DOES ALTITUDE AND FOREST DENSITY AFFECT ECONOMIC GROWTH? A CASE STUDY OF KALIMANTAN BARAT

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ABSTRACT

Kalimantan Barat is one of the individual provinces in Kalimantan due to its diverse geographical elevation among all districts. Mountains and hills dominate the districts near the border; lowlands and river banks dominate the urban areas. A geographical indication is a barrier to economic growth, as a simple growth from limited transportation. Efforts to optimize the economic sector are also carried out in forest management, including Kalimantan Barat as one of the world's lungs. The conversion of forest land functions is suspected to increase economic growth even though it must balance nature. This study aims to determine the significance of altitude as a fixed geographical indicator and forest density as a natural condition that can vary according to human activities. The height of area data and forest density, and the average economic growth in 14 districts/cities in Kalimantan Barat uses the Panel Least Square method. As a result, area height has a negative and significant effect on economic growth, whereas forest density has no such relationship. Simultaneously, both variable is having a substantial impact on economic growth in Kalimantan Barat.

JEL: O18, R11.

Keywords: *altitude, economic growth, regencies/cities, geographical.*

1. INTRODUCTION

Economic growth is the process of increasing the production capacity of an economy realized in an increase in income, both regionally and nationally (Acemoglu, 2012). The rise in the number of goods and services produced also made some changes in the regional economic structure (Carree & Thurik, 1999). Economic growth is also required to be self-generating to provide strength or momentum useful in sustaining growth in the next period. Macroeconomists rely upon a primary focus on quantifiable metrics that are frequently not convincingly linked to a broader impact on improvement in development (Feldman & Storper, 2018).

Farm and forestry, manufacture, trade, and construction are four dominating Kalimantan Barat economic growth (Bank Indonesia, 2020). The variety of natural resources and geographical features among regencies significantly affects farm and forestry performance. This condition tends to create more exported commodities, such as rubber, timber, and palm oil. There is an acceleration of harvest lands in some regencies due to the functional shift of forest, especially Ketapang Regencies (Wardanu & Anhar, 2014). Kalimantan Barat also experienced a reasonable and fluctuating rate of economic growth in the last 5-10 years (Bank Indonesia, 2020). Regionally, Kalimantan Barat contributes around 8.37% of economic growth, making this province the second-largest Gross Regional Domestic Product after Kalimantan Timur (Badan Pusat Statistik Provinsi Kalimantan Barat, 2020). However, due to its diverse geographical features, not every regency in Kalimantan Barat experiences an acceptable rate of growth. Porfiriev (2018), examines that

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physical environmental conditions can affect the smooth operation of production, distribution, and consumption of goods and services in the region. Rough terrain that is dominating some regencies near the borderline has obstructed industrial development and economic growth.

Physical environmental conditions can affect the smooth operation of production, distribution, and consumption of goods and services in the region (Porfiryev, 2018). This kind of geographical feature should be considered to measure the rate of economic growth. In some cases, geographical features, such as absolute location, altitude, and morphological situations, can reflect different ways of affecting the economy (Rodrik, 2003). Several kinds of research before have revealed those relationships vary from high-income to poor ones (Farole, Rodri-guez-Pose, & Storper, 2011). The relationship between the economy and geographical conditions shows the differentiation between inferior regions and urban areas with middle to upper income (Feldman & Storper, 2018). Also, studies have shown a correlation between physical geographical characteristics and achieved economic growth (Rodrik, Subramain, & Trebbi, 2004). According to Bloom, Canning, & Sevilla (2003), coastal areas tend to perform better than regions far from the sea. Meanwhile, higher average temperatures significantly reduce economic growth in developing countries (Dell, Jones, & Olken, 2012).

Furthermore, regencies with mountains and hills also undergo a slow rate of growth and development due to some obstacles to facing a challenging morphological situation. In line with it, Rodrik (2003), in his study, found out that absolute location, geological conditions, and land formation can reflect different ways of affecting the economy. Unfortunately, the analysis of determinants of regional economic growth often rules out natural characteristics and only focuses on capital accumulation and fiscal-approach policy (Petrakos, Kallioras, & Anagnostou, 2011). Kalimantan Barat also encounters the exact reference in boosting economic growth. Policymakers tend to generalize those natural characteristics and implement exact interventions, such as investment and trade, to create more capital. Whereas every regency has exclusive aspects, a reliable legal system, primary institutions, and adequate locale features can make a right and proper economic activity. This condition-needed is in line with Boldeanu & Constantinescu (2015), which examined the problem of the inability of the contractual institutions to optimize geographical features as an added value in the economy.

Several types of research before have revealed those relationships, vary from the high-income area into the poor ones (Farole et al., 2011). The relationship between the economy and geographical conditions shows the differentiation between impoverished regions and the urban regions with middle to upper income (Feldman & Storper, 2018). According to Bloom et al. (2003), coastal areas tend to perform better than regions far from the sea. Dell et al. (2012), examine that higher average temperatures have significantly reduced the economic growth in developing countries. In terms of employment, Santini, Guri, & Aubard (2016) review 63% more of people who live in the mountains being employed than the average dairy industry. In creative industries, tourism contributes more when it is located in rural areas due to its more comfortable transportation and accommodation (Iorio & Corsale, 2010). Even if it has poor accessibility, concerning harsh topography, it could also boost economic growth with more efforts to focus on its potential-leading sector.

Regionally, Europe has discovered a more in-depth study of specific geographical features. Korres, Tsobanoglou, & Kokkinou (2011) examined there remains a striking gap in terms of

economic strength between regional performance in Europe with and without physical handicaps. This region treaties also acknowledge the need to strengthen the economic, social and territorial cohesion, particularly concerning the areas which suffer from severe and permanent or demographic handicaps, such as mountains, island, outermost or sparsely populated areas (Monfort, 2009). Geographical indications on growth have a significant impact on local economic actors and households (Scott, 2006; Török, Jantiyik, Maró, & Moir, 2020), summarise that geography is an active component of economic performance, precisely portraying entrepreneurship and innovation in many sectors.

On the other hand, island-formed countries suffer from isolation and small size, which harms transport costs (Morris, Clemente-Colón, Nalli, Joseph, Armstrong, Detrés, Goldberg, Minnett, & Lumpkin, 2006). It also blocks them from impeding the economies, expanding small businesses, and decreasing opportunities for various jobs. As opposed to those small states on the coasts of more significant landmasses, regional contact may be complicated for a comparatively distant and isolated small island and archipelago state (Read, 2004). Minor conditions sectoral specialization varies; those in strategic positions are more vulnerable to outside diplomatic and economic forces. The small island and archipelagic states have some vulnerabilities and threats such as typhoons and increasing sea levels. However, it is also urgent to look at a national scope, specifically for the archipelago-formed country - like Indonesia. With diverse geographical situations and features, every regency of Indonesia has its economic case to work on it. Kalimantan Barat Province, which consists of 14 regencies/cities, has varying regional heights and economic growth rates, as shown in Table 1.

Table 1. Regional Altitude and Average Economic Growth in 2010-2018 in 14 Regencies / Cities in Kalimantan Barat Province

Regencies/Cities	Altitudes (mdpl)	Average of Forest Density in 2010 – 2018 (Ha)	Average Rate of Economic Growth in 2010-2018 (%)
Sambas	10,832	182.432	5,479
Bengkayang	86,058	192.354	5,134
Landak	52,380	237.989	5,367
Mempawah	8,060	131.919	5,1
Sanggau	14,593	549.939	4,61
Ketapang	6,732	1.801.179	6,258
Sintang	25,248	1.971.370	5,422
Kapuas Hulu	34,072	2.333.877	4,837
Sekadau	35,602	152.375	5,979
Melawi	35,508	1.027.827	5,298
Kayong Utara	12,847	530.868	5,553
Kubu Raya	11,521	380.228	6,316
Pontianak	7,545	858	5,868
Singkawang	5,127	11.880	5,926

Source: (Badan Pusat Statistik Provinsi Kalimantan Barat, 2019)

There is a tendency that regencies/cities with relatively low heights have higher economic growth than other regions with higher altitudes. Smooth trade access, ease of dissemination of market information, and the availability of relatively adequate water sources have supporting areas with lower elevations. Meanwhile, areas with higher elevations tend to have rough topography such as mountains and hills and transportation path patterns that are more difficult to pass. This condition resulted in several constraints in the production, distribution, and consumption of goods and services, which resulted in relatively low economic growth in the area (Fujita & Mori, 2005).

Geographically, high-altitude regions tend to have quality natural resources from their rich forest density. Kalimantan Barat is also a region with 8.198.656 ha area of forest, dominated by tropical forests (Badan Pusat Statistik Provinsi Kalimantan Barat, 2020). Forest functions in Kalimantan Barat are to maintain soil fertility and productivity and provide industrial development to boost economic growth. The Agricultural and forestry sector has committed the highest contribution in this region's Gross Regional Domestic Product for the last ten years (Badan Pusat Statistik Provinsi Kalimantan Barat, 2020). This condition indicates that forestry has led the economic activity in almost every regency with some companies' cooperation. Production activities of the forestry industry and its supply chain have opened new job opportunities, creating community empowerment and substantial physical development.

On the other hand, this advantage causes Kalimantan to face a rising rate of deforestation every year (Sifriyani, Ruslan, & Susanty, 2019). The public and private forestry industry oblige to do functional shifts over forests, partially or entirely, while it leads to mass deforestation. For example, the Sintang regency holds 1.3% of Indonesia's forests, including protection and production, also one of the highest rates of degradation, deforestation, and fires in Kalimantan Barat (Sudaryanti, Muin, & Manurung, 2014). This regency also experiences 5.422% of economic growth, as seen in Table 1, similar to Kalimantan Barat's development as a whole. The economy of Sintang is dominated by land and natural resources-based sectors, with rubber and oil palm as the primary commodities. An identical situation occurs in some urban-regencies, as Pontianak, Singkawang and Ketapang. A few forest density, which indicates mass deforestation for public settlement, trade and commercial plantations have generated a reasonable rate of economic growth. When it comes to the debated correlation between economic indicator and forest density, increasing economic growth is firstly associated with forest loss.

At the first level, many studies have examined the relationship between economic growth and forest density. Trevesa, Alix-Garcia, & Chapman (2011) found that higher deforestation creates more land sales and welfare outcomes in Kibale National Park, Uganda. In China, the rapid growth of the timber industry and density of forest area is a double-edged sword, forces that may lead to a good condition of development but shrink of local trees and farms (Rozelle, Huang, & Benziger, 2015). Japan and South Korea achieved industrialization of their economies before the 1980s, and their forest areas remained at high percentages of total land areas throughout this period (Li, Liu, Long, de Jong, & Youn, 2017). The globalization of economics had a broad impact on causing deforestation directly or indirectly, affecting the proportion of forest to total land area (Meyfroidt, Rudel, & Lambin, 2010; Zoomers, 2010). According to Li et al. (2017), nine Asia-Pacific Countries that experienced continuing deforestation have a reasonable rate of income from net exports. In Indonesia, forest density tends to shrink during the enhancement of industrialization. Angi & Wiati (2015), found accelerated deforestation during the optimization target of economic activity in Paser Regency, Kalimantan Timur. Enhancing macroeconomics indicators, including interest and growth, influenced the rate of deforestation nationally in Indonesia, as examined by (Astana, Sinaga, Soedomo, & Simangunsong, 2012).

This study describes the relationship between altitudes of areas and their forest density and achieved economic growth rate. Here, we provide causal evidence that a regional-scale, height, and forest density affect domestic financial performance. Also, we contribute to analyze the effect of nature's permanent endowment and fluctuate indicators of the environment set on a very dynamic rate of economic growth. Therefore, we aim to prove the influence of varying regional

heights and forest density on economic growth achieved in 14 regencies and cities in the province of Kalimantan Barat as a whole. From these results, we will obtain an appropriate model to optimize the potential based on altitude to improve economic growth in Kalimantan Barat better.

2. LITERATURE REVIEW

2.1. Economic Growth

Economic growth is considered an increase in a country's economy, taking into account an increase in the output of goods and services produced and people's living standards (Ramayani, Aimon, & Anis, 2012). Besides, a country can be said to achieve growth if it can maintain it in a sustainable period (Griffith-Jones & Cozzi, 2016). Many countries have discussed how to achieve economic growth at the expected level (Aprilia & Hariyanti, 2014). Countries with large amounts of natural resources tend to be productive in making industrial goods, and countries with narrow territories are likely to improve the quality of their human resources. Several factors drive economic growth, such as the accumulation of physical and human capital and technological advances in the mass production of goods and services (Banerjee, Duflo, & Qian, 2020).

The rate of accumulation of physical capital is one of the main factors determining the level of actual per capita output, which directly impacts economic growth (Bassanini & Scarpetta, 2002). The mechanism used to accumulate physical capital for growth will always significantly affect the level of investment in the entire region. It will ultimately contribute to adding the possible sources of output per capita. However, human resources dominate the main factors of economic growth (Anwar, 2013). Investment in training and development in research can have a more permanent impact on the growth process (Safri, 2016).

Natural resources also drive economic growth as the raw material for carrying out all production steps (Indajani & Pawestri, 2018). The main feature of natural resources is its heterogeneous geographical distribution, so it becomes essential to consider economic growth studies (González-Val & Pueyo, 2019). Their accessibility is more often than not concentrated in a few regions of the world which don't continuously coincide with the locales in which they are joined within the generation, so there should be geographical examination in producing significant exchange volumes, which specifically influence development within the locale and the national economy (Kartiasih, 2019). Furthermore, natural resources and features are taking an essential part in providing materials and the costs of adopting technologies, which can take growth into a better position. In places where production is expensive because of an inhospitable climate, unfavorable topography, keto low population densities, or a lack of proximity to global markets, many technologies will not come and develop (Sachs, 2012).

2.2. Geographical Features and Economic Growth

Geography is understood as a condition that shapes each region - determines the existence of natural resources, transportation costs, and the diffusion of knowledge and technology, thus forming the region's potential for development (Ketterer & Rodríguez-Pose, 2018). As something that cannot be changed in the short term, conditions like this have to deal with the right policies. Geographical conditions as a unique regional or country characteristic are challenging factors to be optimized to have economic growth (Syahputra, 2017). Infrastructure is a sector that plays an essential role in eliminating geographic limitations in increasing economic development in a region (Maqin, 2014). Based on the cases in the field, often, areas with higher elevations have more

challenges in infrastructure development, such as road structures, rough terrain, and challenging terrain. Regions with a higher altitude can optimize economic growth if supported by adequate infrastructure and qualified human resources. From this perspective, productivity and accumulation of human capital are greatly influenced by the geography of the place, which means that geography regulates the growth potential of any region with its various characteristics. Besides, a complex picture of human and geographical development has led to positive aggregate economic effects (Dawson & Seater, 2013).

On a world scale, Gallup, Sachs, & Mellinger (1999) examines that countries in the tropics are almost poor, and nearly all high-income countries are in the middle and high latitudes. Also, the coastal economy, in general, is more developed than a landlocked economy. Several studies have shown that Sub-Saharan Africa, as the most impoverished region, has several characteristics closely correlated with all low-income variables in general, such as high concentrations of tropical land and high population densities in landlocked areas. In contrast, the North American and Western European parts are high-income regions that can meet the high-income variable areas.

From an analytical point of view, geographical features must be considered a significant problem for economic development and the importance of economic and political institutions. As explained by Bloom, Sachs, Collier, & Udry (1998), there are four relationships between geographical determinants and economic growth. First, they suspect that coastal access will be necessary for internal and international trade, given the navigable rivers and seas and the large transport capacity (Ren, Wang, & Ji, 2018). Sea transportation capable of transporting and moving large amounts of logistics is the leading choice in carrying out the trade process to impact the economy in coastal areas that are generally in the lowlands (Jusna & Nempung, 2016). Second Burhanuddin & Abdi (2020), productivity is related to geography by the prevalence of infectious diseases, reducing the economy. Non-natural disasters in contagious diseases will isolate certain areas that will gradually reduce productivity (Herlina, 2020). Areas that tend to differ from one another in terms of natural forms, such as altitude, will experience significant economic contact. The third major correlation between geography and economics is the relationship between cultural output and climate, significantly influencing agricultural goods (Hidayati & Suryanto, 2015). Another prosaic correlation is that the endowment of natural resources (gems, minerals, or petroleum) also affects state income per capita one day, even though economic growth is not always higher. Indeed, the availability of natural resources is positively correlated with geographical location. The results show that geographical features can be one of the determinants of contributing to economic growth. The geographical features mentioned above are significantly related to the height of the area.

2.3. Forest Density and Economic Growth

Developing countries in Asia, such as Indonesia, generally have pretty large forest areas. These forests are spread across almost all regions in Indonesia. The provinces of Papua, Sumatra, and Kalimantan are islands that have vast and untouched forests. With the site owned and the extraordinary natural potential, exploitation activities cannot be avoided. Several activities generally cause changes in forest areas, namely logging legally and illegally, clearing plantation land, forest fires, the need for residential areas (Berutu & Nurman, 2012).

With the wealth of the owned forest, if it is appropriately adequated, it can benefit the people in the area. Optimal utilization of forest products will increase community income and have

a significant effect on economic growth. However, if the natural resources provided by the forest are not appropriately managed and damage occurs, the opposite will happen. Biodiversity loss and climate and weather change will be the main threats caused by improper forest management (uncontrolled deforestation). Loss of biodiversity will cause ecosystems to be disturbed and the failure of several interdependent species (Alroy, 2017). Climate change is disrupting rainfall. Rainfall that is too high will cause flooding, while rain that is too low will cause drought. Floods or drought will directly affect agricultural production (Fauzi, Wibawanto, & Purba, 2020). The decline in agricultural output will affect economic growth.

Deforestation is an activity to change forest cover to non-forest, which impacts decreasing the function of forest ecosystems (Tan-Soo, Adnan, Ahmad, Pattanayak, & Vincent, 2016). The high rate of deforestation in areas with extensive forest areas such as Indonesia requires proper regulations and policies. With the advantage of a large enough forest area, conservative forest management will provide optimal results. However, forest management, which tends to be reasonable, causes resource utilization benefits to benefit certain parties (Napitu, Hidayat, Basuni, & Sjaf, 2017). The uniform and unsustainable pattern of forest use cause the contribution to economic growth in a region to be less than optimal. Reductions in forest cover for specific land uses for commodities are often not proportional to the productivity of previously projected (Dewi & Rudiarto, 2013).

In general, altitude can affect the area of forest cover in a room. Higher regions tend to have more comprehensive forest cover than lower areas (Suryana, Parikesit, & Iskandar, 2018). Naturally, the more elevated areas have more diverse vegetation. Based on the morphology of higher areas, it has more significant challenges to be explored and exploited. Meanwhile, the lower sites are mainly used for more comprehensive land needs, such as housing and agriculture (Asrianny, Paweka, Achmad, Oka, & Achmad, 2019). If managed optimally, areas with more comprehensive forest cover should increase economic growth in those areas. However, management that tends to be unproductive and practical will only contribute to economic growth in the area (Yuwono & Hilmanto, 2015).

3. METHODOLOGY

Kalimantan Barat is a unique province in Kalimantan because of its various geographical indications among all regencies. Mountainous and hills dominate regencies near the borderline, while bare land and river banks are prevailing urban areas. Many regencies also have various altitudes, such as Singkawang City, which has highlands in some parts and beaches in other regions. This province also parts of the Heart of Borneo (HOB), a term to portray groups of a tropical forest as the world's lungs. So, it is urgent to examine the effect of various altitudes and forest density on Kalimantan Barat's economic growth. As stated in the introduction, regionally, Kalimantan Barat contributes a large proportion of Gross Regional Domestic Bruto.

This study analyses the area's altitude, forest density, and economic growth of the last nine years in 14 regencies in Kalimantan Barat. The authors use descriptive analysis, which is discussed and explains the independent variables on the dependent variable. The data used in this study are secondary data obtained from the Badan Pusat Statistik Provinsi Kalimantan Barat and other institutions related to this study. This study also uses panel data, which is a combination of time series data and cross-section data. Then, the data is processed through an economical display software program (E-Views). The variables in this study consisted of the dependent variable,

namely the rate of economic growth in 14 regencies in Kalimantan Barat (variable Y). In comparison, the independent variables consisted of each of the 14 regencies (variable X_1)—the forest density of every regency set as Variable X_2 . This study uses regression analysis with the Panel Least Squares Method, which in general, the model equation is as follows:

$$y_{it} = \alpha_{it} + \beta'X_{it} + e_{it} \quad \dots\dots\dots (1)$$

with:

- y_{it} : i cross-unit i for the t-time period
- β : $(\beta_1, \beta_2, \dots, \beta_K)$ is a $1 \times K$ constant vector with K number of the independent variable
- X_{it} : $(x_{1it}, x_{2it}, \dots, x_{Kit})$ shows an observation vector on an independent variable measuring $1 \times K$
- α_{it} : intercept is the group / individual effect of i cross-unit and the t-time period
- e_{it} : error component with IIDN $(0, \sigma^2)$
- i : $1, 2, \dots, N$
- t : $1, 2, \dots, T$

3.1. Panel Regression Model Estimation Method

In estimating the panel regression model, three approaches are often used, including the common effect model, a fixed-effect model, and the random effect model. The Common Effect Model is an estimation method that uses the principle of least squares. The common effect model ignores the dimensions of time and the individual measurements (cross-section), so it can be assumed that the behavior of individuals does not differ in various periods (Baltagi, 2013). CEM is stated in the model as follows:

$$y_{it} = \alpha + \beta'X_{it} + e_{it} \quad \dots\dots\dots (2)$$

The fixed-effect model assumes that differences between individuals (cross-section) can be accommodated from disagreements in their interception (Gujarati, 2004; Min, 2019). The Least Squares Dummy Variable use to estimate the fixed-effect model. The way to interpret the panel fixed effect data regression results is the same as the interpretation of the common effect model. The difference is the value and form of the panel data regression equation based on the beta coefficient.

The index i on intercept (α_i) shows that the intercepts of each individual are different, but the intercept for unit time series remains (constant). While the random effect model (MER) differences in individual characteristics and time are accommodated in the model's error. Since two components contribute to the formation of errors, namely individual and time, the random error in MER also needs to be broken down into errors for the time component and combined error.

$$y_{it} = \alpha_{it} + \beta'X_{it} + e_{it} \quad \dots\dots\dots (3)$$

Assumed that α_{it} is a random variable on average α_0 so the intercept of each unit is

$$\alpha_i = \alpha_0 + \varepsilon_i, \text{ where } i = 1, 2, \dots, N \quad \dots\dots\dots (4)$$

So the model becomes:

$$\begin{aligned} y_{it} &= \alpha_0 + \beta'X_{it} + \varepsilon_i + e_{it} \quad \dots\dots\dots (5) \\ y_{it} &= \alpha_0 + \beta'X_{it} + w_{it} \end{aligned}$$

3.2. Testing the Panel Regression Model Selection

Before the model is estimated, the model specification test is carried out first to determine the model used, whether it is a common effect, random effect, or fixed effect. The Chow Test is used to select one model in panel data regression, namely, the fixed-effect model and the common effect model. The testing procedure is as follows (Baltagi, 2013).

Hypothesis:

$H_0 = \alpha_1 = \alpha_2 = \dots = \alpha_n = 0$ (the effect of unit cross section as a whole is meaningless)

$H_1 =$ There is at least one $\alpha_i \neq 0$; $i = 1, 2, \dots, n$ (region effect means)

The test statistic used is the F test, that is :

$$F = \frac{[RRSS - URSS]/(n - 1)}{URSS/(nT - n - K)}$$

Information:

n = Number of individuals (cross-section)

T = number of time periods (time series)

K = Number of explanatory variables

$RRSS$ = *restricted residual sums of squares* taken from the fixed coefficient model

$URSS$ = *unrestricted residual sums of squares* that are not restricted from the fixed effect model

If the value of $\alpha > F(n-1, nT - n - K)$ or $p\text{-value} < \alpha$ (significance level/alpha), then the initial hypothesis (H_0) is not accepted, so the chosen model is the fixed effect model. If the Chow test concludes that the corresponding model is FEM, the next step is to carry out the Hausman test. This Hausman test is used to choose a random effect model with a fixed-effect model (fixed-effect model). This test works by testing a relationship between errors in the model (composite errors) with one or more explanatory variables (independent). The initial hypothesis is that there is no relationship between model errors with one or more explanatory variables. The testing procedure is as follows (Baltagi, 2008).

Hypothesis:

$H_0 = \text{Correlation } (X_{it}, \epsilon_{it}) \neq 0$ (Cross-sectional effects are not related to other regressors)

$H_1 = \text{Correlation } (X_{it}, \epsilon_{it}) \neq 0$ (Cross-sectional effects are related to other regressors)

The test statistic used is the chi-squared test based on *Wald* criteria, that is :

$$W = q'[var(q')]^{-1}q$$

$$W = (\beta_{MET} - \beta_{MEA})'[var(\beta_{MET} - \beta_{MEA})^{-1}(\beta_{MET} - \beta_{MEA})$$

Information:

β_{MET} = fixed slope vector estimation effect vector

β_{MEA} = slope estimation vector, random effect model

If the value of $W > X^2_{(\alpha, K)}$ or $p\text{-value}$ less than the specified significance level, then reject the initial hypothesis (H_0) so that the model chosen is a fixed-effect model. According to (Rosadi,

2011), this test aims to see whether there are random effects in the data panel. In statistical calculation, the Hausman Test requires the assumption that the number of cross-section categories is greater than the number of variables independent (including constants) in the model. Furthermore, in the estimation, Hausman Test statistics required estimates of positive cross-section variance, which the model cannot always fulfill. If these conditions are not met, then only the fixed effect model can be used.

4. RESULT AND DISCUSSION

The altitude in 14 regencies of Kalimantan Barat and its economic growth rate will be estimated by the panel regression method. Before estimating, first, determine the appropriate panel data regression model as an estimation method. Some methods that can be chosen include the common effect model (CEM) method, fixed effect model (FEM), or random effect model (REM). After the panel data regression model is obtained, the next step tests the classical assumptions and interprets the panel regression model. The Chow Test is a test to see which method is most appropriate for CEM and FEM.

Table 2. Result of the Chow Test and Hausman Test

	Chow Test	Hausman Test
R-squared	0.026747	0.0263108
Adjusted R-Squared	0.018898	0.0170167
S.E. of Regression	0.953389	0.876817
F-Statistic	3.407809	2.830903
Prob (F-Statistic)	0.067273	0.001175
Sum Squared Resid	112.7100	85.33762
Cross-section Chi-Square	0.0008	0.0000

The chow test calculation of the altitude effect data with the level of economic growth shows the probability of cross-section chi-square = 0.0008, which is less than $\alpha = 0.05$. The decision is to reject H_0 and use the Fixed Effect Model. Then the Hausman test is carried out to determine which method is most appropriate between REM and FEM. Hausman test results show a p-value of 0.0000, which is less than $\alpha = 0.05$. The decision is to reject H_0 and use the FEM for the next step.

Table 3. Fixed Effect Model Estimation Test Statistics

R-squared	0.263108
Adjusted R-Squared	0.170167
S.E. of Regression	0.876817
F-Statistic	2.830903
Prob (F-Statistic)	0.001175
Sum Squared Resid	85.33762

Interpretation of the independent variable regression coefficient is critical to determine how much influence the variable area height, forest cover area, and economic growth are. The regression equation model that can be written from these results is in the form of multiple linear regression equations as follows:

$$\text{Economic Growth} = 6.567829 - 0.508007 X_1 - 0.079498 X_2 + e$$

Then the regression is interpreted as follows: (1) The constant value (a) is 6.567829, which means that if the Altitude of the Area and the Forest Density is 0, then the Economic Growth is 6.567829; (2) The regression coefficient value of the area height variable (X_1) is negative, namely

0.508007. It means that for every increase in the Altitude of the Area by 1%, then Economic Growth will decrease by 0.508007% with the assumption that other independent variables have a fixed value; (3) The regression coefficient value of the Forest Cover Area variable (X_2) is negative, namely 0.079498. It means that for every 1% increase in Forest Density, Economic Growth will decrease by 0.079498%, assuming other independent variables have a fixed value.

As calculated in Table 4, the probability from F-statistic Test also shows a value of 0.001175, which is less than $\alpha = 0.05$, resulting in the inference that the relation between two variables as a whole is positive and significant. It means that most regencies and cities in Kalimantan Barat Province with high altitudes have lower economic growth. Specifically, every regency with different altitudes and morphological features shows a varying economic growth rate due to several terms of problems.

The highest average economic growth rate during 2010-2018 was achieved by Kubu Raya Regencies, at 6.316%. This area is lying above 11.521 meters above sea level, with a straightforward type of land. The subsequent land uses included rice fields and other annual croplands, mixed tree crops, transmigration settlements, smallholder and pineapple plantations, and oil palm plantations (Wahyunto, Supriatna, & Agus, 2013). Due to its low altitude, the temperature and humidity rate of this area is providing soil fertility. Because of that, farming and agriculture have been contributing significantly to the real GDP of this regency. The rapid functional shift of forest also determines the leading sector in Kubu Raya Regency, as the most forest has been utilized for plantation. As a peatland area, Kubu Raya Regency has been influenced by the advancing rate of economic growth. It is proven by several studies that show the increasing income, improving demand for agricultural products and market access, as well as increase off-farm works (Wildayana, Armanto, Zahri, Adriani, & Syakina, 2018). Therefore, due to its strategic position, and supportive topology, the international harbor and airport are located at this regency. This indication tends to be the potential for increased revenue and welfare, also reduced unemployment. Studies have revealed multiplier effects on airport development to local economic growth in the form of the enormous scope of trade and broader access of jobs (Effendi, Musika, & Harahap, 2019; Ulfah, Gunawan, Firdaus, & Rofiq, 2018).

Ketapang Regency also notes an excellent average rate of economic growth during 2010-2018. Located in the south of Kalimantan, this regency is being dominated by swamp and flood plain. The topography and altitude of the Ketapang Regency show a variety of features, which could be divided into three types; flat, wavy, and a minor part of steep topography. The domination of mineral soil, peat, and swamps has been developing oil palm plantations in this regency. This kind of farm has been examined to be one of several drivers of local economic growth in tropical countries (Hutabarat, 2019). In Malaysia, oil palm plantation plays a vital role in the agricultural and economic development of the country (Kushairi, Loh, Azman, Hishamuddin, Ong-Abdullah, Izuddin, Razmah, Sundram, & Parveez, 2018). This situation also occurs in Ketapang Regency, and it becomes more advance because of the openness and convenience provided by geographical features. The lower altitude of areas tends to be flexible for every effort of the commercialization aspect of the oil palm industry. It would cover biotechnology, mechanization, integration and extension, nutrition and food, and oleochemicals. Riau Province, which is similar to the Ketapang Regency in its flat topography, has successfully contributed the refinery process in the oil palm industry to their industrial sector (Apresian, Tyson, Varkkey, & Al, 2020). Hence, the lower altitude of the Ketapang Regency has taken a significant part in their rate of economic growth.

Meanwhile, Ketapang Regency has a wide area of forest density that has consisted of production forest protected forest, convertible production forest, preservation, and natural reserve (Hardiansyah, 2012). As tested in our methodology, forest density has no significant effect on growth, in line with the fact in Ketapang Regency. Participation among stakeholders' regency to preserve forest is reasonable policies that need to be accelerated in the future.

Bengkayang Regency locates at 86.058 meters above sea level. It has a rough topography, where series of hills and mountains are dominating this regency. In some spots, alluvial plains in the form of swamp, peat, tidal area, and rivers have been mainline for transportation (Putri & Sulistya, 2019). Bengkayang Regency has some problematic issues on the accessibility of highways in most places, which has become a barrier for mainly economic activity. The transportation sector includes several different segments that can be split into two categories: those that operate on fixed itineraries and those that serve primarily belong to the distribution of goods, such as trucks, gas, and oil tankers (Brancaccio, Kalouptsidi, & Papageorgiou, 2020). In terms of forest density, Bengkayang Regency has a wide range of forest, that most of them are customary forest. Tambunan, Manurung, & Ardian (2018) summarise that one of the traditional woods, Pengajid, is almost totally protected for commercial purposes. In line with it, Junisa, Oramahi, & Tavita (2019) also find the conventional norm of Dayak Bakati Tribes to preserve the forest in Teriak Village. It again happens to other forest areas, so the productivity of forest resources is not significantly contributing to growth.

Singkawang and Pontianak with a value of 5.93% and 5.87%, while other regencies classified as low altitude also have high economic growth value and do not differ significantly with regencies/cities higher economic growth. These administrative cities benefit from their strategic location, the primary type of land, and flat topography. Those conditions also become the best characteristics to boost tourism and the creative economy, including itineraries and accommodations (Ioannides, Röslmaier & Van Der Zee, 2019). Thus, the achieved rate of economic growth in those cities tends to be higher than other regencies. This situation influences the closest regency from these two areas, namely Mempawah Regency. Mempawah Regency is one of the districts whose economic life still depends on the agricultural sector. It can be seen in the value of Mempawah Regency's Gross Regional Domestic Product (PDRB), where the farm sector is the most significant contributor to GRDP, followed by the trade and industrial sectors (Irmayadi, Yurishintae, & Suyatno, 2016). With geographical conditions dominated by lowlands, the agricultural industry and its derivatives have great potential to continue developing. However, this regency tends to be the hinterland of more developed regencies like Pontianak and Singkawang Cities, so it is economically developed but stressed. It turns out to be that Mempawah Regency achieved a lower rate of economic growth, even it has some significant sectors of economic activities.

Meanwhile, in terms of forest density, Pontianak has few forest areas due to its physical development for urban needs. Adriansyah, Hamid, & Alwi (2016), found the limited proportion of forest area in Pontianak City. As a city focusing on tertiary industry, Pontianak has not been significantly impacted by finite forest density. Similar conditions happen in Singkawang City, where forest density is only high on its borderline, near Bengkayang Regency (Haryanto, Astiani, & Manurung, 2015) and Kartikasari, Oramahi, & Idham (2017) stated that Gunung Sari Forest in Singkawang City has many economic-potential trees. However, the surrounding communities tend to have local protection wisdom for preservation.

Moreover, the center of growth arises in its urban areas, dominated by beaches and lowlands. This condition is one reason why forest in Singkawang City is not figuring an essential part of economic growth. In Mempawah Regency, peatlands dominate forest density and become a large part of the ecosystem (Prastomo, Herawatiningsih, & Latifah, 2017). Production in peatlands cannot be maintained in the medium and long term, so it has to implement more efforts to make it sustainable. Due to lack of budget and awareness of stakeholders, peatlands in Mempawah Regency is only for ecosystem services.

Most of the Sambas Regency area is relatively flat with a composition (slope of 0% - 15%) of about 67.59%; slope 15% - 40% about 25.08; a hill of > 40%, approximately 7.3% of the total area of Sambas Regency with varying altitudes between several districts, but mainly in the form of lowlands. As an agricultural area with a population whose main livelihood is agriculture, it is only natural that the farming sector dominates the economic structure of Sambas Regency. The landscape dominated by lowlands makes it easier to develop the agricultural industry in terms of increasing productivity. At the same time, this benefit could not be taken optimally due to limited facilities and infrastructure. Besides, people's economic activities tend to go to Malaysia because border communities quickly sell their agricultural products and obtain daily life necessities in Malaysia (Akadol, 2012). In this case, flat topography related to good access in borderline has ease society distributing and consuming goods. However, on the other hand, this situation creates an economic dependency on neighboring countries; in terms of forest density, Sambas Regency experience a few protected forests and a large area of production forest. Communities and companies are running agribusiness, such as rice and coconut (Hidayat, 2012).

In general, Sanggau Regency is a hilly and swampy highland area fed by several rivers (Rejeki, 2018). The terrain is quite varied and unpredictable, requiring more significant effort to pass it. The Sanggau area, which is flowed by several rivers, makes transportation access quite limited. On the other hand, some of the main routes in the Sanggau area are on highlands with a relatively high degree of steepness. It is also happening on Sekadau Regency, with the dominance of steep slope conditions. It causes different adaptations for the production and distribution of goods that require more cost and considerations. As many studies have examined, transportation influences trade in many ways, such as proximity to customers, reasonable real estate costs, access to interstate highways, availability of appropriately skilled workers, and reasonable costs of doing business (Cidell, 2010; Glasmeier & Kibler, 1996). Because of that, those two regencies should face their geographical features and improve the economy's activities.

When viewed from the forest area and its ratio to the size of the area, Sanggau Regency is one of the areas with extensive forest cover. The plains morphology, which tends to vary, makes this area has a high diversity of biological natural resources, primarily plants. Supported by terrain classified as complex and unpredictable, the forests in the area have more space and time to grow. Forests in Sanggau Regency are generally only used for private community interests on a small scale (semi-commercial) with supervision from the government. In contrast, commodities from forest products are still limited in use (Iqbal & Septina, 2018). Sekadau, as a district that was once part of Sanggau district, has almost similar characteristics regarding its forest management. Forest products have been used and become commodities such as rattan, but they are still limited to meeting people's personal needs (Riantono & Hardiansyah, 2018). As a relatively young district in terms of its administrative and rough topography, Sekadau District can show a positive trend in economic growth.

Sintang Regency has varied topography and land contours based on its geographical location, namely flat, wavy, wavy, and steep, with an average slope of 15 - 44 percent. Residential conditions are scattered, especially in rural areas. Less optimal and undirected use of the forest causes this natural resource to be unable to raise economic growth in the Sintang regency significantly. The terrain is quite varied and challenging, causing the distribution of natural products to take longer. Landlocked mountainous areas tend to be low in improving trades and production, like Tajikistan, which depends on China's economic relationship (Karrar & Mostowlansky, 2020). This condition is also being a working case of Sintang Regency's stakeholders.

Meanwhile, Sintang Regency has a vast forest density, approximately 1.971.370 Ha (Badan Pusat Statistik Provinsi Kalimantan Barat, 2019). Creative economic activities dominate the use of some forest areas, usually in line with preserving the forest. Sumarni (2016) states that the biodiversity of plantation in Baning Tourism Forest has been triggering some local economic activity. Private companies also played their part in optimizing natural resources and empowering communities by providing new job opportunities (Kristiana, 2014).

Landak Regency is an area with varied morphology, namely lowlands, hills, and valley or plain areas that facilitate socio-economic activities. The location of the Landak Regency, which is located in the middle of West Kalimantan Province, is also an area of the Pontianak - Entikong - Kuching - Brunei Darussalam route making this area very strategic. These advantages make the Landak district experience significant social and economic impacts due to the various activities carried out along this route. Also, this regency, similar to Melawi Regency, is noting good productivity in the agricultural sector. Efforts to increase economic growth by initiating development in agricultural sectors in Landak and Melawi Regency have yielded significant results. However, the geographic challenges in the form of challenging terrain and inadequate infrastructure are among the obstacles in increasing economic growth. Agriculture itself has to be supported with good transportation access and infrastructure (Aggarwal, 2018; Donaldson, 2018; Lei, Desai, & Vanneman, 2019).

Infrastructure development that tends to be centered in strategic areas provides more benefits for Landak Regency (Tiro, 2014). This development makes the forest cover in the Landak Regency area still quite extensive. Most of the use of forests is still used for the agricultural sector and food sources of forest products (Sumarlin, Dirhamsyah, & Ardian, 2015). Natural resources from the forest used by the community are generally still limited for their personal needs. Efforts to optimize forest products, especially food sources, are still in the research and exploration stages. Melawi Regency is an area that still has extensive forest cover. The road pattern that is still linear and a little complicated is influenced by the vast area of the dominating forest. Utilization of the forestry sector, which generally has customary forests, makes forest use still retain the diversity of plant species in it.

Kayong Utara Regency has a relatively small area compared to other regencies/cities in West Kalimantan. Most of the Kayong Utara Regency is seawater and has many islands. Thus, each region has marine potential, which can be developed to improve the welfare of its people. Meanwhile, the most significant contribution to the formation of added value in the agricultural sector, two of which came from the food crops sub-sector and the fisheries sub-sector. The potential of the fishery sector in the Kayong Utara Regency is spread across five sub-districts and

is concentrated in the Karimata Strait waters. However, the considerable fishery potential in Kayong Utara Regency has not been fully utilized optimally due to the low availability of facilities and infrastructure for handling fish catches (Yusuf & Muhartono, 2018). It is also happening on Kapuas Hulu Regency, which can potentially inland public waters in river waters as many as 202 rivers and flooded swamp lakes reaching 147 lakes (Purnamaningtyas, 2019). The significant potential has encouraged fisheries-based development activities to become the primary sector of economic activity for the Kapuas Hulu community. The significant potential of natural resources that are owned is still hampered by hilly terrain, which is quite challenging to pass, and water routes that must use special transportation so that it affects the distribution process of Kapuas Hulu's fishery products.

Kayong Utara is an expanded area of the Ketapang Regency, which has a reasonably wide forest cover ratio. The water area in the Kayong Utara Regency area is one of the main supporting factors for the extent of the forest in this area. The location of Kayong Utara, which is mainly located in the lowlands and coastal areas, contributes to increasing economic growth. The community focus on mangroves makes this ecosystem well-preserved (Wahyuti, 2019). However, the productive use of forest products is still limited by the communities around the forest. Kapuas Hulu, which has relatively wide waters, supports the diversity of forests in this area. The vast forest in Kapuas Hulu Regency is still largely unexplored so that its utilization is not optimal. Forest management that is still traditional has made the forests' diversity in this area preserved and is a source of pride in promoting forest products in Kapuas Hulu Regency (Budiwan & Prayogo, 2018).

Globally, to see the growth, we can calculate the average statistical calculation based on the classification. On average, the area with a lower altitude experienced economic growth of 5.615%, while higher elevations have only increased economic growth by 5.324%. Based on these values, there is a significant difference in growth value between areas with lower altitudes and higher altitudes. Lower altitude areas experience higher economic growth than higher regions. Based on this description, it can be seen that indirectly the height of an area affects the economic growth of an area. It is very closely related to geographic elements in a region, such as geomorphological forms, contour differences, soil types, and weather conditions. The geographical element will directly affect the things that affect regional economic growth, namely ease of distribution, adequate transportation, development of public facilities, and population mobility in the area. Kalimantan Barat, divided into 14 districts/cities, has varying heights and has its geographical characteristics. Based on the correlation test conducted with the Kalimantan Barat region as a research sample, regions with lower elevations tend to experience higher economic growth than areas with higher relative heights. On the other hand, forest density does not correlate with economic growth, even though some regencies experience an excellent growth rate after a mass functional commercial shift. It indicates that there are some possibilities for making a balanced policy between economic growth and ecosystem preservation.

5. CONCLUSION AND RECOMMENDATION

Non-economic factors such as geographical conditions of an area are often overlooked in analyzing economic determination growth. However, geographical elements such as altitude are positively correlated with the economic growth of an area. Based on the identification of parameters in each district/city, areas with lower elevation tend to be supported by terrain that is easier to pass through, smooth trade access, easy dissemination of market information, and the

availability of relatively adequate water sources. Meanwhile, areas with higher altitudes tend to have uneven topography such as mountains and hills and patterns of transportation routes that are more difficult to pass, making the trading process longer and more expensive. Upland areas, which generally have abundant natural resources, cannot optimize their potential than natural resources in the lowlands. It is evidenced by the trend of economic growth in the West Kalimantan region, where the highland areas tend to experience lower economic growth than areas with lower elevations. By looking at the research results, economic growth factors should be seen from economic factors and must pay attention to non-economic factors. Thus, factors that accelerate economic growth, such as abundant natural resources, can be optimized, and inhibiting factors such as difficulties in access to transportation can be minimized or even eliminated. On the other side, declining or increasing areas of forest density is negatively affecting economic growth. It should be noted that preserving the forest with a measurable policy will not affect the optimization of financial resources. Furthermore, more studies can broaden the research areas or lengthen the range of periods to find a long-term result.

REFERENCES

- Acemoglu, D. (2012). Introduction to Economic Growth. *Journal of Economic Theory*, 147(2), 545–550.
- Adriansyah, N., Hamid, A., & Alwi, A. (2016). Perencanaan Kebutuhan Hutan Kota di Kota Pontianak. *Jurnal Teknik Sipil*, 17(1), 272–287.
- Aggarwal, S. (2018). Do Rural Roads Create Pathways Out of Poverty? Evidence from India. *Journal of Development Economics*, 133(1), 375–395.
- Akadol, J. (2012). Kebijakan Pembangunan Perbatasan di Kabupaten Sambas, Kalimantan Barat: Realita dan Harapannya. *Pandecta: Jurnal Penelitian Ilmu Hukum (Research Law Journal)*, 7(1), 46–56.
- Alroy, J. (2017). Effects of Habitat Disturbance on Tropical Forest Biodiversity. *Proceedings of the National Academy of Sciences*, 114(23), 6056–6061.
- Angi, E. M., & Wiati, C. B. (2015). Kajian Ekonomi Politik Deforestasi dan Degradasi Hutan dan Lahan Di Kabupaten Paser, Kalimantan Timur. *Jurnal Penelitian Ekosistem Dipterokarpa*, 3(2), 63–80.
- Anwar, A. (2013). Peran Modal Manusia terhadap Pertumbuhan Ekonomi Regional di Jawa. *Journal Economica*, 13(1), 79–94.
- Apresian, S. R., Tyson, A., Varkkey, H., & Al, S. (2020). Palm Oil Development in Riau , Indonesia : Balancing Economic Growth and Environmental Protection. *Nusantara: An International Journal of Humanities and Social Sciences*, 2(1), 1–29.
- Aprilia, & Hariyanti, D. (2014). Determinasi Pertumbuhan Ekonomi di Negara ASEAN-6. *Media Ekonomi*, 22(3), 205–220.
- Asrianny, A., Paweka, C. B., Achmad, A., Oka, N. P., & Achmad, N. S. (2019). Komposisi Jenis dan Struktur Vegetasi Hutan Dataran Rendah di Kompleks Gunung Bulusaraung Sulawesi Selatan. *Perennial*, 15(1), 32–41.

- Astana, S., Sinaga, B. M., Soedomo, S., & Simangunsong, B. C. H. (2012). Macroeconomic Policy and Economic External Factor Impact on Natural Forest Degradation and Deforestation Rates: Case Study of Deforestation for Food and Estate Crops and Industrial Plantation Forest Areas Expansion and Degradation on Natural Forest Conces. *Analisis Kebijakan Kehutanan*, 9(3), 155–175.
- Badan Pusat Statistik Provinsi Kalimantan Barat. (2019). *Provinsi Kalimantan Barat dalam Angka*. Pontianak: Badan Pusat Statistik Provinsi Kalimantan Barat.
- Badan Pusat Statistik Provinsi Kalimantan Barat. (2020). *Provinsi Kalimantan Barat Agustus 2020*. Pontianak: Badan Pusat Statistik Provinsi Kalimantan Barat.
- Baltagi, B. H. (2008). Forecasting with Panel Data. *Journal of Forecasting*, 27(2), 153–173.
- Baltagi, B. H. (2013). *Econometric Analysis of Panel Data - Fifth Edition*. New York: John Wiley & Sons.
- Banerjee, A., Duflo, E., & Qian, N. (2020). On The Road: Access to Transportation Infrastructure and Economic Growth in China. *Journal of Development Economics*, 145(June), 1–56.
- Bank Indonesia. (2020). *Buku Laporan Perekonomian Indonesia*. Jakarta: Bank Indonesia.
- Bassanini, A., & Scarpetta, S. (2002). The Driving Forces of Economic Growth: Panel Data Evidence for The OECD Countries. *OECD Economic Studies*, 2001(2), 9–56.
- Berutu, D. S., & Nurman, A. (2012). Aplikasi Penginderaan Jauh dan Sistem Informasi Geografis dalam Mengkaji Perubahan Luas Hutan di Kabupaten Kuantan Singingi (Riau) Tahun 2000-2010. *Jurnal Geografi*, 5(2), 189–198.
- Bloom, D.E., Canning, D., & Sevilla, J. (2003). *The Demographic Dividend: A New Perspective on The Economic Consequences of Population Change*. Santa Monica: Rand Corporation.
- Bloom, D. E., Sachs, J. D., Collier, P., & Udry, C. (1998). Geography, Demography, and Economic Growth in Africa. *Brookings Papers on Economic Activity*, 1998(2), 207–295.
- Boldeanu, F., & Constantinescu, L. (2015). The Main Determinants Affecting Economic Growth. *Bulletin of the Transilvania University of Brasov. Economic Sciences. Series V*, 8(2), 329.
- Brancaccio, G., Kalouptsidi, M., & Papageorgiou, T. (2020). Geography, Transportation and Endogenous Trade Costs. *Econometrica*, 88(2), 657–691.
- Budiwan, A., & Prayogo, H. (2018). Analisa Vegetasi pada Pengelolaan Hutan Tradisional Masyarakat Suku Dayak Tamambaloh dan Iban di Wilayah REDD+ KPHP Model Kapuas Hulu. *Jurnal Hutan Lestari*, 6(1), 246–253.
- Burhanuddin, C. I., & Abdi, M. N. (2020). Ancaman Krisis Ekonomi Global dari Dampak Penyebaran Virus Corona (COVID-19). *AkMen*, 17(April), 90–98.
- Carree, M., & Thurik, A. R. (1999). *Industrial Structure and Economic Growth*. Cambridge: Cambridge University Press.
- Cidell, J. (2010). Concentration and Decentralization: The New Geography of Freight Distribution in US Metropolitan Areas. *Journal of Transport Geography*, 18(3), 363–371.
- Dawson, J. W., & Seater, J. J. (2013). Federal Regulation and Aggregate Economic Growth. *Journal of Economic Growth*, 18(2), 137–177.
- Dell, M., Jones, B. F., & Olken, B. A. (2012). Temperature Shocks and Economic Growth: Evidence from The Last Half Century. *American Economic Journal: Macroeconomics*, 4(3), 66–95.

- Dewi, N. K., & Rudiarto, I. (2013). Identifikasi Alih Fungsi Lahan Pertanian dan Kondisi Sosial Ekonomi Masyarakat Daerah Pinggiran di Kecamatan Gunungpati Kota Semarang. *Jurnal Wilayah dan Lingkungan*, 1(2), 175–188.
- Donaldson, D. (2018). Railroads of The Raj: Estimating The Impact of Transportation Infrastructure. *American Economic Review*, 108(4–5), 899–934.
- Effendi, I., Musika, L., & Harahap, A. R. (2019). Silangit Airport Development Strategy in Supporting Improved Economic Growth of Tourism Sector in North Sumatra. *International Journal of Advances in Social and Economics*, 2(2), 54–59.
- Farole, T., Rodríguez-Pose, A., & Storper, M. (2011). Human Geography and The Institutions that Underlie Economic Growth. *Progress in Human Geography*, 35(1), 58–80.
- Fauzi, N. I., Wibawanto, M. A., & Purba, M. P. (2020). Analisis Perubahan Tutupan Hutan di Taman Nasional Gunung Palung, Kalimantan Barat, Menggunakan Penginderaan Jauh. *Tengkawang: Jurnal Ilmu Kehutanan*, 10(2), 75–88.
- Feldman, M., & Storper, M. (2018). *The New Oxford Handbook of Economic Geography*. Oxford: Oxford University Press.
- Fujita, M., & Mori, T. (2005). Frontiers of the New Economic Geography. *Papers in Regional Science*, 84(3), 377–405.
- Gallup, J. L., Sachs, J. D., & Mellinger, A. D. (1999). Geography and Economic Development. *International Regional Science Review*, 22(2), 179–232.
- Glasmeier, A. K., & Kibler, J. (1996). Power Shift: The Rising Control of Distributors and Retailers in The Supply Chain for Manufactured Goods. *Urban Geography*, 17(8), 740–757.
- González-Val, R., & Pueyo, F. (2019). Natural Resources, Economic Growth and Geography. *Economic Modelling*, 83, 150–159.
- Griffith-Jones, S., & Cozzi, G. (2016). *Investment-Led Growth: A Solution to the European Crisis*. New York: John Wiley & Sons.
- Gujarati, D. (2004). Basic Econometrics, 3rd Edition. In *New York: McGraw-Hill*.
- Hardiansyah, G. (2012). Analisis Peran Berbagai Stakeholder dalam Menyongsong Era Pembangunan KPH di Kabupaten Ketapang. *Jurnal EKSOS*, 8(3), 186–194.
- Haryanto, D. A., Astiani, D., & Manurung, T. F. (2015). Analisa Vegetasi Tegakan Hutan di Areal Hutan Kota Gunung Sari Kota Singkawang. *Jurnal Hutan Lestari*, 3(2).
- Herlina, H. (2020). Perubahan Fluktuatif Struktur Ekonomi Indonesia pada Masa Pandemi Covid-19. *Al-Mutharahah: Jurnal Penelitian Dan Kajian Sosial Keagamaan*, 17(2), 199–210.
- Hidayat, A. H. A. Y. R. (2012). Identifikasi dan Inventarisasi Usaha Agribisnis di Sekitar Kawasan Hutan Kecamatan Sejangkung Kabupaten Sambas Kalimantan Barat. *Jurnal Social Economic of Agriculture*, 1(3), 23017.
- Hidayati, I. N., & Suryanto, S. (2015). Pengaruh Perubahan Iklim terhadap Produksi Pertanian dan Strategi Adaptasi pada Lahan Rawan Kekeringan. *Jurnal Ekonomi & Studi Pembangunan*, 16(1), 42–52.
- Hutabarat, S. (2019). Optimalisasi Pemanfaatan Lahan Perkebunan Kelapa Sawit di Riau. *Unri Conference Series: Agriculture and Food Security*, 1, 46–57.
- Indajani, G., & Pawestri, A. (2018). Kajian Pembangunan Ekonomi dan Sumber Daya Alam Kota Malang. *PANGRIPTA Jurnal Ilmiah Kajian Perencanaan Pembangunan*, 1(1), 57–65.

- Ioannides, D., Röslmaier, M., & Van Der Zee, E. (2019). Airbnb as An Instigator of 'Tourism Bubble' Expansion in Utrecht's Lombok Neighbourhood. *Tourism Geographies*, 21(5), 822–840.
- Iorio, M., & Corsale, A. (2010). Rural Tourism and Livelihood Strategies in Romania. *Journal of Rural Studies*, 26(2), 152–162.
- Iqbal, M., & Septina, A. D. (2018). Pemanfaatan Hasil Hutan Bukan Kayu oleh Masyarakat Lokal di Kabupaten Sanggau, Kalimantan Barat. *Jurnal Penelitian Ekosistem Dipterokarpa*, 4(1), 19–34.
- Irmayadi, A., Yurishintae, E., & Suyatno, A. (2016). Analisis Komoditas Unggulan Tanaman Pangan dan Hortikultura di Kabupaten Mempawah. *Jurnal Social Economic of Agriculture*, 5(1), 39–48.
- Junisa, J., Oramahi, H. A., & Tavita, G. E. (2019). Studi Pemanfaatan Jenis Bambu oleh Masyarakat Dayak Bakati di Hutan Adat Desa Tanjung Kecamatan Teriak Kabupaten Bengkayang. *Jurnal Hutan Lestari*, 7(3), 300–310.
- Jusna, & Nempung, T. (2016). Peranan Transportasi Laut dalam Menunjang Arus Barang Dan Orang Di Kecamatan Maligano Kabupaten Muna. *Jurnal Ekonomi UHO*, 1(1), 189–200.
- Karrar, H. H., & Mostowlansky, T. (2020). The Belt and Road as Political Technology: Power and Economy in Pakistan and Tajikistan. *Environment and Planning C: Politics and Space*, 38(5), 834–839.
- Kartiasih, F. (2019). Transformasi Struktural dan Ketimpangan Antar Daerah di Provinsi Kalimantan Timur. *INOVASI*, 15(1), 105–113.
- Kartikasari, D., Oramahi, H. A., & Idham, M. (2017). Kearifan Lokal Masyarakat Kelurahan Pasiran dalam Pengelolaan Hutan Kota Gunung Sari Kota Singkawang. *Jurnal Hutan Lestari*, 5(2), 340–350.
- Ketterer, T. D., & Rodríguez-Pose, A. (2018). Institutions vs. 'First-Nature' Geography: What Drives Economic Growth in Europe's Regions? *Papers in Regional Science*, 97, S25–S62.
- Korres, G. M., Tsobanoglou, G. O., & Kokkinou, A. (2011). Innovation Geography and Regional Growth in European Union. *SAGE Open*, 1(1), 1–10.
- Kristiana, T. (2014). Implementasi Kebijakan Pemungutan Pajak Hotel dan Penginapan di Kabupaten Sintang Provinsi Kalimantan Barat. *Journal Ilmu Sosial, Politik, dan Ilmu Pemerintahan*, 3(2), 1–12.
- Kushairi, A., Loh, S. K., Azman, I., Hishamuddin, E., Ong-Abdullah, M., Izuddin, Z. B. M. N., Razmah, G., Sundram, S., & Parveez, G. K. A. (2018). Oil Palm Economic Performance in Malaysia and R&D Progress in 2017. *Journal of Oil Palm Research*, 30(2), 163–195.
- Lei, L., Desai, S., & Vanneman, R. (2019). The Impact of Transportation Infrastructure on Women's Employment in India. *Feminist Economics*, 25(4), 94–125.
- Li, L., Liu, J., Long, H., de Jong, W., & Youn, Y. C. (2017). Economic Globalization, Trade and Forest Transition-The Case of Nine Asian Countries. *Forest Policy and Economics*, 76, 7–13.
- Maqin, A. (2014). Pengaruh Kondisi Infrastruktur terhadap Pertumbuhan Ekonomi di Jawa Barat. *Trikonomika Journal*, 10(1), 10–18.
- Meyfroidt, P., Rudel, T. K., & Lambin, E. F. (2010). Forest Transitions, Trade, and The Global Displacement of Land Use. *Proceedings of the National Academy of Sciences*, 107(49), 20917–20922.

- Min, C. (2019). *Applied Econometrics: A Practical Guide*. London: Routledge.
- Monfort, P. (2009). Territories with Specific Geographical Features. *Working Papers: A Series of Short Papers on Regional Research and Indicators Produced by The Directorate-General for Regional Policy Territories with Specific Geographical Features*, 02, 24.
- Morris, V., Clemente-Colón, P., Nalli, N. R., Joseph, E., Armstrong, R. A., Detrés, Y., Goldberg, M. D., Minnett, P. J., & Lumpkin, R. (2006). Measuring Trans-Atlantic Aerosol Transport from Africa. *Eos, Transactions American Geophysical Union*, 87(50), 565–571.
- Napitu, J. P., Hidayat, A., Basuni, S., & Sjaf, S. (2017). Mekanisme Akses pada Hak Kepemilikan di Kesatuan Pengelolaan Hutan Produksi Meranti, Sumatera Selatan. *Jurnal Penelitian Sosial Dan Ekonomi Kehutanan*, 14(2), 101–118.
- Petrakos, G., Kallioras, D., & Anagnostou, A. (2011). Regional Convergence and Growth in Europe: Understanding Patterns and Determinants. *European Urban and Regional Studies*, 18(4), 375–391.
- Porfiryev, B. N. (2018). The Green Factor of Economic Growth in Russia and The World. *Studies on Russian Economic Development*, 29(5), 455–461.
- Prastomo, R. H., Herawatiningsih, R., & Latifah, S. (2017). Keanekaragaman Vegetasi di Kawasan Hutan Mangrove Desa Nusapati Kabupaten Mempawah. *Jurnal Hutan Lestari*, 5(2).
- Purnamaningtyas, S. E. (2019). Ichthyofauna in Keliling and Pangelang Protected Lakes in Kapuas Hulu Regency. *Jurnal Iktiologi Indonesia*, 18(3), 241–249.
- Putri, R. F., & Sulistya, A. R. (2019). Determination of Priority Regions as The Direction of Decision-Making for Land Development of West Kalimantan Province. *Journal of Geoscience, Engineering, Environment, and Technology*, 4(3), 186–197.
- Ramayani, C., Aimon, H., & Anis, A. (2012). Analisis Produktivitas Tenaga Kerja dan Pertumbuhan Ekonomi Indonesia. *Jurnal Kajian Ekonomi*, 1(1), 70–94.
- Read, R. (2004). The Implications of Increasing Globalization and Regionalism for The Economic Growth of Small Island States. *World Development*, 32(2), 365–378.
- Rejeki, P. W. (2018). Analisis Pemetaan Potensi Daerah Kabupaten Sanggau Provinsi Kalimantan Barat. *Jurnal Wacana Kinerja: Kajian Praktis-Akademis Kinerja dan Administrasi Pelayanan Publik*, 21(1), 1–18.
- Ren, W., Wang, Q., & Ji, J. (2018). Research on China's Marine Economic Growth Pattern: An Empirical Analysis of China's Eleven Coastal Regions. *Marine Policy*, 87, 158–166.
- Riantono, J., & Hardiansyah, G. (2018). Pemanfaatan Rotan oleh Masyarakat Desa Meragun Kecamatan Nanga Taman Kabupaten Sekadau. *Jurnal Hutan Lestari*, 6(3), 41–50.
- Rodrik, D. (2003). Institutions, Integration, and Geography: In Search of The Deep Determinants of Economic Growth. *In Search of Prosperity: Analytic Country Studies on Growth*, Princeton University Press, Princeton, NJ.
- Rodrik, D., Subramanian, A., & Trebbi, F. (2004). Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development. *Journal of Economic Growth*, 9(2), 131–165.
- Rosadi, D. (2011). *Analisis Ekonometrika & Runtun Waktu Terapan dengan R*. Yogyakarta: Andi Offset.
- Rozelle, S., Huang, J., & Benziger, V. (2015). Forest Exploitation and Protection in Reform China: Assessing The Impacts of Policy and Economic Growth. *China's Forests: Global Lessons from Market Reforms*, 109–133.

- Sachs, J. D. (2012). Government, Geography, and Growth: The True Drivers of Economic Development. *Foreign Affairs*, 91(5), 142–150.
- Safri, H. (2016). Pengembangan Sumber Daya Manusia Dalam Pembangunan. *KELOLA: Journal of Islamic Education Management*, 1(1), 102–112.
- Santini, F., Guri, F., & Aubard, A. (2016). Chapter Ten Geographical Indications and Territories with Specific Geographical Features in The EU: The Cases of Mountain. *Intellectual Property Rights for Geographical Indications: What Is at Stake in the TTIP?*, 195.
- Scott, A. J. (2006). *Economic Geography: Past, Present and Future*. London: Routledge.
- Sifriyani, Ruslan, & Susanty, F. H. (2019). Evaluation of Forest Productivity and Governance on The Preservation of Tropical Rain Forests in Kalimantan Using The Ngwr-Ts Nonparametric Geospatial Method. *EurAsian Journal of BioSciences*, 13(2), 2373–2379.
- Sudaryanti, Y., Muin, A., & Manurung, T.F. (2014). Keanekaragaman Jenis Tumbuhan Tingkat Pohon pada Hutan Rawa Gambut di Taman Wisata Alam Baning Kabupaten Sintang. *Jurnal Hutan Lestari*, 2(1), 14–22.
- Sumarlin, D., Dirhamsyah, M., & Ardian, H. (2015). Identifikasi Tumbuhan Sumber Pangan di Hutan Tembawang Desa Aur Sampuk Kecamatan Sengah Temila Kabupaten Landak. *Jurnal Hutan Lestari*, 4(1), 51–62.
- Sumarni, S. (2016). Studi Jenis Tumbuhan Pakan Kelasi (*Presbitis rubicunda*) pada Kawasan Hutan Wisata Baning Kabupaten Sintang. *Publikasi Informasi Pertanian*, 12(23), 115–124.
- Suryana, S., Parikesit, P. P., & Iskandar, J. I. (2018). Struktur Vegetasi Kawasan Hutan pada Zona Ketinggian Berbeda di Kawasan Gunung Galunggung Kabupaten Tasikmalaya Jawa Barat. *Jurnal Ilmu Lingkungan*, 16(2), 130–135.
- Syahputra, R. (2017). Analisis Faktor-Faktor yang Mempengaruhi Pertumbuhan Ekonomi di Indonesia. *Jurnal Samudra Ekonomika*, 1(2), 183–191.
- Tambunan, H., Manurung, T. F., & Ardian, H. (2018). Keanekaragaman Tingkat Pohon pada Hutan Adat Pengajid Desa Sahan Kabupaten Bengkayang. *Jurnal Hutan Lestari*, 6(4), 221–230.
- Tan-Soo, J.-S., Adnan, N., Ahmad, I., Pattanayak, S. K., & Vincent, J. R. (2016). Econometric Evidence on Forest Ecosystem Services: Deforestation and Flooding in Malaysia. *Environmental and Resource Economics*, 63(1), 25–44.
- Tiro, J. (2014). Satuan Genetika Wilayah dalam Mendukung Peningkatan Perencanaan Infrastruktur Wilayah di Kabupaten Landak. *Jurnal Teknik Sipil*, 14(2), 16–28.
- Török, Á., Jantýik, L., Maró, Z. M., & Moir, H. V. J. (2020). Understanding the Real-World Impact of Geographical Indications: A Critical Review of the Empirical Economic Literature. *Sustainability*, 12(22), 94–134.
- Trevesa, L. N., Alix-Garcia, J., & Chapman, C. A. (2011). Lessons about Parks and Poverty from A Decade of Forest Loss and Economic Growth Around Kibale National Park, Uganda. *Proceedings of the National Academy of Sciences of the United States of America*, 108(34), 13919–13924.
- Ulfah, N., Gunawan, N. I., Firdaus, M. I., & Rofiq, M. (2018). *Multiplier Effects of Airport Development on Local Economic Growth in Soekarno Hatta International Airport*. 147(Grost), 828–836.

- Wahyunto, W., Supriatna, W., & Agus, F. (2013). Land Use Change and Recommendation for Sustainable Development of Peatland for Agriculture: Case Study at Kubu Raya and Pontianak Districts, West Kalimantan. *Indonesian Journal of Agricultural Science*, 11(1), 32–50.
- Wahyuti. (2019). Peran Masyarakat Desa Sejahtera dalam Pengelolaan Wisata Hutan Mangrove di Kecamatan Sukadana Kabupaten Kayong Utara. *Jurnal Hutan Lestari*, 7(1), 381–390.
- Wardanu, A. P., & Anhar, M. (2014). Strategi Pengembangan Agroindustri Kelapa sebagai Upaya Percepatan Ekonomi Masyarakat di Kabupaten Ketapang. *Industria: Jurnal Teknologi Dan Manajemen Agroindustri*, 3(1), 13–26.
- Wildayana, E., Armanto, M. E., Zahri, I., Adriani, D., & Syakina, B. (2018). Socio Economic Factors Causing Rapid Peatlands Degradation in South Sumatra. *Sriwijaya Journal of Environment*, 3(3), 87–95.
- Yusuf, R., & Muhartono, R. (2018). Strategi Pengembangan Usaha Perikanan Tangkap di Kabupaten Kayong Utara. *Jurnal Kebijakan Sosial Ekonomi Kelautan dan Perikanan*, 7(2), 103–114.
- Yuwono, S. B., & Hilmanto, R. (2015). Pengelolaan Hutan Rakyat oleh Kelompok Pemilik Hutan Rakyat di Desa Bandar Dalam Kecamatan Sidomulyo Kabupaten Lampung Selatan. *Jurnal Sylva Lestari*, 3(2), 99–112.
- Zoomers, A. (2010). Globalisation and The Foreignisation of Space: Seven Processes Driving The Current Global Land Grab. *The Journal of Peasant Studies*, 37(2), 429–447.