Southeast Asian Journal of Economics Vol.13(3), December 2025:
Received: July 30, 2024
Revision: October 22, 2024
Accepted: December 11, 2024

Poverty, Institutions, and Village Funds: Case of Rural Areas in Brebes and Banyumas Regencies, Central Java Province, Indonesia

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Abstract

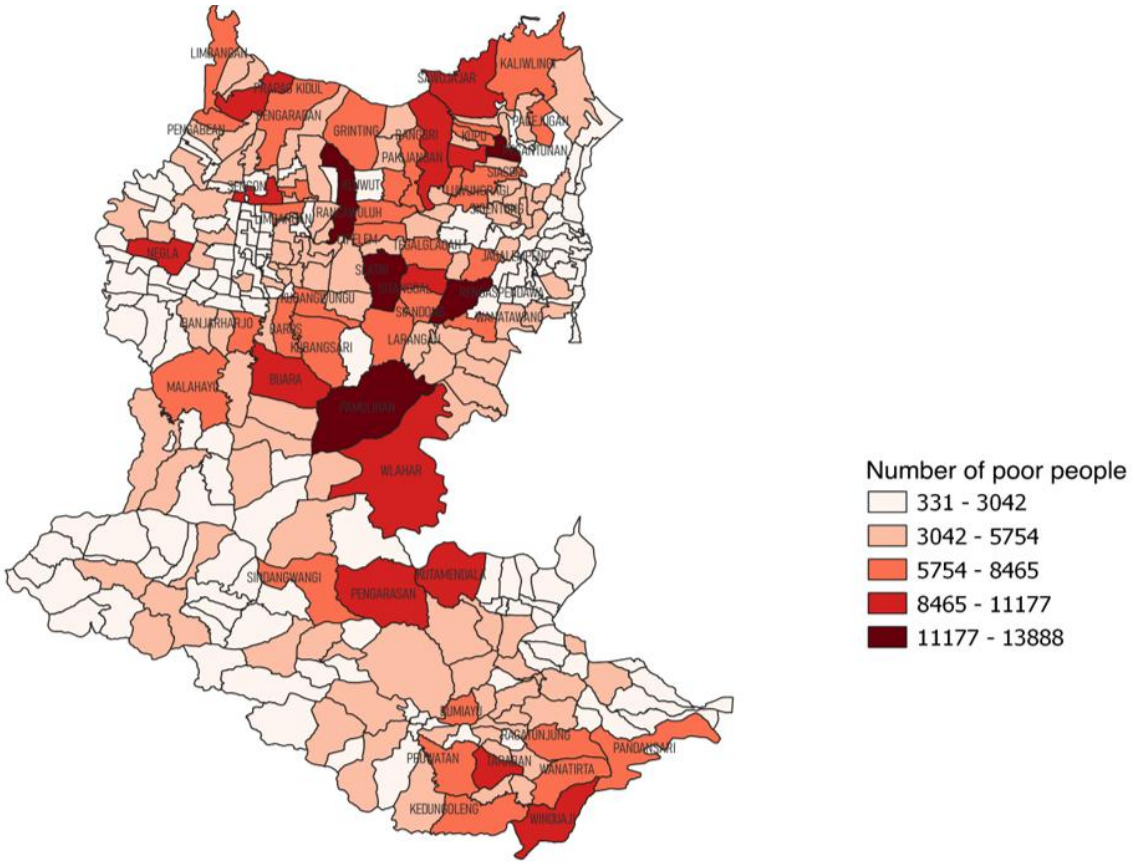
This study investigates the influence of spatial connectivity using geographically weighted regression (GWR) on rural poverty and the allocation of village funds in Indonesia. It employs panel data and village census information from 2018 to 2020. Indicators of social institutions are represented by variables of village meetings (*musyawarah desa)* and mutual cooperation (*gotong-royong*), whereas political factors are represented by variables related to the village government and the Village Council (*Badan Permusyawaratan Desa* or BPD). The panel model encompasses 1,130 observations, whereas the GWR model analyzes 565 villages in 2020. From a spatial perspective, locational considerations affect the relationship between village funds and poverty in the Brebes and Banyumas Regencies, demonstrating a positive correlation. The findings of the panel model demonstrate robustness, with village government and village meetings exhibiting a direct effect on rural poverty, whereas BPD and mutual cooperation do not significantly impact poverty through village funds.

Keywords: rural, poverty, village funds, social institutions, political institutions, spatial.

1. Introduction

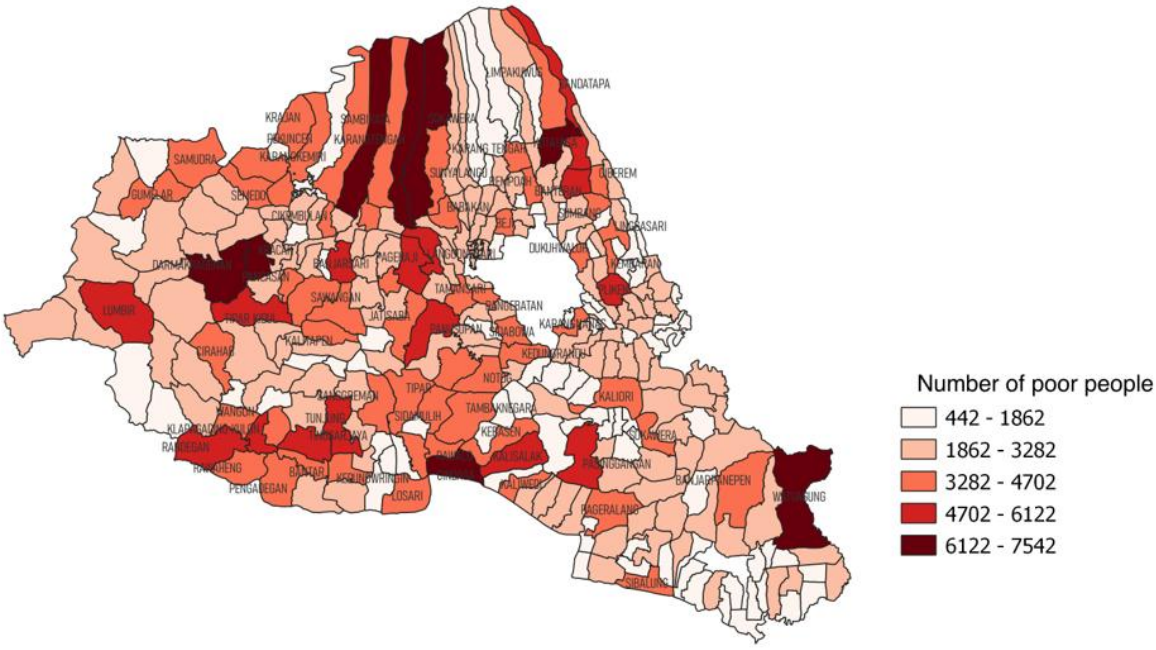
Poverty in rural areas is significantly more prevalent and more serious than in urban areas. According to Khan (2000), the condition of the rural poor is much worse than in urban areas. Booth (1993) also noted that about 17% of the total urban population, about 9.35 million people, and about 14.36% of the rural population, about 17.78 million people, live in poverty. Brebes and Banyumas regencies had a relatively high number of poor people in 2020, based on the annual village meeting of Central Java Province. According to data from the Central Java Province Statistics Bureau (BPS), the highest number of people living in poverty was in Brebes Regency in 2018 and 2020. The decline in the number of poor people, amounting to 400 people, was not very significant in Brebes Regency. During this period, the number of poor people in Banyumas Regency declined to 226,200 people from 225,000 people, a decrease of 14,200 people. Spatial approaches to poverty studies have been used in various nations (Yamauchi et al., 2010; Smajgl & Bohensky, 2013). According to Minot et al. (2006) and Kam et al. (2006), poverty is frequently concentrated in isolated places that are in less advantageous geographic positions, have limited access, and are distant from the hub of economic growth. Hasibuan et al. (2019) conducted a study on poverty in the West Bandung Regency, Indonesia, by applying a spatial distribution pattern of poverty using the Moran Index.

Figure 1. Distribution of the number of poor people in rural areas



Source: Brebes Regency, 2020.

Figure 2. Distribution of the number of poor people in rural areas



Source: Banyumas Regency, 2020.

The highest number of poor people (ranging from 11,177 to 13,888 people) per village in Brebes Regency in 2020 are in the villages of Pamulihan, Rancawuluh, Rengaspendawa, and Pesantunan. Villages with the highest number of poor people (ranging from 6,122 to 7,542 people) in Banyumas Regency in 2020 are Sokawera, Kotayasa, Sambirata, Karangtengah, Kracak, Darmakradenan, Cindaga, and Watuagung (Figures 1 and 2). Good village financial management provides progress in the development of the village. One source of village revenue comes from the village's fund. In addition to being supported by village autonomy regulations, the village funds policy provides freedom for villages to manage these funds through more effective village fund management with the aim of the welfare of village communities. Village funds are very beneficial for village communities. Before the existence of village funds, village development experienced obstacles due to the lack of budget allocations for the development and empowerment of rural communities (Sumarto & Dwiantara, 2019). Rammohan and Tohari (2023) researched the relationship between village fund programs and rural poverty and labor force participation in Indonesia. The findings show that the village fund program in Indonesia reduces rural poverty by empowering villages, providing fiscal support, improving governance, increasing welfare, and encouraging labor force participation. These integrated efforts help meet the specific needs of rural communities and promote sustainable development.

Table 1. Village funds

Regency	**2018**	**2020**
Brebes	353,738,134	506,306,890
Banyumas	291,604,182	373,155,579

Source: Village Financial Statistics (Central Bureau of Statistics)

The average value of the village fund is displayed in Table 1. Brebes and Banyumas Regencies have high village funds, with increases from 2018 to 2020. Brebes Regency experienced an increase from Rp 353 billion in 2018 to Rp 506 billion in 2020. Banyumas Regency experienced an increase in village funds from

Rp 291 billion in 2018 to Rp 371 billion in 2020. Delegation of authority to local governments is part of the decentralization process. Lewis (2015) studied decentralization and poverty, which is linked to government services, finance, and poverty. Antlöv and Sutoro (2010) confirmed these findings and state that decentralization is linked to democratization with development and poverty reduction in rural areas. Putnam et al. (1993) argue that the quality of local governance in Italy today can be traced back to the historical development of what is known as social capital, a network of associations that fosters a culture of trust between strangers and helps address problems through collective action. Trust is a specialized form of social capital, which has a strong correlation with economic growth and development. Decentralization ensures that local communities are empowered and united with common goals, objectives, and voices. Community participation is considered the benchmark of rural development (Hodge & Midmore, 2008). White (2011) concludes that decentralization can be used to achieve sustainable development, especially through the involvement of local communities in identifying solutions to address issues such as poverty.

Decentralization involves not only the distribution of authority to local governments but also requires robust institutional support to ensure that local governments can function efficiently and responsively to community needs. In this context, institutions serve as the framework for carrying out decentralization to achieve village development goals. Several empirical studies on institutions have shown that institutional quality is a relevant and independent factor in explaining political and social performance at the group, community, and national levels (Dasgupta & Serageldin, 2000; North, 1990). Furthermore, Yusuf et al. (2019) determined that collaboration among village institutions improves village development, transparency, and the utilization of local resources. However, their research has limitations because it does not account for the spatial factors and mainly investigates the relationships between village institutions in the context of village

funds management. The location of the research also varies widely, ranging from countries, provinces, and districts, both urban and rural, but there is very limited research in rural areas using specific institutional aspects that exist in the village (Arisukwu et al., 2020; Khan, 2022; Osei & Zhuang, 2020; Hoe & Wahab, 2017). Empirical studies examining the relationship between village financial authorities, such as village funds, and local institutions remain underexplored and warrant further investigation. There are notable discrepancies in the empirical findings, particularly when spatial factors such as the geographic location of villages are considered, highlighting the potential for additional research in this area. Considering these perspectives, this paper aims to examine the impact of social and political institutions on rural poverty through fund villages, with a focus on Brebes and Banyumas Regencies, two of the poorest regencies in Central Java Province, Indonesia.

2. Literature Review

2.1 Rural Poverty

Poverty is a multidimensional social phenomenon. Poverty definitions and causes vary based on gender, age, culture, and other social and economic factors. In general, poverty is dominant in rural areas (Booth, 1993; Todaro & Smith, 2015; Manjaro, 2017) compared to urban areas. According to the Central Bureau of Statistics (BPS) of Indonesia in 2020, rural poverty rates were around 12.82%. Booth (1993) stated that two factors contributing to the number of people living in poverty were economic inequality in rural areas and the slow increase in the poverty line in 1987 compared to the rural price index. Khan (2000) argues that while rural areas have more severe poverty than urban areas, the condition of the urban poor is much better than that of the rural poor. According to the BPS, the poor are individuals whose average monthly per capita expenditure is below the poverty line.

The International Fund for Agriculture Development (IFAD, 2002) has found that rural poverty is the condition of poverty experienced by residents in rural areas, characterized by limited access to resources, services, and opportunities to earn income. These findings are in line with current research, which implies that village institutions and village fund management represent an essential part in addressing limitations to access. Unlike previous studies that focused on economic inequality and access differences in rural areas, this research examines the institutional relationship as a supporting factor for public fund management, in particular, village funds, which support contribution to the welfare of village communities.

Poverty in rural areas additionally encompasses financial deprivation. Poverty is defined as a lack of money, but also by a lack of access to education, medical care, and suitable job possibilities. These conditions create a difficult-to-break cycle in which individuals and families become vulnerable and deal with poverty. This study underlines the significance of considering a number of criteria while investigating poverty, such as household characteristics, employment status, and access to social assistance. For example, improved strategies have been required to address multidimensional poverty in rural Vietnam (Trinh & Lee, 2023).

According to the Asian Development Bank (2007), Asia's rural poor are landless farmers with female heads of households, indigenous and socially excluded communities, pastoralists, and fishermen. Rural poor participate in both agricultural and non-agricultural occupations. The region's poorest areas have few resources and include rugged or hilly terrain, marginal and degraded land, rain-fed agricultural areas, and several coastal locations. Poor rural households typically have larger families, higher dependency ratios, poorer education levels, and higher unemployment rates. The impoverished also lack basic necessities such as clean water and sanitation. Access to credit, inputs, and technology is limited. They also have a low understanding and organizational capacity to take risks and compete in the market.

Following that, Naufal et al.'s (2023) research emphasizes the role of education and health facilities in determining poverty levels in rural Indonesia. The study's findings indicate that increased health infrastructure tends to decrease poverty levels. The Village Development Index (IDM) was found as a moderating aspect of this relationship, illustrating that communities with stronger institutional administration can make better use of infrastructure for welfare. Government support is particularly essential in enhancing education and health services in rural areas so that challenges can be solved more successfully.

2.2 Village Funds, Institution, and Rural Poverty

Village funds represent one of the seven revenue sources for villages. According to Law No. 6/2014 on Villages, 10% of the State Budget (APBN) is allocated to the village funds. This allocation is based on the number of villages and is determined by considering factors such as population, poverty rate, total area, and geographic challenges. The aim is to enhance prosperity and ensure equitable development in villages, as detailed in Article 72, Section 2 of the Village Law. The Village Law specifies that village funds are allocated to villages through the Regional Budget (APBD). This is intended to support governance, development, community empowerment, and social activities within the village. Morrison (2014) argues that rural governance is moving toward institutional blending, leading to increasingly complex governance in rural areas (Morrison, 2007; Hodge, 2013). Tebaldi and Mohan (2010) highlight the importance of considering endogeneity issues in institutional and poverty analysis. They found that government elements, such as spending on defense and security, are considered institutional instruments that directly correlate with poverty. This indicates that institutions have a significant impact on poverty reduction, but endogenous factors such as government spending need to be carefully considered in the analysis, emphasizing the importance of a holistic and accurate understanding of the role of institutions in poverty reduction.

Subjective measures related to institutions are in line with research by Chong and Caldéron (2000). Chong and Gradstein (2007) emphasize government stability, levels of corruption within the government, rule of law and order, democratic accountability, and bureaucratic quality. Acemoglu and Robinson (2012) state that economic institutions are determined by political institutions. They find that an important aspect within the legal framework for economic development is political institutions providing protection for asset ownership rights, thereby incentivizing individuals and companies to innovate, invest, and develop assets. Suttie (2016) emphasizes that inadequate investment in rural infrastructure and public services is linked to political participation, which worsens the inequality between rural and urban areas. From a social perspective, exclusion patterns in rural areas can sometimes undermine unity and create additional challenges for certain groups in enhancing their livelihoods. Narayan et al. (2000) used participatory action research to investigate the social factors of poverty. Research related to institutional governance highlights that social capital plays an important role in poverty alleviation. Abdul-Hakim et al. (2010) state the importance of social capital, including strong social networks, trust, and positive social norms in reducing the risk of poverty. This research also notes that poverty alleviation programs still place insufficient emphasis on the development of social capital, thus requiring more targeted strategies to strengthen social capital in the community. Chen et al. (2024) conducted research in Ghana on poverty alleviation in rural areas by highlighting asset-based community development that emphasizes the utilization of local resources and community participation. The active use of physical, social, and financial assets has proven to help alleviate poverty, while community involvement in decision-making will accelerate the implementation of rural development programs.

Rammohan and Tohari (2023) evaluated the Village Fund Program (PDD) in Indonesia, which aims to alleviate rural poverty and increase female labor force

participation. The PDD substantially raised agricultural household consumption expenditures while simultaneously promoting up to 10% female labor force participation. Furthermore, there was a considerable movement from agriculture to services, showing that the rural economy is becoming more diverse. This initiative significantly reduced the gap in poverty and labor force participation between rural and urban areas, demonstrating that effective village-based interventions can help reduce regional disparities.

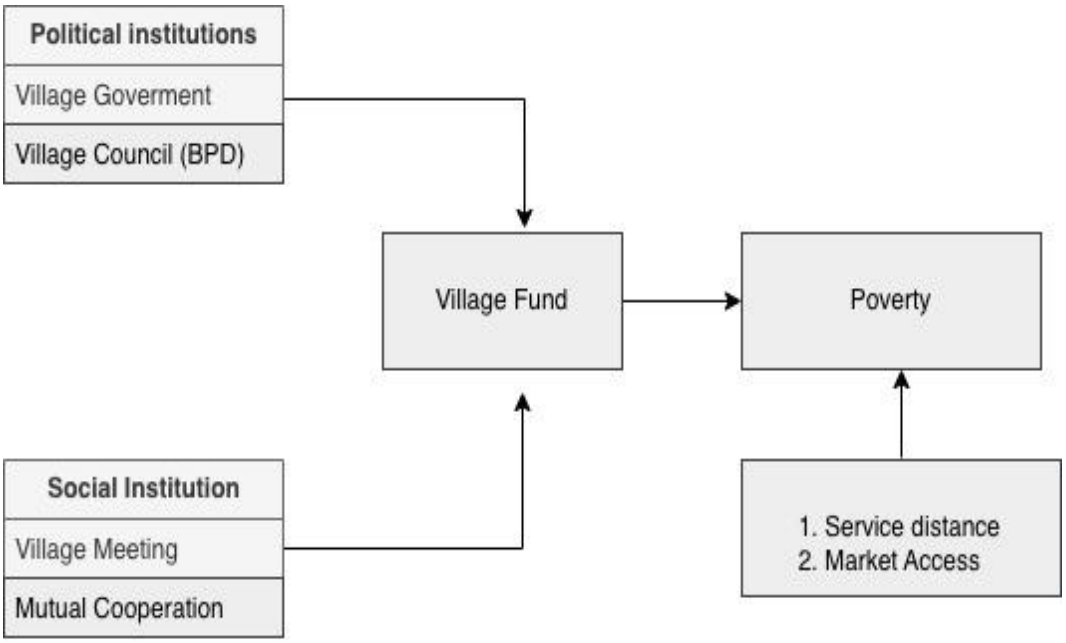
3. Framework and Hypotheses

The conceptual framework of this study hypothesizes that village-level governance structures and community participation mechanisms exert both direct and indirect influences on poverty outcomes. Effective local governance, including the roles of village government and village council, has been widely recognized as a determinant of development performance and resource management (Agrawal & Ribot, 1999; World Bank, 2004). Likewise, participatory processes such as village meetings and collective action initiatives are understood to enhance transparency, accountability, and local decision-making, thereby influencing developmental outcomes (Mansuri & Rao, 2013; Platteau & Gaspart, 2003).

In this context, the village government, village council, village meetings, and mutual cooperation are theorized to have direct effects on the management and functioning of village funds, which serve as essential institutional mechanisms for local development (Ostrom, 1990; Bardhan & Mookherjee, 2006). These same governance and participatory factors are also expected to directly influence poverty levels, consistent with evidence that community-based governance can shape poverty reduction outcomes through resource allocation and collective action (Chambers, 2014; Narayan et al., 2000). In addition, village funds themselves are hypothesized to directly affect poverty reduction (Arham & Payu, 2020). Furthermore, the framework proposes that governance and participation variables

indirectly influence poverty through their effects on village funds, reflecting theoretical models in which institutional quality mediates development outcomes (North, 1990; Acemoglu & Robinson, 2012). This mediating relationship suggests that improvements in governance quality and community cooperation enhance the effectiveness of village funds, thereby contributing to more substantial poverty alleviation outcomes.

Figure 3. Framework of research



Therefore, we have the following hypotheses:

Hypothesis 1 (H1): Village government directly influences the Village Funds.

Hypothesis 2 (H2): Village council directly influences the Village Funds.

Hypothesis 3 (H3): Village meeting directly influences the Village Funds.

Hypothesis 4 (H4): Mutual cooperation directly influences the Village Funds.

Hypothesis 5 (H5): Village government directly influences Poverty.

Hypothesis 6 (H6): Village council directly influences Poverty.

Hypothesis 7 (H7): Village meeting directly influences Poverty.

Hypothesis 8 (H8): Mutual cooperation directly influences Poverty.

Hypothesis 9 (H9): Village funds directly influences Poverty.

Hypothesis 10 (H10): Village government indirectly influences Poverty through the Village Funds.

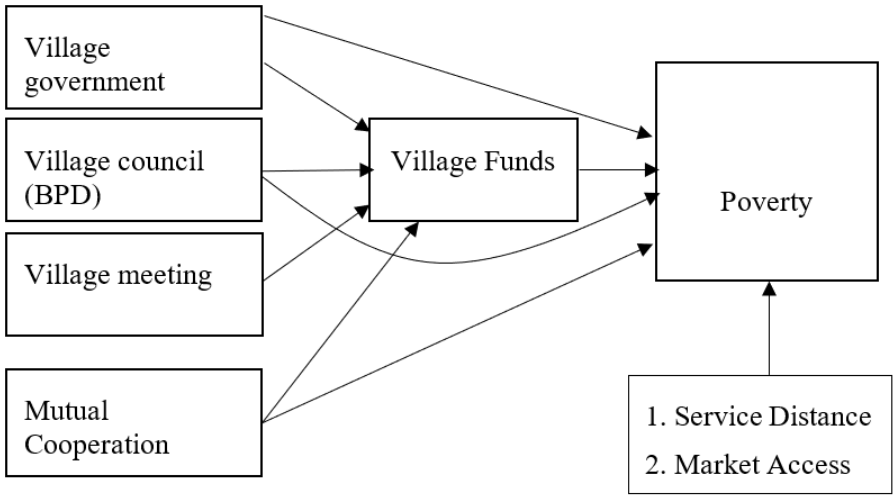
Hypothesis 11 (H11): Village council indirectly influences Poverty through the Village Funds.

Hypothesis 12 (H12): Village meeting indirectly influences Poverty through the Village Funds.

Hypothesis 13 (H13): Mutual cooperation indirectly influences Poverty through the Village Funds.

The mechanism can be pictured:

Figure 4. Hypotheses of village funds and social and political institutions on rural poverty



4. Data and Research Method

4.1 Data Source

The data used are secondary data published by the Department of Social Affairs of Central Java Province, the Ministry of Village, Development of Disadvantaged Regions, and Transmigration of the Republic of Indonesia, Directorate General of Financial Balance of the Ministry of Finance of the Republic of Indonesia. Other main data sources were obtained from the "Podes" of the BPS. The Village Potential Statistics (Podes) is a comprehensive survey conducted by the BPS of Indonesia every three years. It gathers detailed information on village characteristics and facilities by interviewing village heads or designated representatives. This data collection aims to provide insights into the potential and

infrastructure of villages across Indonesia, supporting regional development and planning. In order to collect data, a systematic random sampling method was followed to select 1,130 villages in Brebes and Banyumas.

4.2 Research Methods

Data were analyzed by using the geographically weighted regression (GWR) model and the panel data method. Fotheringham et al. (2002) developed the GWR model, which is a modified weighted regression model from the global regression model. The difference from the global regression is that the GWR model estimates different regression parameters for each geographic location, whereas the global regression has constant model parameters for each observation location. This results in variations in the regression parameter values across different geographic regions. The GWR model cannot be used if the regression parameters have fixed values across all geographic regions; in other words, the applicable model is the global model. The model that applies to all geographic regions is the global model. The GWR model is used to assess how each community reacts to an increase in local funds to alleviate poverty, making use of the village's geographic location. In geographical analysis, the Moran coefficient is a type of correlation analysis. Both spread-out (a negative correlation) and spatially concentrated (a positive spatial correlation) phenomena are measured by an indicator using the Moran coefficient (Samyukta, 2014). Then, the n x n matrix of Moran coefficients between the k variables is calculated as

$$M = X^T W X \tag{1}$$

The matrix transpose is indicated by the superscript *T*. A matrix of normal (Pearson) correlation coefficients would be produced by equation (1) in the absence of spatial weighting, where *W* is the unity matrix. In that scenario, a set of weights that may be utilized to compute a composite measure *X* would be obtained from an eigenvector of the correlation matrix, represented by *u*. It can be demonstrated that the eigenvector belonging to the greatest eigenvalue is related to the projection that

minimizes the residual variance between X and the projection. This composite measure is really a projection of the data matrix X onto the vector u. For an accurate interpretation, the eigenvector optimizes the "fit" between the lower-dimensional projection and the data. For each subsequent greatest eigenvalue, the matching eigenvector maximizes the fit of the residual variance. This procedure is called principal components.

Furthermore, there is a panel data approach. Panel data model is a combination of time-series and cross-sectional data, which involves observations from a specific analytical unit at a particular point in time (Gujarati, 2004; Baltagi, 2005). Panel data has several advantages: 1) It allows the modeling of more complex behavior; 2) It provides more informative and diverse data, with lower levels of collinearity between variables, increases the number of degrees of freedom, and is more efficient; 3) It incorporates heterogeneity explicitly in the analysis by including certain variables, 4) It reduces bias in the data during regression, 5) It is better able to detect and measure impacts than time series or cross-sectional data alone; and 6) It allows the study of dynamic changes with cross-time observations. Robust standard errors can be utilized to ensure the validity of statistical inference when there are violations of classical assumptions, particularly heteroskedasticity and autocorrelation (Wooldridge, 2010; Greene, 2008). These robust standard errors can enhance the accuracy of regression results, especially in the presence of outliers.

The model used in this study to measure the relationship between poverty and village funds spatially uses a model specification as follows:

$$Y_{2_i} = \beta_0 (u_i, v_i) + \sum_{k=1}^{p} \beta_k (u_i, v_i) Y_{1_{ik}} + \varepsilon_i \quad (2)$$

To measure the relationship between social and political institutional aspects and village funds with poverty, the following model specification is used:

Structure 1: $Y_{1_{it}} = \alpha_3 + \beta_1 X_{1_{it}} + \beta_2 X_{2_{it}} + \beta_3 X_{3_{it}} + \beta_4 X_{4_{it}} + \beta_5 X_{5_{it}} + \beta_6 X_{6_{it}} + \varepsilon_{it}$ (3)

Structure 2: $Y_{2_{it}} = \alpha_0 + \beta_1 X_{1_{it}} + \beta_2 X_{2_{it}} + \beta_3 X_{3_{it}} + \beta_4 X_{4_{it}} + \beta_5 Y_{1_{it}} + \beta_6 X_{5_{it}} + \beta_7 X_{6_{it}} + \varepsilon_{it}$ (4)

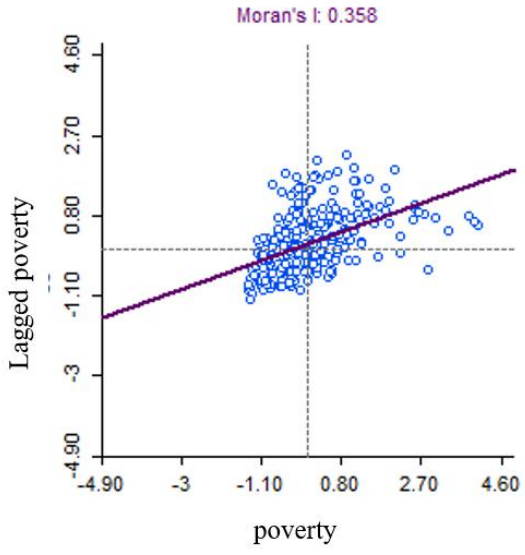
where Y_1 is village funds, Y_2 is poverty, X_1 is village government, X_2 is village meeting (*musyawarah*), X_3 is village council/BPD (*Badan Permusyawaratan Desa*), X_4 is mutual Cooperation (*gotong-royong*), X_5 is service distance, and X_6 is market access.

5. Results

5.1 GWR Estimation

Spatial effects in modeling are characterized by indicators at an identified site that demonstrate a significant dependence on observations at proximate locations (nearest-neighbor). The spatial effect can be categorized into two types: dependence and spatial heterogeneity. The presence of spatial dependency or correlation in cross-sectional data suggests dependency or dependency between sites. The random area effect, defined as the difference between one site and another, causes spatial heterogeneity (Lee & Wong, 2001). The Moran test is used to test for spatial dependence or autocorrelation between observations or locations. Measuring the Moran index is one of the methods used to test the mapping. If there is a spatial effect, follow up with spatial regression modeling locally, particularly GWR.

Figure 5. Index Moran Brebes Regency



A Moran's I value of 0.358 indicates a positive value for Brebes Regency, signifying a state of positive autocorrelation in spatial clustering, which reflects a pattern of concentrated regions exhibiting similar characteristics. Locations with high or low values of the poverty variable tend to be near other locations with similar values, though the effect is relatively mild. Figure 6 illustrates precisely the same thing in Brebes Regency. The Moran index value of 0.215 shows an encouraging result. Positive spatial autocorrelation indicates that places with identical features cluster nearby.

Figure 6. Index Moran Banyumas Regency

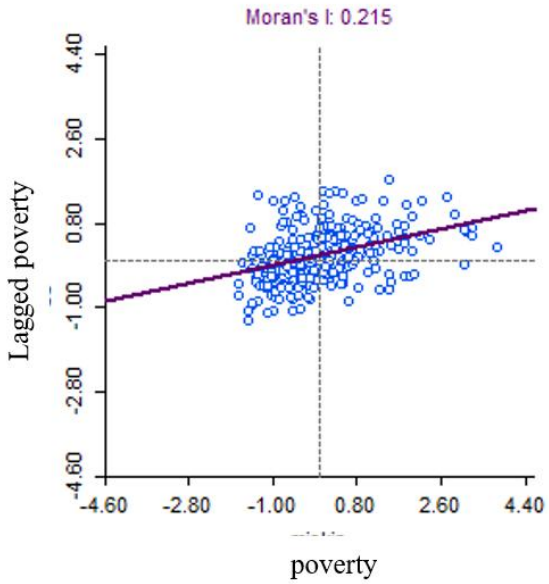


Figure 7**.** Significance value of villages in Brebes Regency

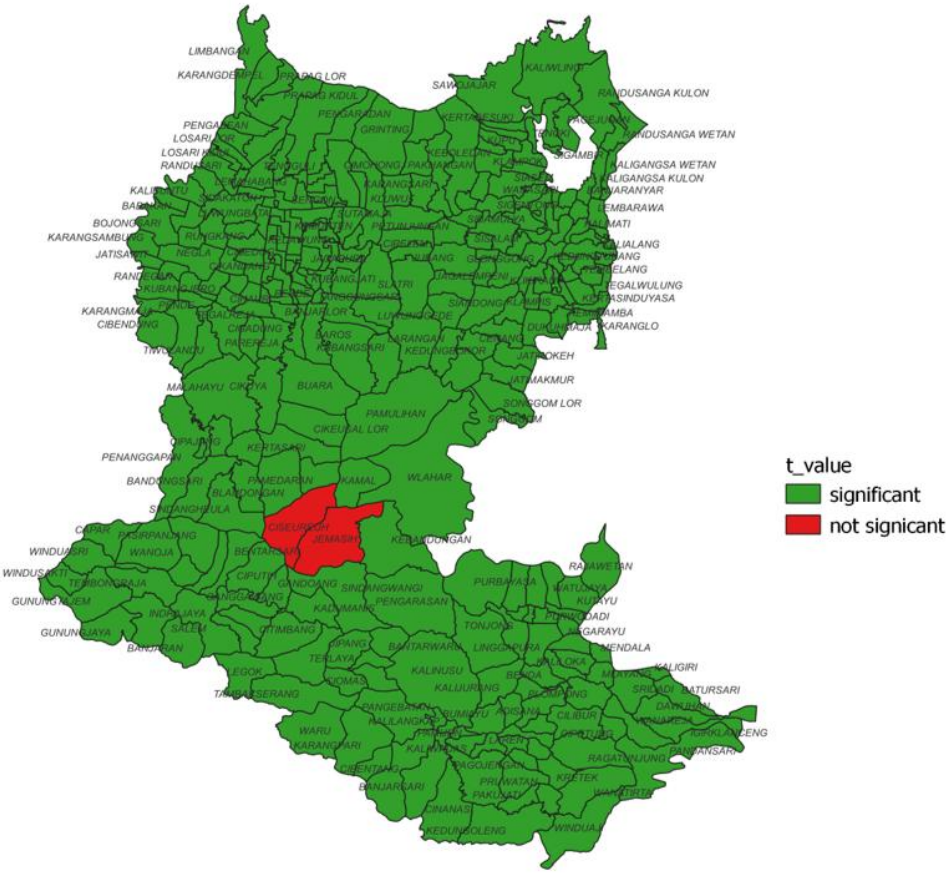
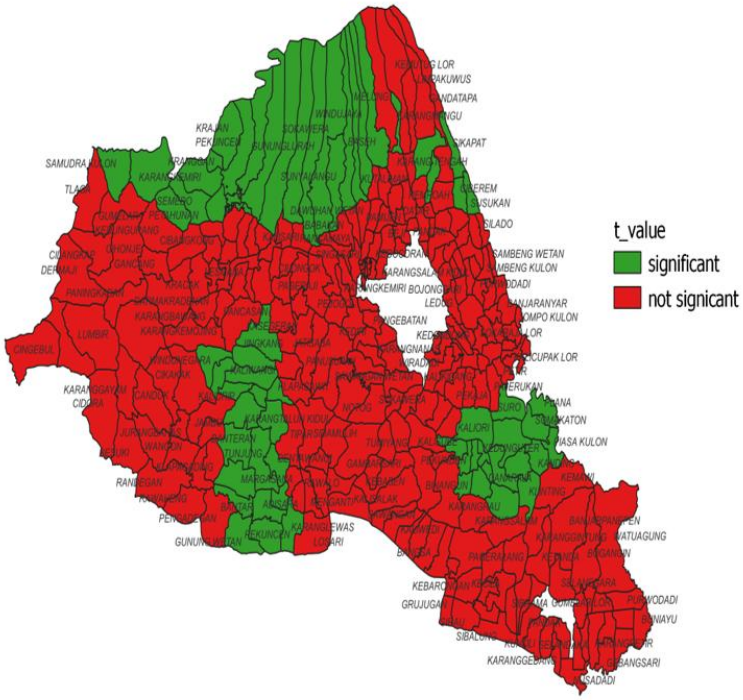


Figure 8. Significance value of villages in Banyumas Regency



Figures 7 and 8 show the spatial relationship of each village in the Brebes and Banyumas Regencies between village funds and poverty in 2020. In Brebes Regency, only two villages have an insignificant relationship between village funds and poverty, and the rest are significant. The level of significance varies between positive and negative. Figure 7 illustrates that the northern and central regions of Brebes exhibit areas where village funds have a statistically significant effect on rural poverty, as indicated by the green areas. The red areas indicate that southern and certain central regions of Brebes exhibit minimal influence of village funds on rural poverty alleviation. The substantial areas (green) are predominantly located in the northern half, while the southern region exhibits a greater prevalence of red regions, signifying minimal or no significant impact in these areas. Villages with a significant population of poor people tend to show insufficient infrastructure, particularly concerning fundamental services such as education and healthcare access. High village funds are insufficient to create effective infrastructure.

Figure 8 illustrates that the majority of Banyumas and demonstrates a significant impact of village funds on rural poverty, as evidenced by the prevalence of green. Only a small cluster of villages in the central region has a minimal impact. Overall, the impact distribution in Banyumas is more homogenous than in Brebes, with only a small portion of the area considered insignificant. Anshori and Bukhori (2018) also mentioned that the role of village funds in reducing poverty was not felt significantly by residents. The program plays a more indirect role by improving public infrastructure to facilitate community access to public facilities. Job creation in village fund infrastructure projects is also not enough to help the poor because the number of working days is very limited, and the workers do not have to be from among the poor. One reason village funds remain ineffective in reducing poverty is that approximately 80% are allocated to village development, while only 4% to 10% are directed toward social capacity building and community empowerment (Ministry of Finance, 2020; Abidin, 2015).

Figure 9. Estimation coefficient in Brebes Regency

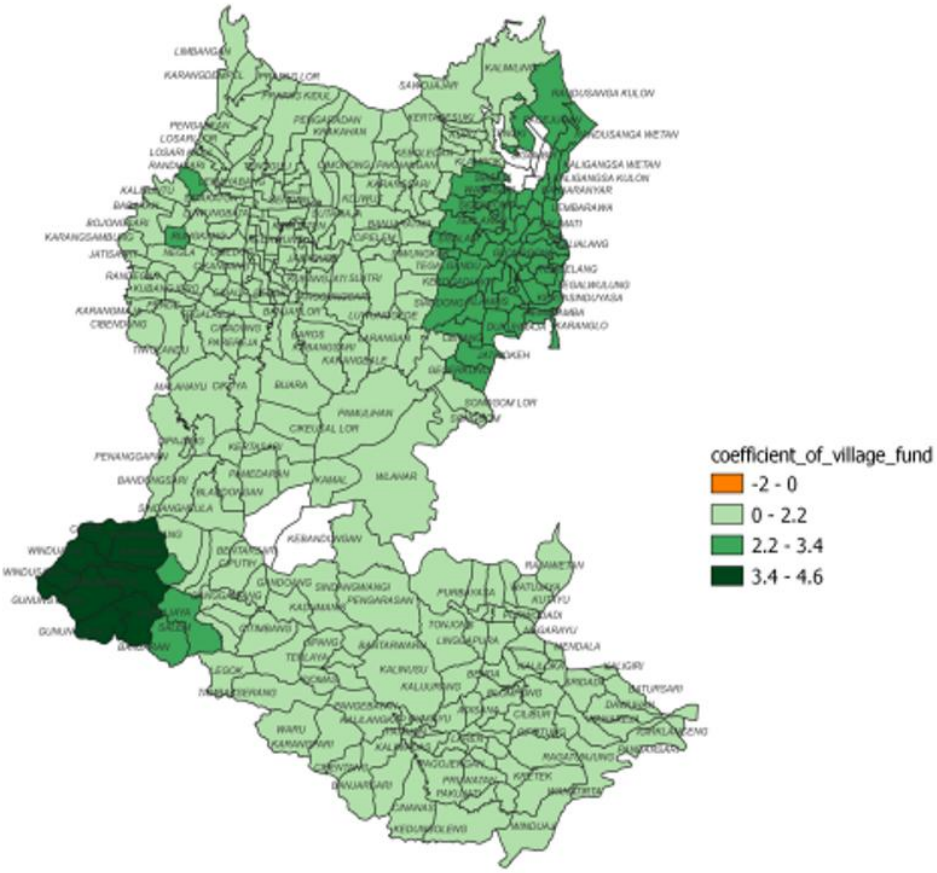
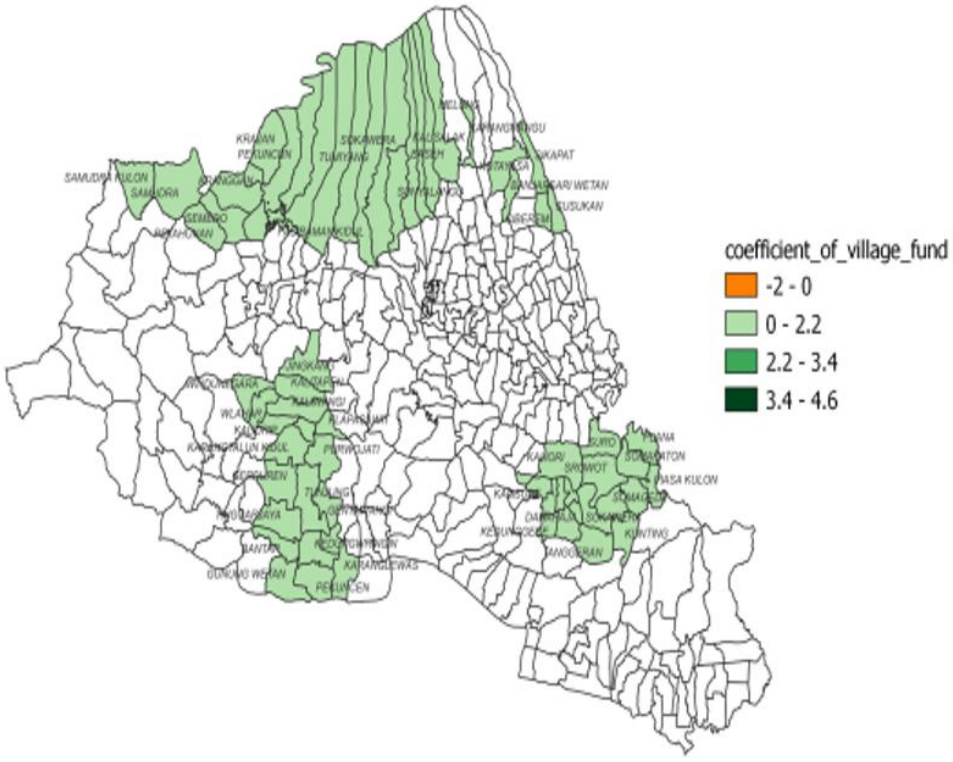


Figure 10. Estimation coefficient in Banyumas Regency



The variation in coefficient values in Figures 9 and 10 shows a positive relationship for all villages in Brebes Regency, while for Banyumas Regency, there are several villages that have a negative relationship, but it is not significant. The positive relationship indicates that the receipt of village funds in each village of the Brebes and Banyumas Regencies actually increases poverty. Figure 9 displays that village funds with light green coefficient values (0 to 2.2) have a slight positive effect on poverty reduction, but dark green coefficients imply a stronger correlation between village funds and poverty reduction. Most villages in Brebes Regency demonstrate that village funds have a significant influence on poverty reduction.

Figure 10 indicates that the places with darker green shading appear to have received the most favorable benefits from the village funds, implying that these funds have considerably contributed to the reduction of rural poverty in these areas. As a result, the places shaded orange might not have advanced as much or may have even had a negative effect. Putra (2018) revealed that an increase in village funds has a significant impact on reducing poverty. Empirically, village funds have a positive impact on poverty reduction. Warih and Syugiarto (2021) found that village funds have a negative effect on poverty, but changes in poverty that occur with the existence of village funds provide a relatively small reduction in poverty; even in South Sumatra Province, it was found that village funds disbursed did not have a significant impact on poverty. Briefly, the description of the research variables is presented in the following table.

Table 2. Statistic description

Variable	Obs	Mean	Std. Dev.	Min	Max
Poverty (Y_2)	1,130	0.575	0.162	0.053	0.992
Village government (X_1)	1,130	37.938	36.689	4	194
Village council (X_2)	1,130	6.807	2.004	3	11
Village meeting (X_3)	1,130	6.888	4.599	1	60
Service distance (X_5)	1,130	6.709	5.298	1	36

Source: Ministry of Finance; Central Bureau of Statistics, processed.

The variable poverty (Y_2) has an average value of 0.575, with a standard deviation of 0.162. The poverty ratio variable reaches a maximum value of 0.992 and a minimum value of 0.053. The average value of the village government variable is 33.938, with a standard deviation of 36.689. The village government variable reaches a maximum value of 194 and a minimum value of 3. The village council (X_2) variable has an average value of 6.807, with a standard deviation of 2.004. The village council variable reaches a maximum value of 11 and a minimum value of 3. The average value of the village meeting (X_3) variable is 6.888, with a standard deviation of 4.599. The village meeting variable reaches a maximum value of 60 and a minimum value of 1. The service distance (X_5) variable has an average of 6.709 and a standard deviation of 5.298, with a maximum value of 36 and a minimum value of 1. The number of observations in the study is 1,130 villages.

Table 3. Description of dummy variable

Year	Mutual Cooperation (X_4)			Market access (X_6)		
	0 = not active	1 = active	Total	0 = otherwise	1 = access	Total
2018	93	472	565	72	493	565
2020	84	481	565	66	499	565
Total	177	953	1,130	138	992	1,130

Source: Ministry of Finance; Central Bureau of Statistics, processed

In 2018 and 2020, there were varying patterns and changes in market access across villages in the Brebes, Banyumas, Batang, Tegal, Pati, and Kudus Regencies. According to Table 3, 992 out of 1,130 villages had easy market access, while 138 did not. Additionally, 953 villages had a tradition of full community involvement in mutual cooperation, while 177 villages saw partial participation in this tradition among residents.

Based on Table 4, the best model used is the Fixed Effect Model (FEM) obtained from the Hausman test with robustness. Below are the estimation results using robust standard errors.

Table 4. Panel data model estimation

Variable	Structure 1: Dependent variable village funds		
Ln_village funds (Y_1)	OLS	REM	FEM
Village government (X_1)	-0.002 (0.000)	-0.003 (0.000)	-0.004 (0.000)
Village council (X_2)	-0.029 (0.005)	-0.032 (0.005)	0.006 (0.041)
Village meeting (X_3)	0.004 (0.002)	0.004 (0.002)	0.004 (0.002)
Mutual cooperation (X_4)	-0.082 (0.024)	-0.06 (0.023)	-0.013 (0.027)
Constant	21.316 (0.042)	21.334 (0.044)	21.013 (0.279)
Control variable:			
Service distance (X_5)	-0.003 (0.002)	-0.005 (0.002)	-0.008 (0.002)
Market access (X_6)	-0.066 (0.026)	-0.035 (0.024)	0.035 0.028)
LR chi2			
R^2:	0.156		0.580
Within		0.568	
Between		0.000	
Overall		0.148	
Hausman x^2			278.612
Observed			1.130

Variable	Structure 2: Dependent variable poverty		
Poverty (Y_2)	OLS	REM	FEM
Village government (X_1)	31.077 (1.385)	0.001 (0.000)	0.000 (0.000)
Village council (X_2)	51.001 (25.771)	-0.024 (0.003)	-0.036 (0.018)
Village meeting (X_3)	7.034 (10.196)	0.001 (0.001)	0.001 (0.001)

Mutual cooperation (X_4)	-742.676 (134.326)	-0.008 (0.011)	0.009 (0.012)
Ln_village funds (Y_1)	4566.351 (167.177)	0.021 (0.015)	-0.069 (0.019)
Constant	21.316 (0.042)	21.334 (0.044)	21.013 (0.279)
Control variable:			
Service distance (X_5)	-29.88 (9.496)	0.002 (0.001)	0.000 (0.001)
Market Access (X_6)	-636.215 (144.44)	0.027 (0.011)	0.023 (0.013)
R^2:	0.511		0.152
Within		0.114	
Between		0.142	
Overall		0.138	
Hausman x^2			61.581
Observed			1,130

Notes: *, **, and *** represent statistical significance at 10%, 5%, and 1%, respectively.

Source: Ministry of Finance; Central Bureau of Statistics, processed

Table 5. Robust standard errors

Structure 1: Dependent variable ln_village funds (Y_1)		
Variable	Coefficient	Robust Standard Error
Village government	-0.004***	0.000
Village council	0.006	0.018
village meeting	0.004***	0.001
Mutual Cooperation	-0.013	0.041
Constant	21.013***	0.136
Control variable:		
Service distance	-0.008***	0.002
Market access	0.035	0.052
R^2	0.580	

Structure 2: Dependent variable poverty (Y_2)		
Variable	Coefficient	Robust Standard Error
Village government	0.000**	0.000
Village council	-0.036	0.025
village meeting	0.001*	0.001
Mutual Cooperation	0.009	0.013
Ln_village funds	-0.069**	0.031
constant	2.203***	0.678
Control variable:		
Service distance	0.000	0.001
Market access	0.023**	0.011
R^2	0.152	

Based on the estimation results in Structure 1 (Table 5), the village government variable has a negative effect on the village funds, meaning that the higher the village government (supporting H1), the greater the decrease in percentage of village funds. The village council (BPD) variable has a positive effect on the percentage of village funds, which means that the higher the BPD, the higher the percentage of village funds (not supporting H2). The village meeting has a positive effect on the percentage of village funds, which means that the higher the village meeting, the higher the percentage of village funds. The village meeting variable has a negative effect on the percentage of village funds, which means that the higher the village meeting, the more the percentage of village funds will decrease.

Table 6 shows, the highlights how village meetings can have a significant positive impact on village funds. This implies that deliberative activities can drive a community to raise its funds. Village meetings provide a forum for citizens to form groups and exchange ideas on how to allocate village funds. It is established that village meetings will strengthen the transparency of village budget allocation and

allow village money to be managed more efficiently and with innovative concepts. The direct effect of '*gotong royong*' (mutual cooperation) on village funds is insignificant. According to Zuhri (2020), village arguments determine the maximum allocation of village funds for village development in order to enhance people's well-being.

Table 6. Direct effects of the panel model (Structure 1)

Variable	Direct Effects	Std. Error	P-Value	Hypotheses
H1: village government → village funds	-0.004***	0.000	0.000	Supported
H2: village council → village funds	0.006	0.018	0.783	Not supported
H3: village meeting → village funds	0.0048**	0.001	0.019	Supported
H4: mutual cooperation → village funds	-0.013	0 .041	0.525	Not supported

Notes: *, **, and *** represent statistical significance at 10%, 5%, and 1%, respectively.

Source: Ministry of Finance; Central Bureau of Statistics, processed

Based on the estimation results in Structure 2 (Table 5), the village government variable has a positive effect on poverty, which means that the higher the village government, the higher the percentage of poverty can increase. The village council variable has a negative effect on the percentage of poverty, which means that the higher the village council, the lower the percentage of poverty. The village meetings variable has a positive effect on the percentage of poverty, which means that the higher the village meetings, the higher the percentage of poverty. The variable 'mutual cooperation' has a positive effect on poverty, meaning that the higher the level of mutual cooperation, the higher the poverty percentage. On the other hand, the village fund variable has a negative effect on poverty, indicating that as village funds increase, the percentage of poverty can decrease. According to Rammohan and Tohari (2023), the village fund program in Indonesia alleviates rural poverty by empowering villages, offering fiscal support, enhancing governance, boosting welfare, and promoting labor force participation.

Table 7. Direct effects of the panel model (Structure 2)

Variable	Direct Effects	Std. Error	P-Value	Hypotheses
H5: village government → poverty	0.0003**	0.0001	0.030	Supported
H6: village council → poverty	-0.0356	0.0247	0.151	Not supported
H7: village meeting → poverty	0.0013*	0.0007	0.074	Supported
H8: mutual cooperation → poverty	0.0086	0.0126	0.495	Not supported
H9: village funds → poverty	-0.0686**	0.0311	0.028	Supported

Notes: *, **, and *** represent statistical significance at 10%, 5%, and 1%, respectively.

Source: Ministry of Finance; Central Bureau of Statistics, processed

Table 7 shows a direct relationship between village government and poverty, significant at the 5% level. This suggests that an increase in village government correlates with higher poverty, indicating that the number of village officials has not decreased the number of poor people. The effect of the village council on poverty is not significant at the 5% level. The village council's role is primarily consultative, with limited executive power. The village head (*Kepala Desa*), representative of the village government, holds significant authority over the planning and implementation of development projects, often sidelining the BPD's influence. However, the impact of village meetings on poverty is positive and significant at the 10% level, meaning that more village meetings in the Brebes and Banyumas Regencies are associated with higher poverty. This implies that village meetings have not been effective in reducing poverty in those regencies.

The control variables used for this study consist of access to services distance and market access; both have a direct relationship to the village community. Since market access is a well-known determinant of economic growth and poverty alleviation, using it as a control variable ensures that the observed effects on poverty are not entirely due to improved market access, but rather are related to the main variable under investigation. Public service and market access have significant effects on poverty levels. Controlling for these allows for studies to better examine the impact of other factors on rural poverty, such as community programs or

government policies. In the context of services distance, facilities such as education, healthcare, and basic administration directly impact people's quality of life and productivity. When access to these services is limited or unavailable, rural communities face difficulties in obtaining adequate education or necessary healthcare.

In a study conducted by Sulistyo et al. (2023), it was found that a significant portion of rural populations suffer from a lack of health awareness, primarily due to inadequate access to public health services. This issue is compounded by the presence of widespread poverty, which further hinders equitable access to these essential services for many villagers. The study highlights the critical role of improving access to public services through targeted interventions, such as village fund programs. By enhancing the availability and quality of these services, there is potential to provide rural communities with greater opportunities to improve their overall quality of life. Ultimately, such improvements are essential for fostering sustainable development in rural areas. Besides access to public services, market access is crucial for a village's economic development. Villages with adequate access to marketplaces can more easily sell their products to consumers, leading to an increase in community income. However, efficient market access must be supported by adequate transportation infrastructure, which is essential for the effective distribution of goods. By improving market access through the support of village fund programs, communities can be expected to achieve greater economic independence and enhance their bargaining power in trade. Consequently, access to public services and markets are two critical components that can maximize the positive impact of village funds in alleviating poverty and empowering communities, particularly in the Brebes and Banyumas Regencies.

Table 8. Sobel test

Variable	Direct effects	Indirect effect	Total effect	t-stat	Hypotheses
H10: village government → village funds → poverty	0.0003	0.00025	0.00055	2.193	Supported
H11: village council → village funds → poverty	-0.0354	-0.00041	-0.03581	-0.326	Not Supported
H12: village meeting → village funds → poverty	0.0013	-0.00029	0.00101	-1.738	Supported
H13: mutual cooperation → village funds → poverty	0.0086	0.00086	0.00946	0.300	Not Supported

The indirect effects are presented in Table 8 as follows. The indirect effect of village government on poverty through village funds was found to mediate the relationship between village government and poverty. Indirectly, village government has a significant positive effect on poverty through village funds. The indirect effect of village meeting on poverty through village funds indicates that village funds can mediate the relationship between village meeting and poverty. The World Bank (2017) conducted activities and evaluations related to the relationship between community participation and poverty through village funds and found that village funds could provide effectiveness in activities related to community participation. The mutual cooperation (*gotong royong*) and village council (BPD) variables show no significance to the poverty ratio, so it can be concluded that *gotong royong* and BPD do not mediate the poverty relationship. The tendency of villages in the Brebes and Banyumas Regencies is that village funds have not impacted efforts to reduce poverty through village funds.

Synchronization between the duties of the BPD as the village legislative body and one of the bodies that functions to carry out supervision of village financial management in accordance with Law No. 16/2014 has not run optimally. The practice of democracy in the village often experiences problems that result in the implementation of development and poverty reduction efforts. Cahyono et al. (2020) support this by noting that democratic issues in rural areas can sometimes

create additional challenges. The BPD frequently lacks the necessary resources and systems to oversee the use of funds and ensure accountability.

Therefore, it is crucial for villages to be prepared to manage village funds; otherwise, efforts to accelerate community welfare and reduce poverty will be unsuccessful. For this reason, the village government (village officials and BPD) and the community must have mutual cooperation despite the fact that there is still no synergy between the village officials (village head) and the BPD. Mutual cooperation (*gotong royong*) in the village is a vital form of social capital, but it has been diminishing over time. Empirical evidence shows that in the villages of the Brebes and Banyumas Regencies, only a portion of residents participate in *gotong royong* activities. Broadly speaking, IFAD (2002) states that poverty reduction requires empowering the poor to gain greater access to various assets. These include human and social assets such as education and health, natural assets such as land and water, technological assets such as information and agricultural production methods, infrastructure assets such as roads and health facilities, and financial assets such as income from crop sales. There is strong interaction and complementarity among these asset categories, which are influenced by historical factors and cultural context.

Although the Village Fund has the potential to alleviate rural poverty in Indonesia, especially in the Brebes and Banyumas Regencies, the village council's poor capability, lack of authority, and problems with accountability and transparency make it difficult for them to guarantee that the monies are used to combat poverty. Village development initiatives might be more closely aligned with objectives for reducing poverty if the village council's role were strengthened through more community involvement, improved oversight, and capacity training. In several villages in the Brebes and Banyumas Regencies, social and cultural differences, as well as a lack of trust among community members, might impede efficient collaboration. When villagers lack a sense of unity or when specific groups, such as

women or minorities, are excluded, collaborative efforts to eliminate poverty are less effective.

The Banyumas and Brebes Regencies have social, cultural, and political benefits that contribute significantly to village development and poverty reduction activities. In Banyumas, the community's character, known as "Cablaka" or honesty and openness, is shown in 'babad' texts as a distinct identity that promotes the spirit of mutual cooperation and community unity for mutual improvement (Priyadi, 2008). Cultural traditions such as "unggahan" symbolize the preservation of local cultural values and a means of community togetherness regardless of social status, which encourages active community participation (Nawawi, 2016). In the political aspect, the government system in Banyumas enables public participation through village meetings based on the 2014 Village Law, where citizens can contribute to decision-making for village development (Pamuji et al., 2017). Brebes Regency has similar advantages. *Gotong royong* is an important social capital that fosters relationships between people of different backgrounds and encourages cooperation in village activities. The tradition of "cultural carnival", or *kirab budaya* is held to mark Brebes' anniversary and is an event to enhance togetherness in local cultural activities, demonstrating Brebes' cultural diversity.

In terms of politics, village governance in Brebes is supported by village autonomy regulations, which allow villages to manage their budgets and funds independently, with community participation in village deliberations allowing residents to express their aspirations for village development (Brebes Regency Government, 2019). Thus, Banyumas and Brebes offer enormous possibilities for poverty alleviation through the development of social capital, cultural preservation, and community involvement in the administration of village revenues and assets.

6. Conclusion

Village funds significantly impact poverty reduction in the Brebes and Banyumas Regencies. The spatial location of villages is crucial in determining this

relationship. In Brebes Regency, some village locations positively and significantly impact poverty, while in Banyumas Regency, several villages have a negative and significant impact. Using panel models with two equation structures, it was found that village government and village meetings influence poverty through village funds, whereas mutual cooperation and the village council do not. This indicates that, both directly and indirectly, and considering the spatial aspect (village locations), village funds have not effectively reduced poverty when considering political (village government and village council) and social institutions (village meetings and mutual cooperation) in the Brebes and Banyumas Regencies. Reducing poverty in rural areas depends not only on the community's allocation of finances, but also on the role of outstanding institutions in ensuring that development programs are successful. Several recommendations have been made to improve the effectiveness of social and political institutions, particularly village funds, in reducing poverty in the Brebes and Banyumas Regencies, including strengthening village council capacity and role, improving community engagement, and ensuring inclusive decision-making processes.

Spatial analysis should guide fund allocation, targeting villages based on specific needs and characteristics. Improving governance and transparency and introducing digital monitoring systems will enhance accountability. Cooperation should be revitalized to support community-driven projects, and funds should focus on long-term, sustainable poverty reduction initiatives like education, healthcare, and income-generating activities. Coordinating political and social institutions will help align efforts more effectively with poverty alleviation goals. Academically, this study contributes to the literature on village fund management, village institutions, and the impact of spatial determinants on the efficiency of poverty alleviation initiatives, providing the foundation for future studies in the context of more sustainable village development.

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