The Effect of Village Income on Village Expenditure: A Case Study of Belitung Regency

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ABSTRACT

The development progress of rural areas generally lags behind that of urban areas. To bridge this gap, the support of various factors is essential, with financing being one of the key elements. In rural regions, several financing sources can be utilized to bolster development efforts, such as Village Original Income (PAD), Transfer Funds, and other financial resources. Belitung Regency, as an archipelagic area within the Bangka Belitung Islands Province, undoubtedly requires financial support to foster developmental progress within its jurisdiction, given the pivotal role of financing in development. To comprehend the impact of financing, particularly on village expenditures in rural locales, it is imperative to undertake research. Hence, this study is designed to examine and analyze the influence of village income on village expenditures in Belitung Regency. The *Geographically Weighted Regression* (GWR) is one analytical model applicable for assessing the impact of village income on village expenditure. Data for this study is amassed through observation, with some obtained from specific agencies. Utilizing the GWR analytical model will elucidate the varying influences of village income on village expenditure across individual villages, since the GWR method is an advanced form of simple regression analysis that incorporates spatial elements to yield more granular, region-specific outcomes. The findings from the GWR analysis indicate that village funds and allocations have a positive effect on village expenditures in certain areas, signifying that they can increase spending. However, in other regions, these same financial instruments display a negative impact due to poor planning. Additionally, variables such as profit sharing, bank interest, aid grants, and general village original income positively influence village spending, suggesting that an increase in these variables can bolster spending in Belitung Regency. It is recommended that stakeholders engage in meticulous financial planning to maximize the potential of village funds.

1. INTRODUCTION

Initially, the concept of a rural development approach was relatively straightforward, focusing on resolving rural issues through urbanization, industrialization, and agricultural modernization [1]. However, perspectives on rural development have evolved to emphasize poverty alleviation, sustainable development, and inclusivity [2, 3].

According to a classical development model, all countries must transition linearly from a traditional society through the stages of takeoff prerequisites, takeoff, industrialization, and ultimately, high mass consumption [4]. In this framework, rural areas transform from static providers of basic food needs to dynamic regions with high agricultural productivity, facilitated by technological innovation. Meanwhile, Lewis's 1960s "dual sector" theory posited that rural areas primarily supply surplus labor. The allure of higher wages in the modern industrial sector draws this surplus labor until it is fully absorbed, subsequently prompting a shift towards the commercialization of agriculture as labor surpluses diminish

[5]. These theories often presuppose a rural-urban dichotomy, depicting urban areas as modern and dynamic and rural areas as backward and traditional, heavily reliant on subsistence agriculture [6].

Village development endeavors to enhance the quality of life and overall welfare of the community within a specific locality [7]. This development is an integral part of regional development management at both district and provincial levels, requiring an analysis of the interrelationships among villages, sub-districts, and larger administrative divisions [8, 9]. Village development plays a crucial role in the broader national development agenda, given its extensive scope as the foundation of overall development [10, 11]. The goal of village development is to improve the living standards and welfare of rural communities, necessitating a comprehensive approach to various construction and development activities.

In relation to village development, numerous factors significantly influence its success and are imperative for achieving the desired level of progress. Financing is one such critical factor. It is pivotal in the development process because,

without adequate funding, the development initiatives cannot proceed effectively [12]. Various sources of financing are available to underpin the village development process, including:

1) Original village income, which comprises revenues from the business activities of the village, management of village assets, community self-help and participation, cooperation, and other forms of indigenous village revenue;

2) Transfer funds, which consist of village funds, village fund allocations, profit-sharing, and financial assistance from the provincial government;

3) Other income, which includes grants and donations from third parties.

Village expenditure refers to the funds disbursed by the village government to finance activities such as village development, community development, empowerment of village communities, as well as disaster and emergency management [11, 13].

In recent years, rural development in Belitung Regency has made significant strides, with the local government prioritizing initiatives that improve the quality of life in its villages. Focused efforts on infrastructure development, access to clean water, healthcare facilities, and educational opportunities have contributed to the enhanced well-being of its rural communities. Moreover, financing has played a crucial role in supporting these endeavors, with both governmental funding and community-driven initiatives providing the necessary financial backing for these development projects. This comprehensive approach to village development not only promotes economic growth but also helps to preserve Belitung's distinctive cultural heritage, positioning it as an exemplar of sustainable rural development in the region.

This research aims to explain factors that provide positive contributions to village spending, as well as those that negatively influence it, and to determine whether these influences are "significant" or "insignificant". This will enable the formulation of strategic measures to address these situations and conditions. The research was conducted in Belitung Regency, which is one of the regencies in the Bangka Belitung Islands Province.

Belitung Regency is an archipelagic area consisting of several large and small islands, totaling 163 islands, both inhabited and uninhabited. The regency covers an area of 2,286.31 km^2, with a total population in 2020 of 177,472 people. Administratively, Belitung Regency is divided into 5 sub-districts, with four located on Belitung Island: Tanjungpandan District, Sijuk District, Badau District, and Membalong District. In contrast, one sub-district, Nasik Strait District, is on the island of Mindanao. Belitung Regency boasts considerable natural wealth and has long been renowned as one of the world's tin-producing regions. It is also known as one of the largest producers of pepper. To further advance its regional development, the Belitung Regency Government is actively developing other economic sectors such as fisheries, tourism, and agriculture, including palm oil and rubber. Currently, the government is vigorously promoting the tourism sector, as Belitung Regency is one of the National Tourism Centers, with Tanjung Kelayang being designated as a National Tourism Strategic Area (Kawasan Strategis Pariwisata Nasional, KSPN). Additionally, Belitung Regency has recently been recognized by UNESCO as a "Global Geopark," a testament to the region's remarkable

granite rock formations scattered across the area.

Financing factors in village development in Belitung Regency offer valuable insights for policymakers, stakeholders, and researchers. Policymakers can utilize financial data to allocate resources efficiently, ensuring that development projects are adequately funded and are targeted to meet specific community needs. Stakeholders, including local communities and businesses, can leverage this information to align their investments with development priorities, fostering collaboration and sustainable growth. Researchers can explore financing mechanisms to evaluate the impact of various funding sources and strategies, which can enable evidence-based recommendations for future development efforts in Belitung and similar settings. Ultimately, a thorough understanding of financing factors is crucial for informed decision-making, promoting transparency, and contributing to the effective management of village development initiatives, leading to enhanced socio-economic conditions in these regions.

In this context, Belitung Regency needs financial support to realize its aspiration of becoming a developed and autonomous district, especially in the development of rural areas on its outer islands. Therefore, the primary question in this study is the extent to which village income influences village expenditure in support of the progress of Belitung Regency. The purpose of this study is to investigate and analyze the effect of village income on village spending in Belitung Regency.

2. RESEARCH METHODS

2.1 Research design

This study aims to examine the impact of an independent variable on a dependent variable. Specifically, we seek to understand the influence of the sources of village income on village spending. To obtain robust results, an appropriate analytical model is essential for this research. The model that will be employed combines quantitative analysis with qualitative analysis.

The quantitative analysis model focuses on measuring and analyzing the cause-and-effect relationships between variables, in this case, the variables of village income and village expenditure. This model utilizes descriptive statistics and econometric models for data processing, supported by quantitative data. The outcomes of this quantitative analysis will yield coefficients for the independent variable, which can be either positive or negative. Significance testing will be conducted at an alpha level of 0.05 for absolute significance and 0.1 for actual significance, resulting in findings that are either significant or not significant. On the other hand, qualitative analysis involves a descriptive approach to elucidate the quantitative results in greater detail. This analysis draws on theoretical frameworks, field observations, and the researcher's insights to reinforce the constructed arguments or statements.

2.2 Type and data source

Two types of data are utilized in this study: primary and secondary. Primary data were collected through field observations from February to May 2021, aimed at comprehensively understanding and assessing the condition of

Belitung Regency. Secondary data were gathered from information compiled and disseminated by various agencies from 2010 to 2021.

2.3 Research sites

The research was conducted in Belitung Regency, Bangka Belitung Islands Province; the selection of Belitung Regency as a research place consideration: Belitung Regency is one of the districts that are still relatively new after the formation of the Bangka Belitung Islands Province based on the Law of the Republic of Indonesia Number 27 of 2000 concerning the Establishment of the Bangka Belitung Islands Province. In 2003 Belitung Regency experienced a division into 2 districts, namely Belitung Regency and East Belitung Regency. Belitung Regency has access that is quite close to the center of growth on the island of Java (the Capital of the Republic of Indonesia, namely Jakarta) and has a relatively large wealth of natural resources, but in other aspects, economic and human resource growth in Belitung Regency still needs to be increased. In addition, Belitung Regency is an archipelago with 98 large and small islands. With these conditions, the location of the Belitung Regency is the most appropriate choice for designing a study on the implications of village funds on poverty alleviation and rural development performance. Belitung Regency has 5 sub-districts, 7 sub-districts, and 42 villages. Data on the distribution of villages in sub-districts refers to BPS 2021 data (Table 1 and Figure 1).

Table 1. Distribution of villages and sub-districts by sub-district

Subdistrict	Urban	Village
Membalong	-	12
Tanjungpandan	7	9
Badau	-	7
Seljuk	-	10
Selat Nasik	-	4
Total number	**7**	**42**

Source: Regional statistics of Belitung regency 2021

Figure 1. Research sites

2.4 Analysis methods

2.4.1 Geographically weighted regression (GWR) analysis

The GWR model is a global regression model transformed into a regression model [14, 15]. The GWR approach may be easier to overcome spatial heterogeneity than the global approach, which considers spatial error dependence. In a standard regression approach, spatial correlation in error could indicate a high spatial correlation in explanatory variables and heterogeneity in regression coefficients [16]. In contrast to the uniform regression coefficient in the standard approach, the area-specific GWR regression coefficient addresses the problem of a particular heterogeneity. The parameter value will be calculated at each geographical location point so that each has a different regression parameter value [17-19]. GWR can also describe models with varying geographic spaces or nonsurgical parametric [20]. Adjusted R2 in GWR is 50 percent which adequately explains the data, while the AIC value in GWR is smaller than in OLS and SEM models. Another advantage of GWR in this study is that it can create a combination of nearly 1,900 coefficients that can reduce the influence of outlier data and multicollinearity cases. Based on the application to poverty in Indonesia, it was found that the GWR was better than OLS through R2 and AIC values (1):

$$Y_i = \beta_0 \left(\mu_i, v_i \right) + \sum_{K=1}^{\rho} \beta_\kappa \left(\mu_i, v_i \right) \chi_{i\kappa} + \varepsilon_i \qquad (1)$$

Information:

Y_i: response variables at the location of-i (i=1, 2, ..., n);

χ_{ik}: predictor variables the-k to the location of-i (i=1, 2, .., n);

(u_i, v_i): latitude longitude coordinates of the point of-i at a geographical location.

k (u_i, v_i): regression coefficient the-k at each location or realization of the continuous function k (u_i, v_i) on point of-i;

εi: errors that are assumed to be identical, independent, and generally distributed with a mean of zero and a constant variance $\sigma2$.

GWR (Geographically Weighted Regression) is utilized to determine the coefficients of variables that influence financial factors. This spatial analysis technique considers the geographical context of data, allowing for a more nuanced understanding of how various factors impact financial outcomes in specific locations. GWR is especially valuable in assessing regional disparities and tailoring financial strategies to address the unique needs of different areas, providing policymakers and researchers with a powerful tool to optimize resource allocation and enhance financial development efforts.

2.4.2 The effect of village funds on the village expenditure model

In analyzing the effect of village income on village expenditure in this study, a Geographically Weighted Regression (GWR) analysis was used. The dependent variable used is the village expenditure variable. In contrast, the independent variables used are the village fund variable (VF), village fund allocation (VFA), revenue sharing (RS), provincial financial assistance (PFA), grants (G), and local revenue (LR), where the variables selected will be variables that have passed the classical assumption test and statistical test. The identification of the GWR model used to determine the spatial diversity of the influence of village funds on village spending is as follows (2):

$$\begin{aligned} VSi = &\ \beta_0 \left(u_i, vi \right) + \beta_1 \left(u_i, v_i \right) VF_i + \beta_2 \left(u_i, v_i \right) VFA_i \\ &+ \beta_3 \left(u_i, v_i \right) RS_1 + \beta_4 \left(u_i, v_i \right) PFA_1 + \beta_5 \left(u_i, v_i \right) G_1 \\ &+ \beta_6 \left(u_i, v_i \right) LR_1 + e_i \end{aligned} \qquad (2)$$

Information:
VS_i=Dependent variables, namely Village expenditure in villages of-i;
β_0=Constant;
$\beta_1,\ldots \beta_6$=Coefficient of independent variables;
u_i=longitude spatial coordinates for village observations of-i.
v_i=latitude spatial coordinates for village observations of-I;
VF_i=Village Fund of-i (State Budget Allocation);
VFAT=Village Fund Allocation of-i;
RS_i=Revenue Sharing in the Village of-i;
PFA=Provincial Financial Aid in villages of-i;
G_i=Grants in the Village of-i;
LR_i=Local Revenue in the Village of-i;
e_{it}=Error.

3. RESULTS AND DISCUSSION

3.1 Village development status

The development status of the village is essential to see the extent of the success rate of development in the village. The success of village development can be seen in the development of the village's status from year to year. Therefore, the status of the village becomes necessary to measure the extent of the direction of change and development of the village. To measure the development of village status, the village building index (IDM) indicator can be used. This IDM data is a measuring tool developed to strengthen efforts to achieve village and rural development goals. IDM focuses more on strengthening village autonomy, which follows the national spirit to improve the quality of village life as stated in Law Number 6 of 2014 concerning villages. The purpose of the regulation is to reflect the problems and structural obstacles to village development that must be addressed and intended to be realized through the Village Law. Village building Indonesia is faced with the poverty of village life. The village area is where most of the poor life [21].

If we look at the data on the building village index in 2020, it was recorded that there were 19 (45.24 percent) villages in the category of developing villages, 23 (54.76 percent) of developed villages, and there were no independent villages. However, from the 2022 building village index figures from a total of 42 villages in Belitung Regency, only 11.90 percent (5) of villages have a developing status, 66.67 percent (28) villages have the status of developed villages, and 21.43 percent (9) villages have the status of independent villages.

3.2 Development of village income

In order to finance village spending needs, the Village Government in Belitung Regency must strive to obtain sources of village income [22]. There are various sources of village income, including village funds, village fund allocations, profit sharing, bank interest, grants, assistance, original village income, and other legitimate income. The amount of income varies for each source in each village.

In 2017, the total village income in Belitung Regency for 42 villages was Rp. 99,383,963,957, the village with the largest income in that year is Air Saga Village of Rp. 3,258,275,050, and the village with the smallest income is Tanjung Tinggi Village, which is 2,170 591,961. Then in 2018, there was an increase in overall village income of Rp. 3,706,816,337, where

the total village income of Belitung Regency that year was Rp. 103,070,780,294. Seliu Island Village in 2018 is the village that has the largest income of Rp. 3,098,494,005, while Tanjung Tinggi Village is the village that has the smallest income of Rp. 2,124,801,799. In 2019, the village income of Belitung Regency increased again by Rp. 15,002,357,891 with total revenue of Rp. 118,073,138,184. However, in the 20th year, the village income of Belitung Regency decreased by minus Rp. 4,708,297,940. The total village income of the Belitung Regency in 2020 was IDR. 113,364,840,244, where Tanjung Binga Village is the village that gets the largest income of Rp. 3,491,520,000, and Dukong Village is the village that earns the smallest income of Rp. 2,339,006,000. If we look at the source of income, in 2020, the largest village income in Belitung Regency is sourced from the allocation of village funds, IDR. 54,373,879,000, followed by a source of income derived from village funds of Rp. 47,322,874,000. The smallest source of income for the village comes from other legitimate income, which is Rp. 213,209,674.

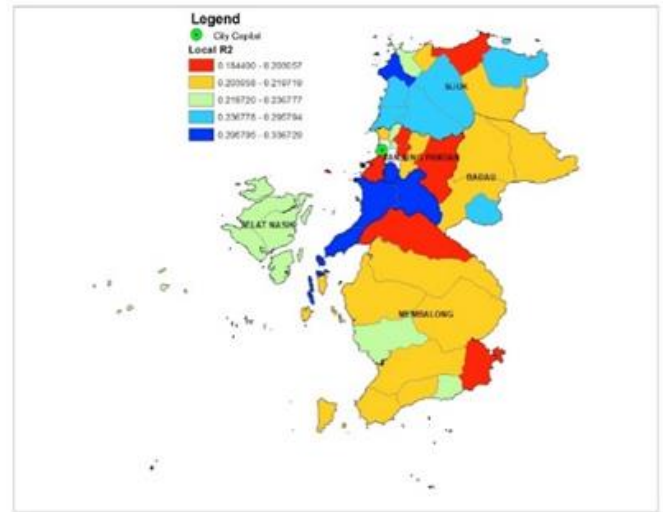### 3.3 The effect of village income on village spending

Figure 2. The value of the coefficient of local determination

Analysis of the relationship between village income consisting of Village Funds (X1), Revenue Sharing (X2), Village Fund Allocation (X3), Provincial Financial Assistance (X4), Grant Assistance (X5), Local Revenue in the Village (X6), to village expenditures was carried out using GWR analysis. With the GWR analysis, information on the influence of each *specific independent* variable can be obtained in each observation village. After obtaining the coefficient figures, a significance test was carried out with a t-test on each *independent* variable with an accurate 5 percent to 10 percent. Based on the analysis results, the determinative coefficient value (R^2) on average by 24%. In this study, the variation in village expenditure in Belitung Regency can be explained by the factors of village income, both village funds, profit sharing, village fund allocation, bank interest, aid grants, and original village income of 24%, while the rest is explained by other factors that are not explained in the model. GWR modeling produces local regression equations with variations in each unit of territory. Locally, each village also has a different determinant (Figure 2). The philosophical value of determination of the calculation results ranges from 18-34 people. The lowest coefficient is a red village ranging from

0.15-0.20 which is found in 8 villages, namely Sijuk, Aik Rayak, Juru Seberang, Sumedang Island, Bantan, Tanjung Rusa, Buluh Tumbang, and Air Merbau. The highest local determinationofisien in blue ranges from 0.29-0.33 which is found in 6 villages, namely Air Seru Village, Pegantungan, Cerucuk, Dukong, Sungai Samak, and Tanjung Binga.

3.3.1 The effect of village funds on village expenditure

The results of the GWR analysis of the effect of village funds on village expenditure in the Belitung Regency can increase and, in some other areas, reduce village spending. It is characterized by a regression coefficient that partially indicates a positive value and partly indicates a negative value. The villages with negative coefficient values are in Dukong Village, Samak River, Pegantungan, Cerucuk, Ibul, Nasik Strait, Seru Water, Aik Pelempang Jaya, Aik Rayak, Air Selumar. It means that the higher the village income derived from village funds will influence the level of village expenditure which decreases (Figure 3) [7, 20].
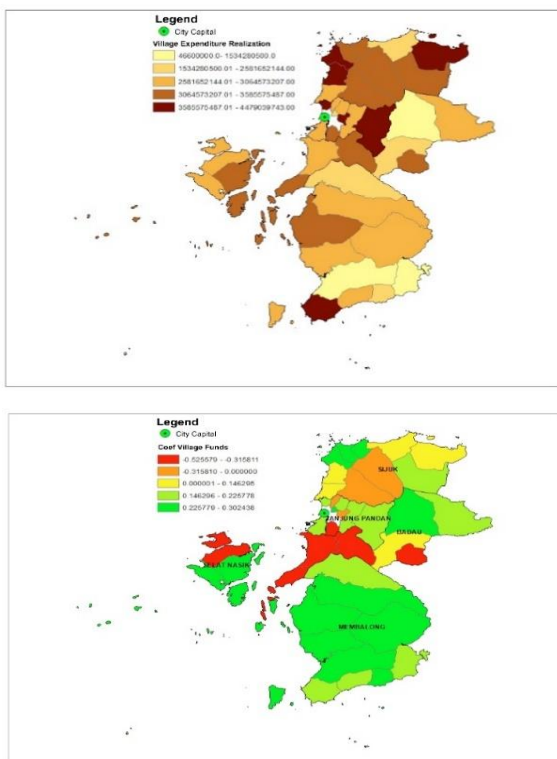

Figure 3. The effect of village funds on village expenditure

3.3.2 The effect of profit sharing on village expenditure

The GWR analysis (Figure 4) shows that village income derived from profit sharing affects increasing village spending. It is characterized by the positive coefficient obtained. It means that the greater the profit sharing fund, the higher the village expenditure. It proves that the size of the village expenditure is greatly influenced by the size of the profit-sharing funds received by a village. Based on significant tests, it shows that the effect of profit-sharing funds on village spending has not been significant enough, with both alpha levels of 5 percent and 10 percent.

The effect of village fund allocation on village expenditure in Belitung Regency has a positive relationship in 4 villages, namely Dukong Village, Sungai Samak Village, Pegantungan Village, and Tanjung Binga Village. With the value of the reflection coefficient ranging from 0.007-0.045, in *ceteris*

paribus conditions, adding village fund allocations by one unit will increase village spending by 0.007-0.045. However, in general, the allocation of village funds negatively influences village spending in Belitung Regency (Figure 5).
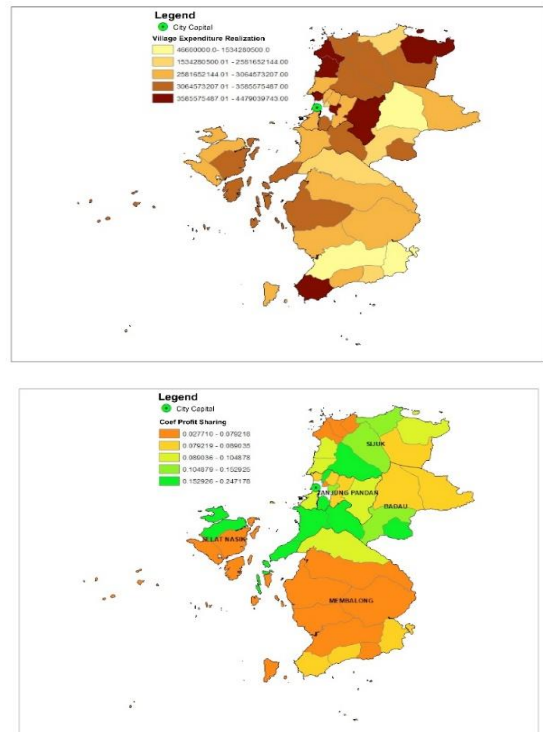

Figure 4. The effect of profit sharing on village expenditure

3.3.3 The effect of village fund allocation on village expenditure

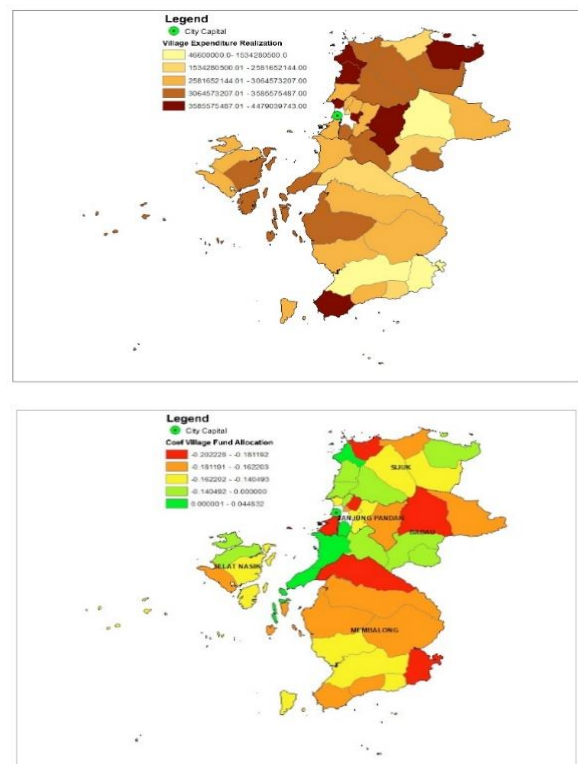The effect of village fund allocation on village expenditure

Figure 5. The effect of village fund allocation on village expenditure

3.3.4 The effect of bank interest on village expenditure

From the results of the GWR, it can be seen that bank interest affects increasing village expenditure. It is characterized by the positive coefficient obtained. The greater the bank interest, the higher the village expenditure. The most significant coefficient is 0.427 in Pegantungan Village, and the lowest coefficient is 0.241 in Ketekok Water Village. Adding bank interest by one unit will increase village spending by 0.241-0.427, *ceteris paribus*.

Based on the results of a significant test with a fundamental level of 0.05, it shows that the effect of bank interest on village spending is significant in 10 villages in Belitung Regency, namely Pegantungan Village, Abul Village, Dukong Village, Sungai Samak Village, Nasik Strait Village, Aik Pelempang Jaya Village, Cerucuk Village, Aik Rayak Village, Seru Water Village, and Sijuk Village.

In the significance test with an absolute level of 0.1, the effect of bank interest on village spending, there are 10 villages in Belitung Regency, namely Badau Village, Batu Itam Village, Selumar Water Village, Sungai Padang Village, Eggplant Village, Sumedang Island Village, Juru Seberang Village, Pelepak Pute Village, Bantan Village, and Buluh Tumbang Village (Figure 6).
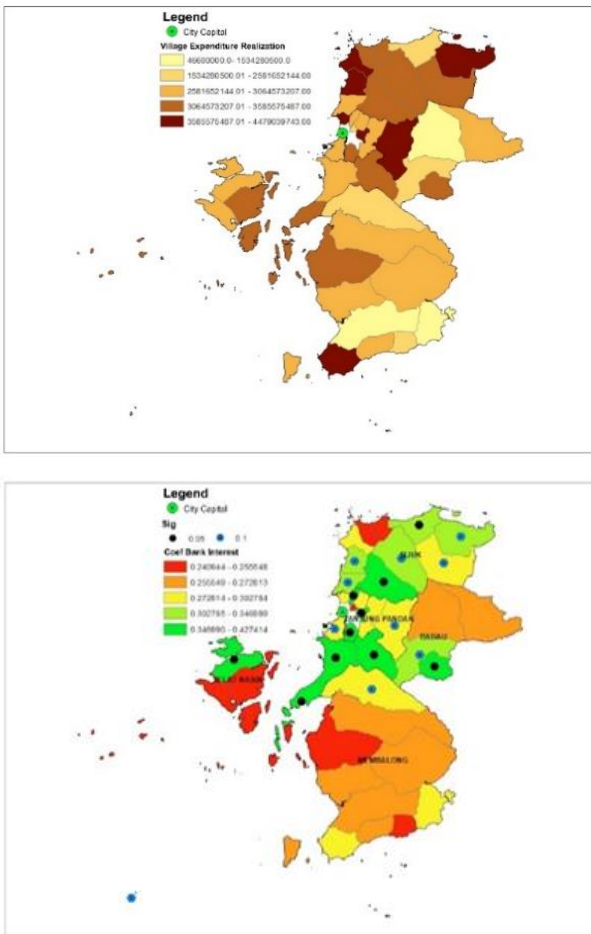

Figure 6. The effect of bank interest on village expenditure

3.3.5 The effect of aid grants on village expenditure

Analysis of the effect of aid grants on village spending in the Belitung Regency showed a positive influence. It shows that the greater the grant of aid received by a village, the more it will be able to increase village spending. The magnitude of the effect of grant income on village expenditure can be seen from the magnitude of the regression coefficient value. The greater the value of the coefficient indicating, the greater the effect. The most considerable influence is shown in Figure 6. villages with dark green colors are the villages with the most significant influence, ranging from 0.276-0.402, located in Eggplant Village, Cerucuk Village, Seru Water Village, and Selumar Water Village. In ceteris paribus conditions, adding a grant of aid by one unit will increase village expenditure by 0.276-0.402. Meanwhile, the lowest regression coefficient ranges from 0.137-0.160, which means that in ceteris paribus conditions, adding aid grants by one unit will increase village spending by 0.137-0.160. The value is in Tanjung Binga Village and Dukong Village (Figure 7).
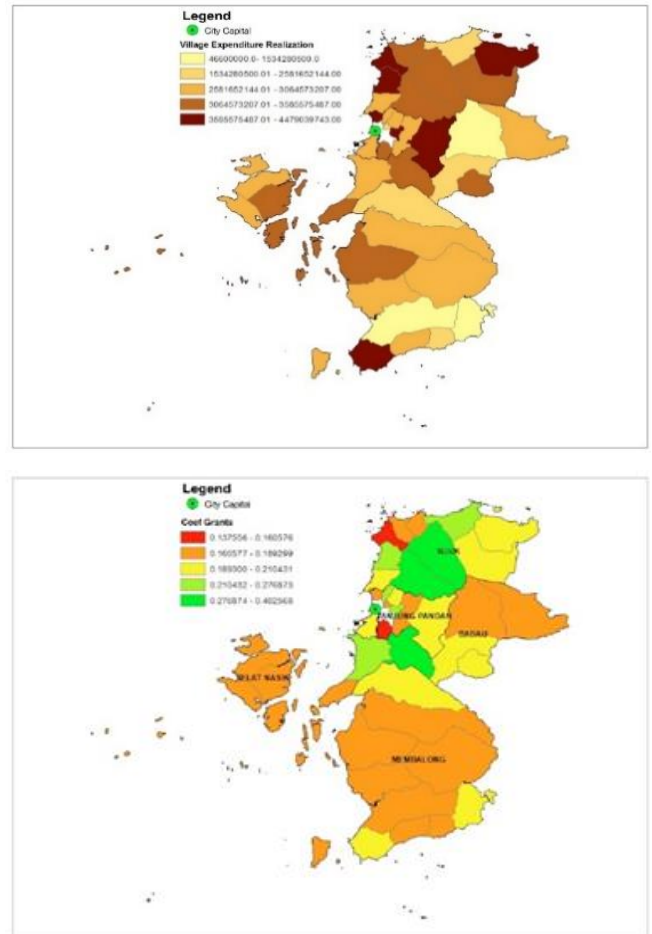

Figure 7. The effect of aid grants on village expenditure

3.3.6 Effect of original village income on village expenditure

The results of the GWR analysis show that the influence of PAD on village expenditure in the Belitung Regency has a generally positive effect. The most considerable influence is in villages with green colors in Sungai Padang Village, Pegantungan, Samak River, Abul, Cerucuk, Seru Water, Eggplant, and Selumar Water Village, which have coefficient values ranging from 0.072-0.194. An increase in PAD by one unit will increase village spending by 0.072-0.194, ceteris paribus (Figure 8).

The original income of the village is the income of the village which comes from the results of village business, the results of village asset management, mutual aid, self-help and participation, and another original village income. Thus, the original income of the village is an income derived from the ability of the village itself [23, 24].
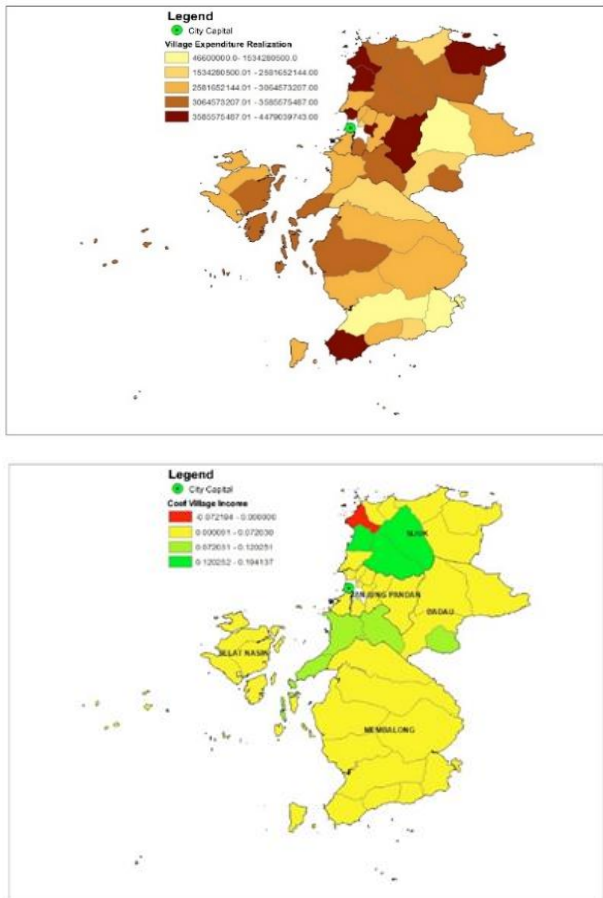
Figure 8. The effect of original village income on village expenditure

The effect of village funds and village fund allocations on village expenditures in some areas shows a positive influence, meaning that village funds and village fund allocations in some villages can increase village spending, but in some other areas it shows a negative influence because of failed planning. Meanwhile, the variable profit sharing, bank interest, aid grants, and the original income of the general village have a positive effect, meaning that adding these variables can increase village spending in Belitung Regency.

4. CONCLUSIONS

This research aims to explain factors provide positive damage to village spending, factors also have a negative influence on village spending by using GWR analysis. Based on the results of the study on the effect of village income on village expenditure, we can understand that village income consisting of village funds, village fund allocations, profit sharing, bank interest, aid grants, and original village income is an essential factor in supporting development financing in an area, predominantly rural areas. Development financing can be realized through these sources of income to achieve village progress.

The GWR analysis of the effect of village income on village expenditure showed varying results for each variable in each village. The bank interest variable is the variable that most affects village spending, which is indicated by the value of the regression coefficient, which is positive. Based on the results of a significant test with a fundamental level of 0.05, it shows

that the effect of bank interest on village expenditure is significant in 10 villages; there is a significance test with an absolute level of 0.1 on the effect of bank interest on village expenditure is significant in 10 villages. The variables of profit sharing, aid grants, and original village income have a positive but not yet significant effect, meaning that adding these variables can increase village spending in Belitung Regency. Meanwhile, the variable amount of village funds for village spending is only positive for villages in Belitung Regency. The variable allocation of village funds to village expenditures shows a positive influence in only four villages, meaning that in these four villages, the allocation of village funds can increase village spending, but in some other areas, it shows a negative influence.

From this study, it is hoped that it can provide input to local governments regarding the use of village income for village expenditure in each village in Belitung Regency more effectively and on target. The use of village income that is more effective and on target will have a positive influence on the progress of the region, especially in suburban areas or island areas such as Belitung Regency. This needs to be done considering that the income obtained by each village is relatively large, while the results obtained are still relatively not optimal, this result is reflected in the existence of villages with the status of developing villages. For this reason, optimizing village income, especially for village expenditures starting from the planning, implementation, and supervision stages is necessary by prioritizing togetherness, kinship, and cooperation to realize village progress.

Future research in the realm of village development should focus on exploring the factors that contribute to the variations in the effects of different income sources on village expenditure. Understanding how specific sources of income impact spending patterns in diverse rural contexts can lead to more tailored and effective financial strategies. Additionally, future researchers should investigate the effectiveness of different strategies for optimizing village income and expenditure, with an emphasis on sustainability and long-term economic growth.

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