57.19%. However, diversity among districts remained high, with upper secondary completion rates ranging from a minimum of 13.6% to a maximum of 91.54%. The gap across districts remained high after four years, although the national level rates showed an increase.

The disparity was also evident in the percentage of villages with community learning centers and the number of upper secondary classrooms in districts. On average, 21.2% of a district's villages had a community learning center. However, villages in some poorer districts did not have access to community learning centers. Districts had an average of 334 classrooms, but poorer districts did not have any access to classrooms, indicating that children in those districts did not have any education access.

Table 2.2.2 also shows that some districts implemented the 12-year compulsory education policy, with 38% announcing that their district planned and implemented 12-year compulsory education. At the national level, conditional education cash transfers were implemented by the central government. On average, 15% of children benefited from the conditional cash transfer program.

Table 2.2.3. Summary Statistics for Changes with the 9-Year Implementation 2015 and 2018

Variables	2015	2018	Change
Upper secondary completion rate	47.99	56.25	8.26
Percentage of children in the district who received education cash transfers	0	15.89	15.89
Total upper secondary classrooms	244	273	29
Percentage of villages in the district with community learning centers	21.32	18.94	-2.38

Source: Statistics Indonesia (2015-2018), (Statistics Indonesia, 2014-2018) and (Ministry of Education and Culture of Indonesia, 2015-2018)

Table 2.2.3 compares the before and after summary statistics for districts that implemented the 9-year compulsory education policy. The completion rate increased by 8.26 percentage points from 47.99% to 56.25%. The percentage of children receiving education cash transfers increased to 15.89% from 0 because the central government implemented this program after implementing the 12-year compulsory education policy. Education cash transfers were also implemented in districts that had not implemented a compulsory education policy, which is why the completion rate may have increased in the absence of a compulsory education policy.

Table 2.2.3 shows that, on average, the number of classrooms increased by 29 units from 244 to 273, indicating that districts implementing the 9-year compulsory education policy also worked to provide increased education access. However, this effort did not extend to providing community learning centers, which decreased from an average of 21.32% to 18.94% per district. Decreasing access to community learning centers decreased access to education for adults and people in rural areas.

Table 2.2.4. Summary Statistics for Changes with the 12-Year Implementation 2015 and 2018

Variables	2015	2018	Change
Upper secondary completion rate	47.03	58.50	11.47
Percentage of children in the district who received education cash transfers	0	13.76	13.76
Total upper secondary classrooms	372	419	47
Percentage of villages in the district with community learning centers	28.15	24.31	-3.84

Source: Statistics Indonesia (2015-2018), (Statistics Indonesia, 2014-2018) and (Ministry of Education and Culture of Indonesia, 2015-2018)

Table 2.2.4 compares the before and after summary statistics for districts that implemented the 12-year compulsory education policy, showing that the completion rate increased by 11.47 percentage points from 47.03% to 58.50%, which is a greater completion rate increase than was found in districts that implemented the 9-year compulsory education policy.

The percentage of children receiving education cash transfers increased by 13.76 percentage points in districts that implemented the 12-year compulsory education policy; however, districts that implemented the 9-year policy showed a greater increase (15.89 percentage points). Notably, the central government implemented the education cash transfers, which differs from the other analyzed factors that were implemented by districts.

Table 2.2.4 shows that the 12-year policy group had a greater increase in the number of classrooms than the 9-year policy group. Since classrooms were not solely provided by the central government (depending on the district), it is possible that the 12-year policy group put more effort into increasing school classrooms than the 9-year policy group. However, further analysis was required to assess the impact of increasing classrooms in the 12-year policy group compared to the 9-year policy group.

Both groups showed a decrease in the percentage of villages with a community learning center. Decreased availability of community learning centers might reduce the effectiveness of compulsory education programs in both the treatment and control groups because the number of children who need informal education is saturated. However, it is still necessary to carefully analyze the impact of these programs on increasing the completion rate.

3. Result and Discussion

This section explains the regression model results. I used a difference-in-difference (DID) model to analyze the impact of 12-year compulsory education on education completion in Indonesia.

The first model used regression without interaction to examine the direct impact of 12-year compulsory education without controlling for strategies attached to the policy. I wanted to ensure that the district-implemented 12-year compulsory education policy directly impacted education completion, despite that the policy also controlled the attached strategies.

The second model used regression without interaction to examine the direct impact of 12-year compulsory education by controlling strategies attached to the policy. I wanted to ensure that the district-implemented 12-year compulsory education policy directly impacted education completion but was controlled by the attached strategies without interaction.

The third model used regression with interaction to examine the direct impact of 12-year compulsory education while controlling for the impact of an interaction between the dummy variable and the strategy. This model also examined how the districts' strategy implemented 12-year compulsory education more effectively than the districts that did not implement it.

3.1 Difference-in-Difference: Before and After the Nationwide Policy Announcement

Table 3.1.1 shows the difference-in-difference model results that describe the change in the 12-year and 9-year policy groups' completion rates before and after the 12-year compulsory education policy was announced.

Table 3.1.1. Difference-in-Difference: Upper Secondary Education Completion Rates in the Treatment and Control Groups Before and After Policy Announcement

Variable	12-year compulsory education (treatment group) (1)	9-year compulsory education (control group) (2)	Difference: treatment-control (3)
Completion rate increase before law change (2010 to 2014)	10.60	12.93	-2.33
	(8.23)	(11.91)	
Completion rate increase after law change (2015 to 2018)	11.07	7.98	3.09
	(10.54)	(10.48)	
Completion rate increase, after-before the law change	0.47	-4.95	5.42
	(13.28)	(17.21)	

Source: Statistics Indonesia (2015-2018)

Result (1) showed a change in the upper secondary education completion rate in districts that implemented a 12-year compulsory education policy before and after the policy was announced nationwide, where the completion rate increased by 10.60 percentage points from 2010 to 2014 in the treatment group. After the law change in 2015, the upper secondary education completion rate increased by 11.07 percentage points, showing a difference of 0.47 percentage points in the treatment group before and after the policy was announced.

Result (2) showed a changed upper secondary education completion rate in districts that implemented a 9-year compulsory education policy before and after the policy was announced nationwide. The completion rate increased by 12.93 percentage points from 2010 to 2014, before the policy was implemented. After the policy was implemented nationwide, districts that implemented 9-year compulsory education increased only 7.98 percentage points from 2015 to 2018, indicating a negative completion rate change (4.95 percentage points) before and after nationwide policy implementation.

Result (3) showed a difference in completion rate increases between districts that implemented 12-year compulsory education and districts that implemented 9-year compulsory education. Before the policy was announced, the difference between the control and treatment groups was negative 2.33, indicating that the control group completion rate was more progressive than the treatment group completion rate before the policy was announced. After the policy was announced, the difference between the control and treatment groups' completion rates was positive (3.09), indicating that after the policy was promoted nationwide, the treatment group completion rate was more progressive than the control group completion rate. As shown in Table 3.1.1, applying this policy had a larger effect in districts that implemented 12-year compulsory education than in districts that implemented 9-year compulsory education. The trend data reflecting before and after policy implementation showed that the policy had a higher impact on districts that committed to the 12-year policy.

3.2 Estimation Result of Regression Model without Interaction

Table 3.2.1 shows the results of the regression analysis model without interaction effects. Result (1) used the pooled cross-sectional model without controlling the time fixed effect and state fixed effect. Result (2) directly examined the impact of 12-year compulsory education without controlling for strategies attached to the policy. Result (3) examined the impact of 12-year compulsory education controlling for one strategy. Results (4) and (5) examined the impact of 12-year compulsory education controlling for two strategies and three strategies, respectively.

Table 3.2.1. Estimation Result of Completion Rate without Interaction

Variables	**Upper secondary education completion rate**				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Dummy 12 year compulsory education	5.849***	10.353***	4.700***	3.475***	3.531***
	(1.297)	(0.946)	(0.938)	(0.956)	(0.96)
Education cash transfer recipient upper sec	0.233***		0.417***	0.321***	0.326***
	(0.053)		(0.033)	(0.039)	(0.039)

Variables	Upper secondary education completion rate				
	(1)	(2)	(3)	(4)	(5)
Logarithm of total classrooms	2.259***			20.713***	20.546***
	(0.536)			(4.472)	(4.481)
Percentage of villages with community learning centers	-0.058***				0.028
	(0.032)				(0.042)
Constant	38.726***	50.447***	48.381***	-61.933**	-61.718**
	(2.893)	(0.34)	(0.339)	(23.818)	(23.834)
State effects?	No	Yes	Yes	Yes	Yes
Time effects?	No	Yes	Yes	Yes	Yes
R-squared	0.081	0.604	0.212	0.163	0.164
N	968	968	968	968	968

* p<0.05, ** p<0.01, *** p<0.001

Result (1) used a pooled cross-section model and showed that districts that implemented 12-year compulsory education increased education completion more than districts that implemented 9-year compulsory education, although there were some control variables included in the model. However, the difference-in-difference model was needed to compare differences before and after the policy was implemented.

Result (2) directly regressed the policy on completion rates and showed that districts with 12-year compulsory education significantly increased completion rates more than districts with 9-year compulsory education, without controlling for other variables.

Result (3) included the control variable, education cash transfers, in the model and showed that 12-year compulsory education significantly impacted completion rates while controlling for education conditional cash transfers. Conditional cash transfers also showed a significant impact on completion rates.

Result (4) included the number of classrooms and showed that districts that implemented 12-year compulsory education significantly increased completion rates. Conditional cash transfers and increasing total classrooms also had significant effects on increasing completion rates.

Result (5) added community learning centers and showed that implementing 12-year compulsory education significantly improves completion rates, although strategies attached to the policy influence the completion rates. Conditional cash transfers and increasing total classrooms also had a significant impact on increasing completion rates. However, the strategy to provide community learning centers did not significantly affect completion rates. An explanation for this finding is that community learning centers primarily affect adults, and completion rates are only measured for upper secondary education level students.

3.3 Estimation Result of Regression Model with Interaction

The previous section explained the direct impact of 12-year compulsory education on completion rates. However, it is also necessary to control for interaction effects from implementing the policy and strategies themselves. This analysis explained how strategy from implementing the 12-year compulsory education policy significantly affected education compared with implementing the 9-year compulsory education policy.

Table 3.3.1 Estimation Result of Completion Rate with Interaction

Variables	Completion rate upper secondary education		
	(1)	(2)	(3)
Districts that implemented 12-year compulsory education=1 (d_1)	7.464***	6.585***	6.187***
	(1.014)	(1.124)	(1.145)
Percentage of people age 16-18 who received education cash transfers (X_1)	0.464***	0.384***	0.386***
	(0.035)	(0.045)	(0.045)

Variables	Completion rate upper secondary education		
	(1)	(2)	(3)
Interaction term between d_1 and X_1	-0.563***	-0.452***	-0.416***
	(0.106)	(0.107)	(0.106)
The logarithm of total classrooms (X_2)		15.533***	15.458***
		(5.407)	(5.416)
The interaction term between d_1 and X_2		-2.211**	-2.299**
		(0.764)	(0.765)
Percentage of villages with community learning centers (X_3)			0.012
			(0.04)
The interaction term between d_1 and X_3			0.105*
			(0.052)
Constant	48.146***	-34.536	-34.416
	(0.224)	(28.775)	(28.821)
State effects?	Yes	Yes	Yes
Time effects?	Yes	Yes	Yes
R-squared	0.422	0.443	0.447
N	968	968	968

* p<0.05, ** p<0.01, *** p<0.001

Table 3.3.1 shows three results of the interaction model. Result (1) shows the interaction impact effect of conditional cash transfers alone. Result (2) shows the interaction effects of both conditional cash transfers and increasing total classrooms. Result (3) shows the full interaction effects for the policy with all attached strategies.

Result (1) showed that implementing the policy significantly increased completion rates while controlling for education cash transfers and the interaction term. This model also showed that education cash transfers affected completion rates, indicating that the interaction of 12-year compulsory education with education cash transfers significantly affects upper secondary education completion rates. However, the impact was negative, suggesting that education cash transfers increased completion rates more effectively in districts that implemented 9-year compulsory education.

Result (2) showed that the impact of 12-year compulsory education on completion rates remained significant when controlling for two variables with an interaction between them. The two variables significantly impacted the completion rate, similar to that described in the previous section. However, the interaction between policy and the strategy to increase classrooms increased classrooms in districts that implemented 12-year compulsory education to a lesser extent than in districts that implemented 9-year compulsory education.

Results (3) showed that the previous Results (1) and (2) were similar. Result (3) included the strategy of providing community learning centers and showed that this did not significantly increase completion rates, similar to the results described in the previous section. However, this result does not extend to the interaction term. There was a significant impact when the community learning center strategy was applied in districts that implemented 9-year compulsory education but none in districts that implemented 12-year compulsory education. We assumed that in the district that implemented 9-years compulsory education, informal education is an effective strategy, while they do not have another effective strategy to increase the completion rate.

From these results, we concluded that implementing 12-year compulsory education significantly increases upper secondary education completion rates, although the increase of completion rate is also influence by strategies attached to the policy. The increasing classrooms and providing education conditional transfer strategies improve completion rates significantly. However, providing community learning centers did not have a significant impact on completion rates.

The interaction between strategy and policy had a significant negative impact, indicating that the strategy was more effective for increasing completion rates in districts that implemented 9-year compulsory education rather than districts that implemented 12-year compulsory education. However, this does not mean that the strategy was not effective under the 12-year compulsory education policy. Rather, it suggests that districts that implemented 12-year compulsory education provided additional efforts beyond the strategy. Extending strategies beyond the usual approach is very important for mayors who need to achieve a high goal after committing to implementing this policy. This requires creativity as well as increased spending of district resources to achieve that goal.

3.4 Advanced Strategies of 12-Year Compulsory Education District Implementation

Surabaya City is one of the districts/cities that implemented a 12-year compulsory education policy. Located in East Java, Surabaya City is the center of the economy in this province. Like in other metropolitan cities, people have economic problems, and some of their children needed to work or become buskers. This limits children's access to education.

As Mayor, Tri Rismaharini is responsible for ensuring that every child in Surabaya has access to education to prove her commitment to 12-year compulsory education. However, children not attending school pose a problem because they correlate with the economic condition. Therefore, the Mayor applied creative strategies rather than the usual strategies:

- The Mayor developed a Memorandum of Understanding with a company near Surabaya to ensure that children get a job there when they graduate from upper secondary education, and the company gives children a stipend to pay school fees.
- After establishing this agreement between the district government and the company, the Mayor encouraged children who were not attending school and children in the street to return to school.
- Another problem faced by the Surabaya government is that the upper secondary school is not available in all locations. Children must travel to access a school, and this requires funding. Therefore, the Surabaya government provides a school bus for these children.
- The last strategy, which is also very important to this creative action, is monitoring. The government needs to ensure that every child who is back in school stays until they graduate and the employment commitment from the company is fulfilled.

Conclusion

A formal schooling system is the best way to elevate an economy, especially in developing countries, because a formal schooling system increases people's ability to generate income. Therefore, to catch up with those left behind, Indonesia must accelerate formal education—a strategy already related to millennium and sustainable development goals.

Indonesia still faces the challenge of achieving good quality and equity in education. To make education equitable for everyone, in 2015, the President of Indonesia committed to implementing a 12-year compulsory education policy. Before 2015, Indonesia had a 9-year compulsory education policy, which was implemented from 2015 until 2018. It was important to evaluate the impact of the 12-year compulsory education policy. However, not all districts implemented the policy, which provided a control group (9-year policy implementation) to compare with the treatment group (12-year policy implementation).

Using a difference-in-difference model, We found that districts that implemented 12-year compulsory education had more progressive upper secondary education completion rates than districts that implemented 9-year compulsory education when We compared before (2010–2014) and after (2015–2018) the nationwide policy announcement. The results indicate that 12-year compulsory education significantly increased education completion in Indonesia.

Furthermore, the 12-year compulsory education policy included strategies for providing education cash transfers, building new schools and new classrooms, and providing community learning centers. The results show that implementing a 12-year compulsory education policy enhanced education participation in Indonesia with or without controlling for other conditions and factors, except for the strategy of providing community learning centers, which did not increase completion rates in districts that implemented the 12-year policy. However, this result is still plausible because community learning centers primarily affect adults rather than the upper secondary students who are counted in the completion rates.

I also found that education cash transfers, increasing the number of classrooms, and providing community learning centers were effective in districts that implemented 9-year compulsory education. However, this does not mean that the strategies did not affect districts that implemented 12-year compulsory education. Those districts were likely to have implemented additional strategies beyond those attached to the policy to demonstrate their commitment to the government's 12-year compulsory education target.

Recommendation

Implementation of 12-year compulsory education at the local level effectively increases education participation in Indonesia. For this reason, the implementation of the 12-year compulsory education policy must be intensified in every region in Indonesia because this can trigger regions to increase efforts to distribute education services in their respective areas. In addition, good practices at the regional level need to be studied more deeply and are expected to be replicated in regions that have similarities in sociological, anthropological, and geographical aspects. Thus, regions that have low educational participation can catch up.

Good efforts such as constructing new classrooms and providing education cash transfers that have been carried out so far must also be maintained. Then, with the commitment to implement the 12-year compulsory education, the local government hopes that these good efforts can be carried out more seriously. One of the efforts that will be carried out more optimally by the regional government, among others, is the provision of land for the construction of educational infrastructure and efforts to submit transfer funds to the central government and use regional funds.

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Commentary Paper

A Paradigm Shift: Redesigning Public Health Resilience to Sustain National Economic Revival

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1. Introduction

As one of the largest countries in Southeast Asia, Indonesia has shown promising economic growth since it rose from the financial crisis at the end of the 90s. Prior to the COVID-19 pandemic, Indonesia was gradually able to perform consistent economic growth and recently achieved the status of an upper-middle-income country (World Bank, 2021). Indonesia's economic growth increased during the 2010-2018 periods. The value of Gross Domestic Product (GDP) has increased from IDR 6.864 trillion (2010) to IDR 10.425 trillion (2018). Despite the slow growth in 2012-2015, Indonesia's GDP growth rate (calculated at constant prices) from 2015-2018 was relatively stable, and its GDP growth is forecasted to increase to 5.5% in 2020 (World Bank, 2021).

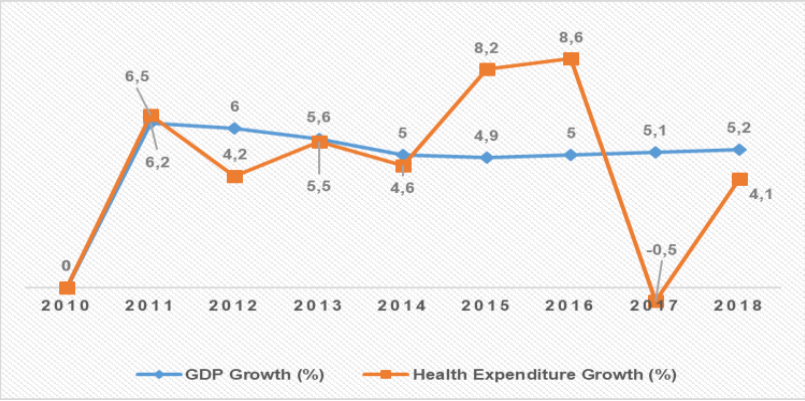

Figure 1. Indonesia's GDP and Health Expenditure Growth, 2010-2018
Source: Indonesia's National Health Account 2018, GDP Growth (annual %) The World Bank

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However, the growth did not occur when the pandemic plunged the economy into a severe depression of -5.32 percent in the second quarter of 2020 (Badan Pusat Statistik, 2020). There have been serious economic disruptions in all sectors ever since. The main economic consequences not only had a direct impact, such as an increase in death, illness, and care, but influenced economic productivity, with job losses, declining in earnings, and a decrease in purchasing power for products and services. As an epidemic event, the COVID-19 pandemic has recently demonstrated the need for public health resilience carrying capacity in ensuring economic growth. Both economy and health have a strong and beneficial interdependent relationship. For many years, health services were regarded as inevitable expenses that had to be accommodated as a necessary service. However, they have recently been put at the top of the list of policy objectives. Indonesia's economic growth is not constantly in line with the growth rate of spending on goods and services in the health sector, which tends to fluctuate, ending at 4,1% in 2018 (Figure 1). Indonesia's total health expenditure has increased from IDR 204.7 trillion (2010) to IDR 320.0 trillion (2017). Indonesia's annual per capita health expenditure has also increased from IDR 858 thousand (2010) to IDR 1.2 million (2018) at constant prices. Nevertheless, the contribution of health expenditure to the total consumption of goods and services in Indonesia stagnates only around 3% during 2010-2018 (World Bank, 2021).

One of the most prominent economists of the modern period, William Baumol, characterized healthcare as a "cost illness" in which expenses inevitably climb. Healthcare expenses surpass the value of services given and make it less attractive than the manufacturing sector, which is viewed as a propelling engine for economic progress. Indonesia's total health expenditure is relatively low compared to several countries in Southeast Asia. Most countries in the Southeast Asia region have a higher proportion of health expenditure to GDP than Indonesia, except Laos and Brunei Darussalam (Figure 2)(WHO, 2021).

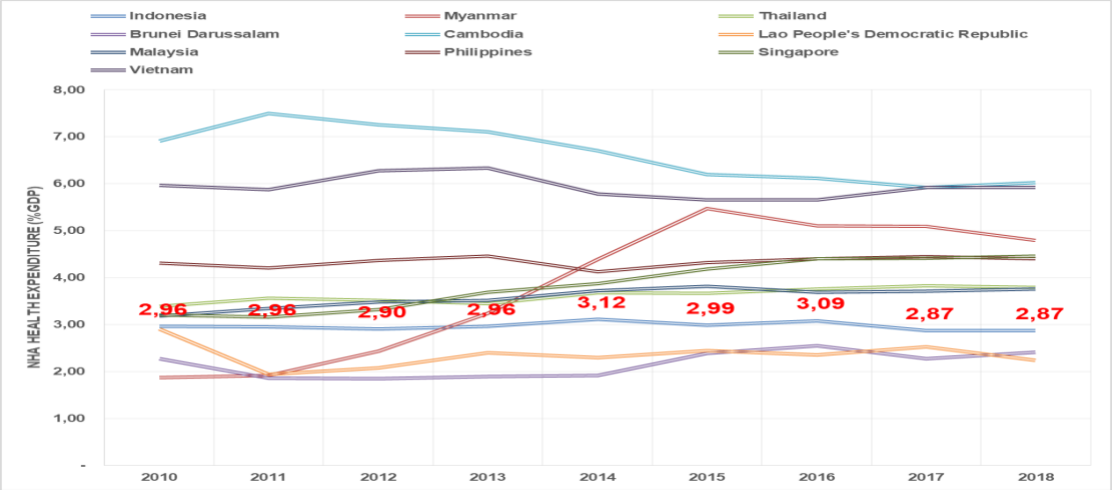

Figure 2. Health Expenditure Proportion (%GDP) among Southeast Asia Nations
Source: Global Health Expenditure Database (WHO)

The present financial structure and health care organization in many developing nations, including Indonesia, give significant incentives to treat sickness rather than invest in prevention. Since Indonesia's National Health Insurance (NHI), known as *Jaminan Kesehatan Nasional* (JKN), was implemented in 2014, health financing focus has been biased towards curative efforts, in which spending on health promotion and prevention interventions is marginalized (Bappenas, 2019b). Indonesia's health spending for individual healthcare reached 73,3% compared to Public Health spending (9,6%) and Health System Management (16,8%). See Figure 3. On the other hand, all types of health disorders require treatment interventions, including promotive and preventive interventions. Meanwhile, the current pattern and the development of health problems increase the importance of intervention in public health services and strengthen the health system (Bappenas, 2019b). If public health interventions are neglected, various targets for improving health indicators will be difficult to achieve. Although NHI is important, it is not the only urgent issue; the public health budgeting scheme should be considered strategic to build National health security by strengthening public health resilience. A reformed system should be integrated between personal or therapeutic care and public health approach, including

population-wide health initiatives (Figure 3).

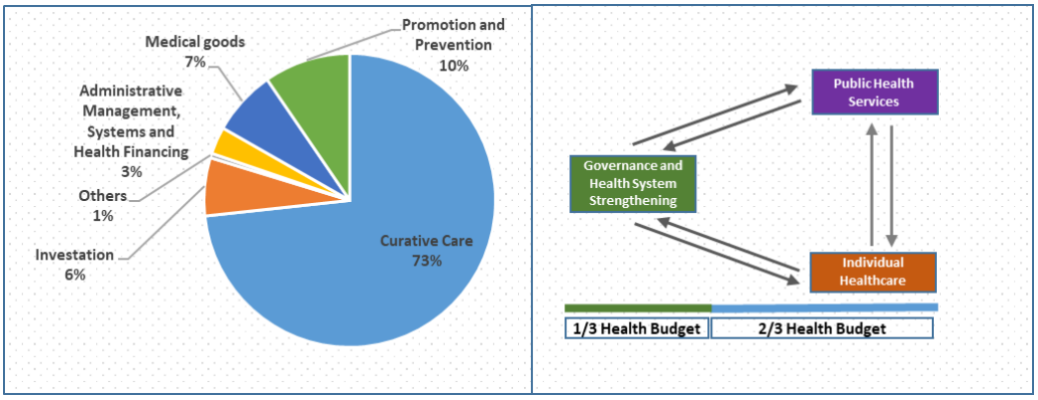

Figure 3. Public Sectors Health Expenditure and Health Budget Allocation Scheme
Source: Bappenas Health Sector Review (Health Financing and National Health Insurance)

As the front line of defense against the pandemic threat, public health functions are critical parts of health systems resilience. A global health risk framework is built on strong public health competencies and infrastructure at the country level. We understand that public health cannot be viewed as a "box" (Commission on a Global Health Risk Framework for the Future & National Academy of Medicine, Secretariat, 2016). Public health functions have a direct and critical role in enhancing the capacity to respond swiftly and efficiently to communicable diseases outbreak, including disease detection, identification, and early treatment of infected individuals (Figure 4). They are also crucial in reducing the health effects of other health emergencies, such as natural calamities and man-made disasters (Meyer et al., 2020).

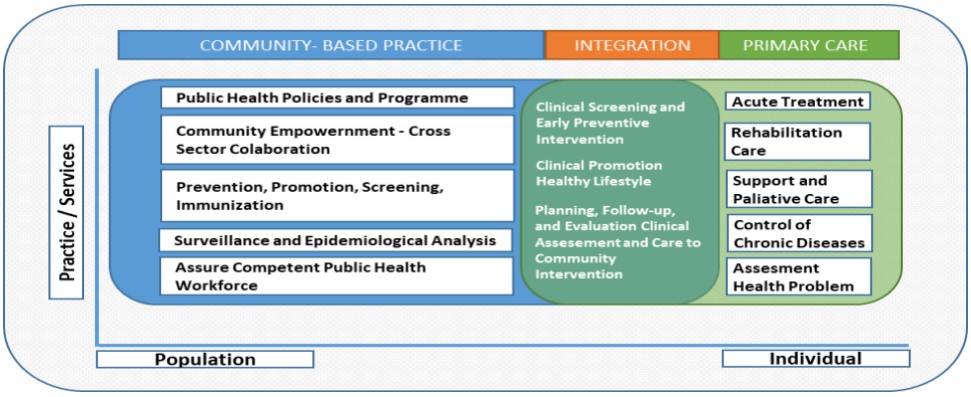

Figure 4. Intercorrelations between Public Health and Primary Care
Source: Modified by Author from Public Health and Primary Care Interaction Framework

How important public health resilience is simply described from recent infectious disease outbreaks. COVID-19 pandemic shows that the world health system is not strong enough in dealing with public health disasters, where the functions of health promotion and health prevention again - for several times - fail to be optimally actualized in stemming outbreaks (Meyer et al., 2020). The escalation of COVID-19 cases and hospital bed occupancy during the COVID-19 pandemic is in line with increasing population mobility and community compliance with health protocols. By June 13, 2021, Indonesia reached the highest peak number of new and active cases for the second time in the same year at 55.320 cases (38,3%) and 113.388 cases (15,17%), respectively (Satgas COVID-19, 2021a). The situation escalated the bed occupancy rate, reaching 80% on average and surpassing WHO recommendation of 60% (Figure 5) (Satgas COVID-19, 2021b).

Figure 5. Bed Occupancy Rate (BOR) and COVID-19 Cases Escalation
Source: Indonesia's COVID-19 Task Force

Even though the government has strengthened the regulation, synergy among the community, government, private sectors, and other parties are required to prevent and control the spread of COVID-19. Also, increasing public health function capacity to contribute as the first and secondary level prevention in containing and breaking the chain of COVID-19 spread is as important as upgrading the capacities of infirmary services to create forceful public health security. Therefore, it is necessary to build up the capacity and capability of the health system by putting public health security as a fundamental concept and priority to be upgraded (Figure 6) (Meyer et al., 2020).

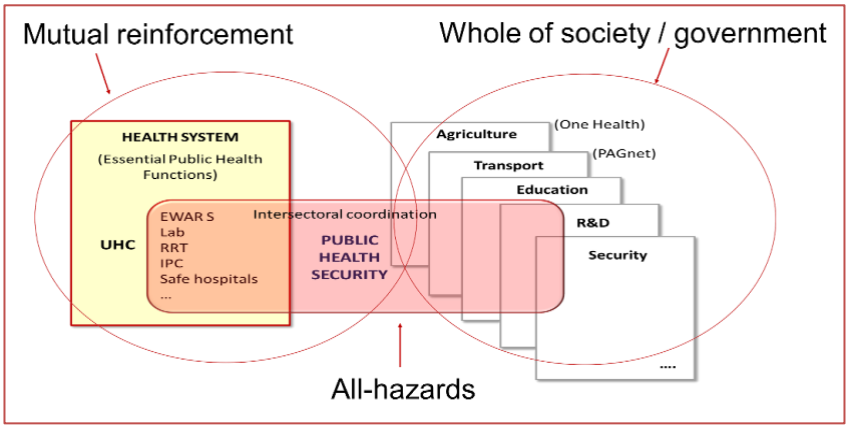

Figure 6. Emergency Preparedness Framework
Source: WHO Emergency Preparedness Framework HSS for SDGs Framework

2. Improving priority elements for public health resilience

In order to reinforce and advance public health across WHO regions, all members agreed to apply the International Health Regulation (IHR) through Joint External Evaluation (JEE) tool at the country level to advance health security. The Global Health Security Index (GHI) is the first thorough evaluation and comparability of health security and related capabilities among the 195 nations representing the International Health Regulations States Parties. The predictors and questionnaires prioritize interpretation of health security capacities and capabilities in the context of a state's broader national

health system and other national health determinants to prevent, detect, and respond to biological risks and infectious disease threats that can lead to potential outbreaks. As a result, Indonesia's GHS Index is in the 'middle' category as a more prepared country, with an overall score of 56,6 above the average world score of 40,2 and ranked 30th out of 195 countries. Nevertheless, Indonesia still has the lowest index score for some elements which need to be upgraded as fundamental functions to detect and respond, such as real-time surveillance and reporting, emergency planning and response, and public health vulnerabilities (NTI, JHU, & EIU, 2019). Four concepts can be considered to improve the performance of these elements, including:

2.1 Integrated Surveillance System

Public health surveillance is the continual comprehensive collection, analysis, and interpretation of data, which is strongly linked to the timely distribution of these data to those responsible for disease prevention and control (Thacker & Berkelman, 1988). This is a method for estimating the health condition and behavior of societies. Because surveillance can directly monitor what is happening in the population, it is valuable for determining the need for interventions and the effectiveness of treatments. The goal of surveillance is to provide timely, meaningful evidence to decision-makers, allowing them to lead and manage more effectively (Jamison et al., 2006). In this scope, Indonesia has the lowest GHS Index score among other indicators responsible for supporting response capability. We need to dig deeper to develop a strong foundation and create a powerful public health real-time surveillance and integrated reporting system that serves updated epidemic-risk information and can be accessed by all levels of the health care system (Baker & Fidler, 2006).

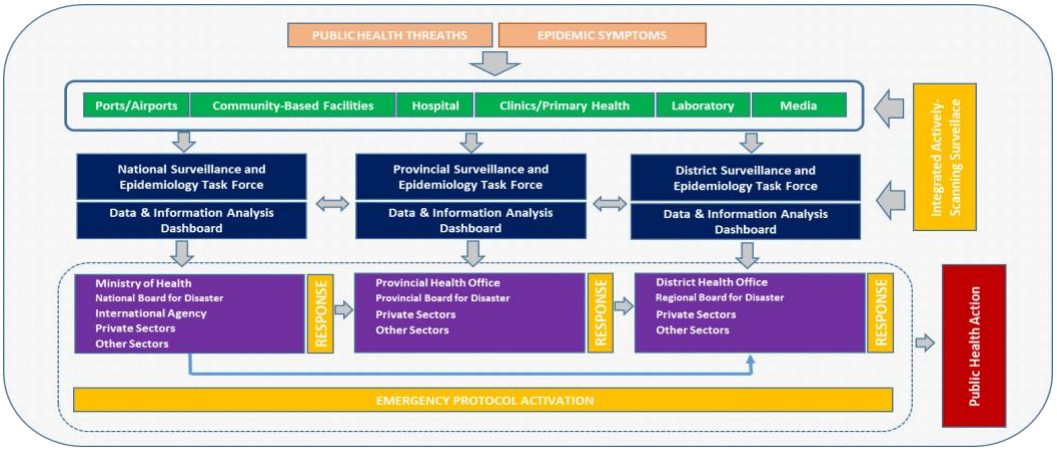

Figure 7. Integrated Disease Surveillance and Response (IDSR) Conceptual Framework
Source: Modified by the author from technical guidelines for integrated disease surveillance and response (WHO, 2019)

The new Integrated Disease Surveillance (IDSR) regional model is one of the initiatives to be taken seriously as part of the overall endeavor to enhance health systems. In early 2000, Indonesia had developed a tiered "IDSR-like" surveillance system guideline, starting from the primary health center to the national level (ICDC/ADB project), yet no further progress is made (Bappenas, 2019a). The development of this information system is critical in dealing with public health security problems. The IDSR strategy links epidemiological and laboratory data at all service levels in the infectious disease surveillance system, focusing on integrating surveillance and response. This strategy is based on core activities, including case-patient detection, registration, and confirmation; reporting, analysis, and data feedback; epidemic preparedness; quick and continuous response and real-time epidemic investigation responses; public health interventions, and contact tracing (WHO, 2020).

Districts should develop powerful and strict surveillance systems through population-centered surveillance units and health services, mainly in ports, airports, and national borders. This should be prioritized to increase efforts to gather timely data, analyze the collected data, and use the information for public health actions. Furthermore, laboratory-based surveillance and virology sentinel surveillance may be carried out by utilizing clinical specimens collected by ILI, ARI, and SARI sentinel surveillance. Integrated epidemiological and viral surveillance will be critical in tracking viral transmission and

evolution, such as comprehending viral co-circulation, interpreting respiratory epidemiology and clinical data, and supporting diagnostic tests and therapy updates. The integrated surveillance methods at all levels encourage active surveillance of emerging rumors that are continuously updated into the information system over time. The information obtained can be quickly converted into decisions in activating emergency response in all service units (Figure 7).

2.2 Creating epidemic-agile Primary Health Center (PHC)

Health systems continue adapting to cope with the pandemic. Much focus has been placed on the scaling-up of hospital, drug, and workforce capacities. Meanwhile, PHC are increasingly overwhelmed in stemming the growth of the pandemic, reaching a critical point towards health system failure. This COVID-19 crisis highlights the significance of community-centered health services at the foundation of health systems, both for managing an unanticipated increase in demand and ensuring continuity of service to everyone. Robust Primary Health Center (PHC), structured with cross-functional teams and health professionals, directly connected with communities, equipped with digital technology, and performed with well-designed objectives, is expected to help in delivering a successful health system response.

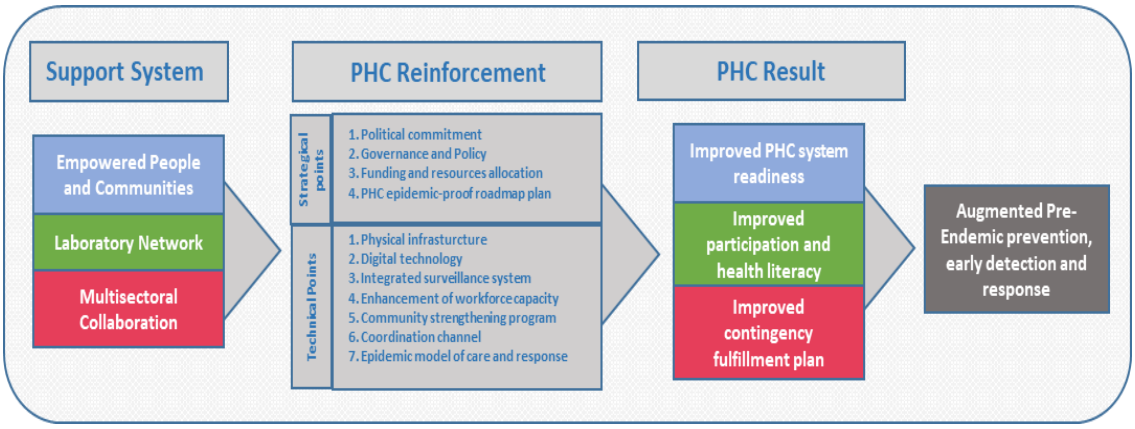

Figure 8. Epidemic-proof Primary Health Center (PHC) Conceptual Framework
Source: Modified by Author from the operational framework for primary health care: transforming vision into action

The Astana Declaration reaffirms primary care as the primary driving force behind universal health coverage. We must consider the three primary functions of addressing people's vital needs rather than simply meeting people's needs during the illness; investigating the social determinants of health problems, for example, financial difficulties and limited educational opportunities; and enabling communities to participate in the protection and enhancement of their fitness and well-being (The Lancet, 2018).

The concept of "rebuild better" was used at the Third United Nations World Conference on Disaster Risk Reduction to describe a post-disaster recovery strategy that reduces vulnerability to future disasters and builds communities' ability to respond to the challenges (Hallegatte et al., 2018). The notion of health resilience is dualistic, comprising both adaptability and robustness. Both are required and interconnected for resilience (Abimbola & Topp, 2018). The pre-disaster setting determines the resilience of health systems. The system's initial robustness determines the adequacy of the adaptive response. For example, an adequate digital health infrastructure (system robustness) is required to expedite telemedicine delivery (an adaptive response). One fundamental aspect of building public health resilience is through institutions, facilities, and community inter-correlation reinforcement (Figure 8). Primary Health Center (PHC) has a pivotal for those transformational changes that can play both dualistic concepts and focus on sharpening immunity shield from epidemic events. Some transformations to be upgraded include:

1) Building an integrated surveillance system and facilities with individual and population-centered approaches by developing a Field Epidemiology Training Program (FETPs) from the lowest community level collaborated with private and educational institutions to expand informal

networks

2) Increasing the capacity and capability of health workers through epidemic surveillance management and continuous responses training
3) Building a road map for strengthening epidemic-proof Primary Health Center and preparing standard operational documents and pre-endemic and pandemic action plan modules
4) Community empowerment through pre-epidemic and epidemic education, promotion, general guidelines booklet, and building communication and coordination networks at the household level
5) Increasing the portion of primary health center budgeting for pre-epidemic activities and initial response, and strengthening infrastructure and workforce capacity, health promotion, and epidemic reserve budgets
6) Developing and strengthening public health laboratory networks
7) Developing handy digital tools and telemedicine services

All these points must be developed gradually to build an integrated system that is responsive to minimize outbreaks and fatalities and to quickly respond in recognizing patterns and possible rumors of an outbreak.

2.3 Surging Community Engagement

The Ministry of Health created a program called "*Desa Siaga*" in 2006, which is a form of reorienting health services from being centralized and top-down to being more participatory. Desa Siaga is a village whose residents have resources and capabilities, readiness, and the will to independently prevent and deal with health problems, disasters, and health emergencies (Hadi, 2020). The integration between this concept and the outbreak emergency preparedness plan will strengthen community participation and empowerment at the village level. During public health emergencies, community participation and other community-centered approaches are increasingly acknowledged as crucial parts of health emergency planning and response to create favorable and intensified circumstances for behavior change, thereby reducing the spread of disease (Bedson et al., 2020). In the event of a pandemic COVID-19 outbreak, community action is critical for the public health response. Fundamentally, the transmission of the disease is slowed by the actions of community members, such as adhering to social distancing, respiratory and hand hygiene guidelines. People who are clinically susceptible and must be 'protected' by staying at home for an extended period can successfully self-isolate and reduce the exposure risk to COVID-19 only with community assistance.

Communities and community-centered groups will play a significant role in the rebuilding process. Community resilience refers to a community's ability to cope with and recover from large-scale catastrophes. One systematic review and meta-analysis assessed 35 citizen engagement programs in Lower-Middle-Income Countries (LMICs). It was found that enhanced citizen engagement occurred primarily through four routes: participation, the inclusion of marginalized groups, transparency, and literacy. Intervention targets are at the level of internal institutional systems (decentralization of and community engagement in decision-making) and external engagement with citizens (interventions to disseminate information on performance, quality, or cost) that contribute to building emergency capacity in the community (Figure 9). There are several essential points to propose in terms of this community affirmation:

Figure 9. Community-centered public health support systems
Source: Compiled by Author

1) Community Literacy and Emergency Risk Communication

The COVID-19 pandemic has exposed the evidence that health literacy is an "overlooked worldwide public health problem." Health literacy, defined as "the degree to which individuals have the ability to collect, process, and comprehend basic health information and services required to make knowledgeable decisions," is a prerequisite for implementing healthy behaviors that can shield both infectious and non-infectious diseases. (Collins et al., 2020).

Poor hygiene habits at the individual, home, community, and corporate level are connected to low health literacy, contributing to or worsening disease outbreaks. Handwashing with soap, for example, has been identified as one of the most cost-effective health interventions for reducing disease burden. However, it is estimated that only 19% of the population washes their hands with soap after using sanitary facilities (Freeman et al., 2014). Decision-makers must assess their public health literacy requirements and engage in long-term public awareness campaigns as part of pandemic preparation and response. A continuous public communication initiative with clear and straightforward messaging helped people understand what the measures are being taken and practical advice on what individuals might do to protect their own and their families' wellbeing.

There is a need to develop an effective emergency risk communication approach, taking into account the following principles:

a) Truthful and prompt
b) Listening through two-way communication
c) Effective channels and key influencers

2) Sustainable Information Flow

The development of real-time community data collection and evaluation should be prioritized as critical inputs to support response decision-making.

3) Capacity Building and Response

Through activation of dasawisma, community leaders, RT/RW, and UKBM cadres, front-line community workers should be appropriately taught, compensated, assisted, and monitored to detect the epidemic occurrence. In addition, the existence of guidelines related to community responses and simulations of technical implementation in the field will regularly increase the readiness and public habituation in dealing with outbreaks of communicable diseases.

4) Simply applicable technology

Using handy technology and application to assist communities in monitoring citizens' health can maintain and improve the quality of community life (Lo et al., 2020). The development of user-friendly and informative applications for the community to monitor, report, and continuously communicate with mentors will increase insight and habituation for the community in receiving various information that can help the community interact, provide reinforcement and support, and cross-check the circulating information at once.

5) Population-based asset preparedness

Mapping and mitigating facilities and capacities readiness sourced from community assets can be an important support in building community-centered preparedness. This effort is necessary to anticipate and respond quickly in the initial phase of an outbreak and monitor the development of events that are suspected of developing into outbreaks.

6) Community Involvement

This approach can be performed by stimulating the local community, including marginalized groups, to join in developing participation plans. This initiative must be embraced by the government and non-government institutions to enable community independence and economic resilience.

7) Workforces, NGOs, and Community Partnership

Establishing partnerships among community residents, health care experts, and epidemic-prevention professionals can develop community-centered clinics for triage and treatment. Moreover, utilizing voluntary and community sector (VCS) organizations can be important, particularly the grassroots organizations in touch with groups and individuals who face the greatest risks and underserved populations.

Building resilient communities and supportive settings have long been highlighted as a public health concern by the WHO Regional Office for Europe. Creating resilient communities is about what public health systems can do to improve protective characteristics, such as strong social networks, to

help people and communities organize, respond, and recover successfully (South et al., 2020).

2.4 Investing in preparedness

It has been predicted using some models that the annual cost of a global influenza pandemic would impact South Asia's GDP to contract by 2% (World Bank, 2021). Indonesia's first COVID-19 episode was reported in March 2020, with GDP growth for the first quarter of 2020 falling from 5% to 3%, compared to the typical average year-on-year (YoY). This was followed by contractions to -5.3% in the second quarter and -3.5% in the third quarter, bringing the total growth of -2.0% at the end of 2020 (YoY) (Habir & Wardana, 2020). This experience demonstrated how much economic loss had suffered due to unpreparedness in the prevention of a pandemic like COVID-19. The world has witnessed several examples of what former World Bank President Jim Kim has described as a cycle of "panic, neglect, panic, neglect." The fear caused by a disease epidemic recedes, attention changes and our essential outbreak-fighting systems shift to fade.

Despite years of legislative debate, convincing economic analyses, and technically feasible alternatives prior to COVID-19, national investments in pandemic preparedness were "woefully inadequate." Based on Pandemic Preparedness Financing Report released by WHO, Indonesia is categorized as "developed capacity" where annual per capita cost to implement NAPHS, and IHR core capabilities are estimated only 0,03 % of total health expenditure, lower than Myanmar and Vietnam with 0,84% and 0,26% respectively (World Bank, 2019). For decades, this percentage depicts that several worldwide societies underinvest in readiness and interrupted funding for the reaction when the outbreak struck, claiming millions of deaths and billions of dollars in national income.

World Bank and WHO analysts predict that investments in health systems to implement IHR (2005) will lead to positive returns and a high level of outbreak preparedness. According to the World Bank and WHO approximation, most nations would need to invest between USD 1 and USD 5 per person per year to achieve an adequate level of pandemic preparation. An annual investment of USD 1.9–3.4 billion in health systems would result in an estimated worldwide public benefit of more than USD 30 billion per year, up to 10 times greater investment return (Global Preparedness Monitoring Board, 2019). We realize this is a rough estimation with a wide error margin. However, the change of investment perspective can continue to evolve as a new transformational approach which would help suppress the estimated cost will be even more significant in handling outbreaks in the future.

Figure 10. Public Health Investment Scheme
Source: Compiled by Author

From this perspective, it makes sense to consider making a contingency financing framework, build National preparedness capacities by referring to International Health Regulation (IHR), and ensure rapid and effective preventive strategies that can be invested in some ways (Figure 10). There are many concepts proposed on how to enhance health structure resilience. A better system could be based on the principle of active preparation and should be built on mechanisms that can be applied consistently,

dynamically, and "Stay Sync." As a result, they are ready to-work when outbreaks occur. There are three public health pillars that can be considered to invest in, which have a pivotal role in responses since the first occurrence of rumors performing the tendency for becoming an outbreak.

1) Investing in constructing an actively scanning surveillance system

   The idea of an active surveillance system may encourage governments and other stakeholders to figure out how to improve this tool. We can identify how to address gaps in this system in order to respond promptly and effectively to pandemic occurrences. Through pre-established coordination channels among public and private sectors, and the community, the investment can be considered to be allocated to develop these points:

   a) Building effective rumor-based screening system at the point of entry;
   b) Creating communication and coordination channel: risk communication systems, internal and sectoral communication and coordination, effective communication and community involvement and rumor management;
   c) Conduct regular outbreak simulations and cross-sectoral preparedness activities;
   d) Enhancing epidemiological response capacities;
   e) Composing clear and applicable surveillance protocols in all levels;
   f) Developing IDSR-like surveillance of noticeable diseases;
   g) Developing robust pathogen surveillance and serosurveillance;
   h) Building up data integration and sophisticated surveillance information system and infrastructure;
   i) Establishing Population-representative surveillance task force.

2) Community-healthcare partnership

   Another gap found in the early handling of pandemic events is the readiness of the health system to adapt and respond quickly through changing all sub-systems to emergency mode. In the preparatory phase, health systems can be detailed to define epidemic control plans, increase health care capacity, community-centered resources, and assets used to increase additional capacity. These include converting non-healthcare facilities to field hospitals, referring patients by implementing health protocols, redistributing medical-supply stockpiles and emergency equipment supply-chain for community workforces, and preparing community-based quarantine and isolation facility plans. Another measure is developing community capacity-building programs with mentors from community health workers. In addition, the epidemic growth capacity plan should address the need to maintain basic health care services. Systematic joint external evaluation (JEE) tools can be used to assess the overall system readiness and determine the highest priority demand for pandemic preparedness and investment planning.

3) National Research and Development

   Public health experts have often highlighted the threat posed by emerging infectious diseases. However, current national financing and incentive systems fail to recognize and promote innovations that might contribute to the fight against emerging infectious diseases. It seems the government has not been serious in developing information from the community and laboratory-based public health research into practical interventions and vaccine or drug products. Learning from the COVID-19 pandemic, there was a delay in developing specific preventions and interventions. Thus, refinement of research, capacity, and infrastructure development is needed to support national independence, rapid and specific interventions in dealing with future outbreaks. Some approaches to consider are:

   a) Engaging in the research to find promising vaccines, antiviral agents, prospective antibodies, treatment formulation, and manufacturing capacities to face emerging infectious diseases and suspected substances;
   b) Investigating antibiotic resistance and animal to human disease transmission threats;
   c) Studying health determinants and developing specific interventions and cross-sectoral collaboration in building new habits and a healthy environment

Conclusion

Comprehensive evaluations related to the public health function resilience are still very limited. We know that the government, along with other parties, recently remains focused on navigating the current crisis. However, establishing a readiness framework by strengthening public health functions and other public goods, accompanied by prevention-based investments, is urgently needed by enhancing the ongoing COVID-19 response and reducing the chance of future pandemics. These parallel approaches need to be applied continuously. On the one hand, it can accelerate the recovery of community health, which will synergize with economic revival. On the other hand, it will strengthen preparedness which will support sustainable national economic growth and prevent a greater economic collapse in the future caused by other communicable outbreaks.

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Book Review

Planning Theory: Schools of Thought and Practices of Regional Development Planning

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Introduction

The book entitled, ***'Teori Perencanaan: Mazhab dan Praktik Perencanaan Pengembangan Wilayah,'*** [in English: Planning Theory: Schools of Thought and Practices of Regional Development Planning], is written by Indonesian practitioners and researchers active in the planning field with an easy-to-understand writing style. The authors, Ernan Rustiadi (IPB), Galuh Syahbana (LIPI), and Setyardi (IPB), thoroughly present the dualism of procedural and substantial planning theory, with the bulk of discussion given to the substantial domain. This book is organized into seven sections, from the introduction to the closing sections. This book discusses the schools of thought in planning theory (i.e., positivism, post-positivism, and green planning), prominent planning figures and/or thinkers, and their shifting paradigm in the planning field, completed with planning practices that intersect with the history of planning in Indonesia and abroad.

Key Points and Review

The book becomes interesting because, though in a small portion, the authors tried to put planning theories into Indonesia's dynamic context within multiple periods (colonial, the old order, new order, and post-reform) and integrate political conditions, democracy (leadership shifting) and the role of the state and market mechanisms. This book helps understand contextual planning, primarily due to the paradigm shift as the resource envelope managed directly by the state decreases. For the sake of optimization, planning and budgeting should go hand in hand under the direction of the same orchestra. However, planning has been more technocratic in practice, while budgeting has been more politically intervened. Failure to maintain such synergy can cause severe developmental problems deviated from

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the targeted impacts. Furthermore, by observing the role of planning and budgeting, future planning theories can further discuss financing innovations and alternative financing integrated into planning.

Development planning can be viewed from a cross-sectoral perspective, across regions and administrative boundaries, and across stakeholders and authorities in a cross-time frame concerning spatial planning. This book demonstrates that eventually, planning theories and social phenomena are two interrelated interactions and mutually shape one another because of '*r*eflection and abstraction of planning phenomena and practices.' Having reviewed planning practices in foreign countries, the authors argued that national planning in Europe and Asia is not too detailed and emphasizes planning at district or municipal levels. Europe no longer has a comprehensive development like Indonesia's RPJMN and RPJP and focuses more on strategic issues. Conversely, comprehensive planning is still observed in developing countries and Asia, such as China, Thailand, and Vietnam.

Development challenges are closely related to aspects of regional and geographical disparities. Reflecting on Indonesia's condition, where two-thirds of its territory is covered by oceans and having tens of thousands of islands, island-based planning should receive a proportionate share of discussion in addition to terrestrial-based planning. The fundamental and thought-provoking part of the book is when the authors assess planning based on environmental issues, which later become the root of the framework for sustainable development, the concept of carrying capacity, and the ecological footprint. It will be more appealing if green planning is enriched with mainstreaming disaster risk reduction, adaptation to climate change, and circular economy issues. These issues are partly the contemporary responses to the ecological footprint paradigm, conceptualized by William E. Rees[1].

Concluding Remark

This book purely focuses on planning and is less concerned with planning failures occurring at the implementation level and how other scientific disciplines intertwine and influence each other at the practical level, as in sociology, to understand rapid behavioral changes in society and the key actors involved. In addition, planning politics is also a fascinating topic to be further discussed for the betterment of this book in the future. The result of technocratic and participatory processes will undergo various adjustments due to changes in the political process with its high dynamics of uncertainty and complexity. In the future, the planning - which is essentially a rational human way to deal with uncertainty- will face more challenges of the rapid and volatile change (VUCA). VUCA is an acronym for volatility, uncertainty, complexity, and ambiguity.

Finally, this 462-page book with knowledge-intensive content is very worth reading. It reminds planning activists to be able to understand planning in the contextualization of regional development and socio-spatial planning and, in the end, to restore the logic of thinking about managing limited natural resources more wisely and sustainably. This book may become an initial reading to provoke planners to return to science-based policy, where all policies are supported by a scientific basis (theory and research) and tacit knowledge from best practices verified by science.

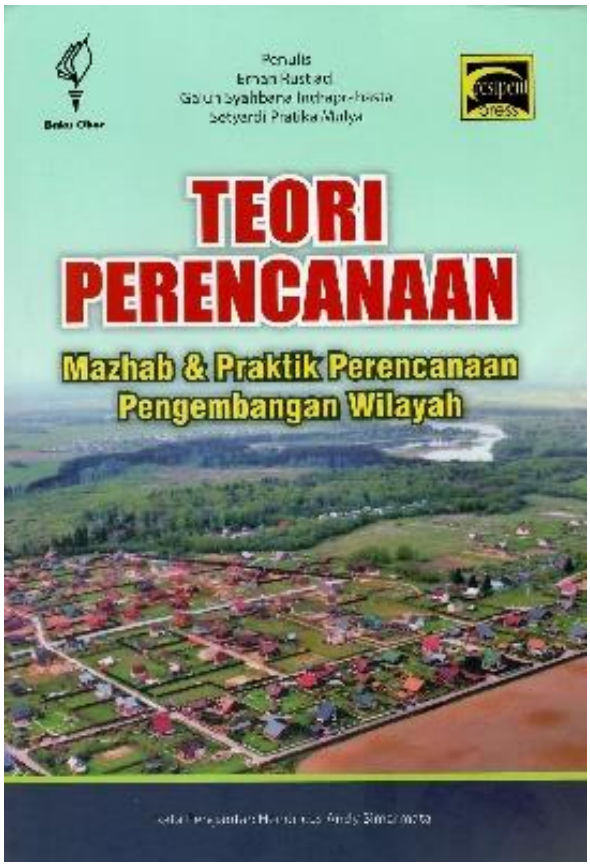
The Book Rating

Quoting the first sentence of this book, 'in fact, humans have always lived in the face of uncertainty... uncertainty in humans creates costs, burdens and risks' (p.1), this book can serve as an enlightenment for us that to encourage economic growth and at the same time reduce uncertainty in development does not necessarily mean endangering the survival of civilization and the resilience of the

[1] A professor emeritus who is known for making the concept of "ecological footprint" which become the most important reference for global sustainable analysis

nation. Thus, as for knowing the basic philosophy of planning for the purpose of the planning quality enhancement, this book has delivered insightful key messages and therefore, it deserves five stars rating.

COVER BOOK REVIEW



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This journal aimed at studying the issues of sustainable development from around the world to later be used as policy material in sustainable development planning in Indonesia, developing countries, and the world in general. This journal absorbs theoretical scientific studies as well as empirical experiences from researchers around the world, primarily from researchers who specialize in developing countries, to then publish them all widely to international forums as an applicable and innovative knowledge.

This journal gives important weight to the issue of sustainable development planning with regard to the mental and spiritual development of the people of Indonesia and the people of the world in terms of politics, economics, social, culture, environment, peace and justice, energy, and other strategic issues about sustainable development planning.

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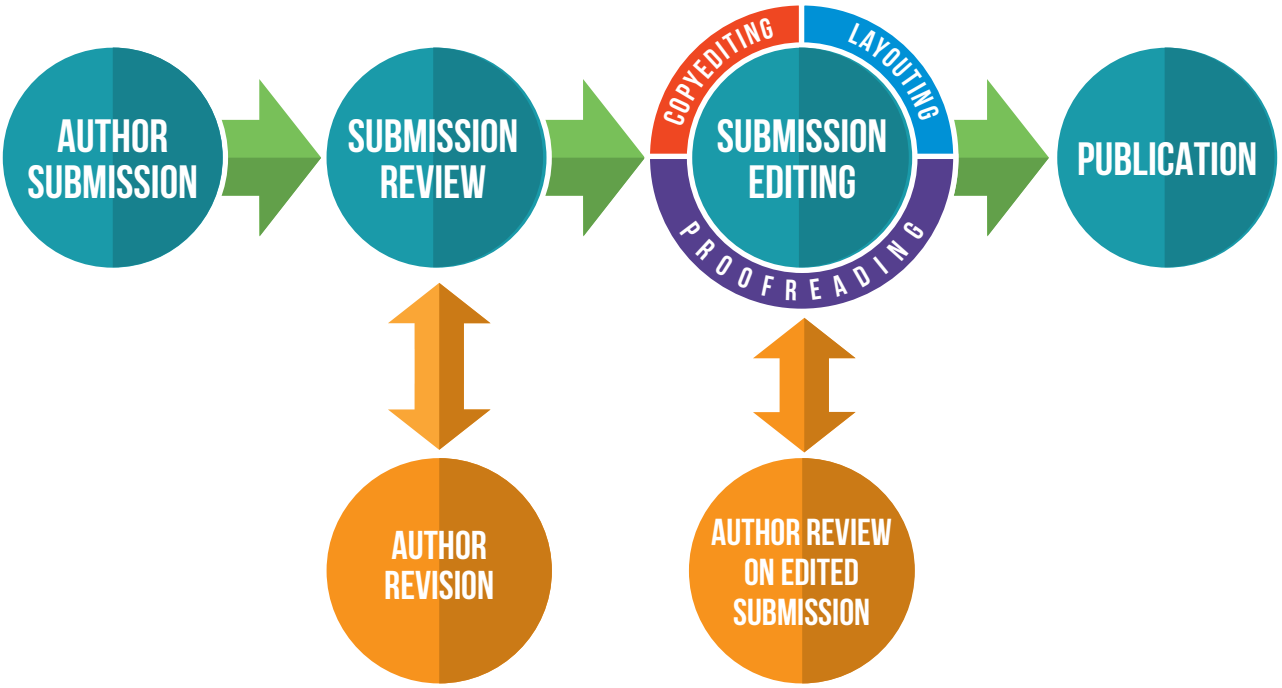

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