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Assessing the Effectiveness of Village Funds in Reducing Rice Agricultural Production Costs: A Case Study from Bicak Village, Mojokerto Regency, Indonesia

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ABSTRACT: The Village Fund program in Indonesia is designed to improve rural economic development, including agricultural productivity. However, its role in reducing the cost of rice agricultural production is still less explored, especially in the local context. This study aims to evaluate the effectiveness of village funds in reducing the production cost of rice farming in Bicak Village, Mojokerto, Indonesia. Using a mixed-methods approach that combines survey data, in-depth interviews with 68 farmers, and financial analysis, the study provides a comprehensive assessment. The results show that the construction of farming roads and the construction of irrigation canals using the budget from the Village Fund have significantly increased the net income of farmers by 26%, several components of farming costs have decreased, namely labor, land cultivation and the use of agricultural equipment (water pumps), another impact is that land rental costs have increased because access to agricultural land is getting easier and smoother. It was concluded that the Village Fund can effectively support cost-effective rice farming, and the right allocation of resources is very important. Future programs should prioritize transparent fund management and training for farmers. This study provides new insights into the intersection between rural development policies and agricultural cost management.

KEYWORDS: Village Funds, rice farming, production costs, rural development, agricultural policy

INTRODUCTION

Agriculture in Indonesia is a very important sector with a contribution of 13.02% to the national Gross Domestic Product (GDP) and provides employment for around 29% of the workforce (Sabarella et al., 2023). Rice, as the main commodity, has a big role in creating national food security. In 2020, Indonesia's rice production was recorded at 54.6 million tons, although it decreased compared to the previous year which reached 55.16 million tons due to bad weather conditions (Sutrisno, Siswanto, et al., 2024). Changing land use also affects rice production, with the area of agricultural land in 2023 recording 10.21 million hectares, producing 53.98 million tons of dry milled grain (GKG) or around 31.10 million tons of rice (BPS, 2024). The government through various programs, such as intensification and fertilizer subsidies, also supports the increase in rice production.

Rice farming activities face various challenges, ranging from limited access to production facilities (Shiferaw et al., 2016), fluctuations in crop prices (Teak, 2018), to capital problems that affect the level of productivity and farmers' income (Bakri, 2022). The success of this sector is very important to ensure stable food availability (Hendriawan, 2023; Kamarudin et al., 2023) reducing dependence on rice imports, and supporting the rural economy. Therefore, there is a need for investment in agricultural technology, extension, and infrastructure that supports food security.

The cost of farming, especially in the rice sector, which is the staple food of the majority of Indonesians, is an important component that affects the welfare of farmers. Smallholder farmers in Indonesia often face high production costs due to the rising prices of fertilizers, pesticides, and seeds (Akanbi et al., 2024) In addition, limited access to low-interest loan facilities further exacerbates the situation. Many farmers are forced to take loans from loan sharks with high interest rates, leading to a cycle of poverty in the agricultural sector (Akanbi et al., 2024; Hanum, 2024) Other factors such as fluctuations in grain prices, pest attacks (Sutrisno et al., 2022) and climate change (Sutrisno, Mangka, et al., 2024) also add to the cost burden and risk of farming. This condition shows the need for policy interventions that can ease production costs for farmers while increasing the efficiency of the agricultural sector.

The village government and residents of Bicak Village in Mojokerto also face various challenges, especially related to low productivity and limited income. To address this problem, the Government of Indonesia launched the Village Fund Program in 2015 to accelerate village development, including improving agricultural infrastructure. The Bicak Village Government uses village funds to improve agricultural infrastructure, such as farming roads and irrigation canals, which play an important role in supporting the agricultural sector. In addition, the Village Fund also allows community involvement in program planning and management, so that the needs of local farmers can be met directly (Kementerian Desa PDTT, 2023; Keuangan, 2016; Permendesa, 2023) Although the potential for the use of Village Funds for the agricultural sector is huge, research on its effectiveness in reducing agricultural production costs, especially at the local level, is still limited.

This article offers a new contribution by evaluating the effectiveness of the Village Fund in reducing the production costs of rice farming in Bicak Village, Mojokerto, Indonesia. The study not only provides an overview of how the Village Fund is being used to support farmers, but also identifies barriers and opportunities in its implementation. In contrast to previous studies that tend to focus on the impact of Village Funds on public infrastructure development, this article specifically explores the relationship between Village Fund allocation and economic efficiency at the farming level. Thus, the results of this study are expected to provide relevant policy recommendations for local and national governments in an effort to improve the management of Village Funds to support the agricultural sector more effectively.

The results of this study are expected to provide evidence-based policy recommendations to the government and other stakeholders. This recommendation not only includes strategies to increase the effectiveness of the Village Fund in supporting the agricultural sector, but also includes measures to increase community participation and transparency in fund management. In addition, the results of this research can also be the basis for further research focusing on agricultural policy development and rural development. This article offers a novelty in a triangulation approach that combines quantitative and qualitative methods to assess the effectiveness of Village Funds in the context of agriculture. By integrating a comparative analysis before and after the allocation of Village Funds with in-depth interviews, this article provides a more holistic understanding of the social and economic impacts that are not only visible from the statistical figures, but also through the direct perspectives of farmers and village officials. This is what distinguishes this study from previous studies that focus more on quantitative aspects alone.

METHODS

This study uses a quantitative approach with a case study method to assess the effectiveness of Village Funds in reducing rice farming production costs in Bicak Village, Mojokerto, Indonesia. The design of this study involves a comparative analysis between the period before and after the allocation of Village Funds, with a mix-method approach to obtain in-depth insights. Primary data were obtained through a structured survey using a questionnaire designed to identify the components of agricultural production costs, including input costs, labor, and supporting infrastructure. The respondents consisted of 68 rice farmers who were selected using the census method based on farmers who directly benefited from the development using the budget from the Village Fund. Secondary data is collected from official village documents, Village Fund financial statements, and government records related to research. Quantitative analyses were conducted using Difference-in-Differences (DiD) to measure significant changes in production costs between the period before and after the implementation of the Village Fund. The paired t-test model was used to identify the relationship between the use of Village Funds and production cost variables, while heteroscedasticity and autocorrelation tests were applied to ensure the validity of the model.

Sensitivity analysis was carried out to test the robustness of the results against variations in the allocation of Village Funds. In-depth interviews with village officials and farmer groups provide qualitative data to understand the contextual factors that affect program effectiveness. Qualitative data was analyzed using thematic analysis techniques to identify patterns and dynamics of the implementation of the Village Fund. The results of the quantitative and qualitative approaches are then integrated in the triangulation analysis, which allows for a holistic assessment of the effectiveness of the Village Fund. Thus, this method not only measures the impact statistically, but also reveals mechanisms and challenges that may not be detected through numerical analysis alone. This approach is expected to make a theoretical and practical contribution to the literature on the management of Village Funds and the sustainability of the agricultural sector, especially in the context of developing countries such as Indonesia

RESULTS AND DISCUSSION

The Effect of Village Funds on Reducing Rice Agricultural Production Costs

The results of quantitative analysis using *the Difference-in-Differences* (DiD) method showed a significant decrease in the production cost of rice farming after the implementation of the Village Fund program. Before the allocation of the Village Fund,

the average total production cost per hectare decreased by **15.54**%.This decrease is mainly seen in the components of labor costs, land cultivation and the use of water pump machines. Before the program, the labor cost per hectare was around Rp 2,000,000, but after the improvement of infrastructure such as irrigation and farming roads, this cost decreased to Rp 1,700,000 per hectare. In addition, the allocation of Village Funds used to improve the irrigation system has succeeded in reducing irrigation costs from Rp. 900,000 to Rp. 700,000 per hectare, and land cultivation from Rp. 1,500,000 to Rp. 1,200,000 per planting season. The program also reduces farmers' dependence on external resources, such as the use of transportation services to transport crops. With the improvement of farming roads, the transportation cost per hectare has decreased from Rp 600,000 to Rp 400,000,

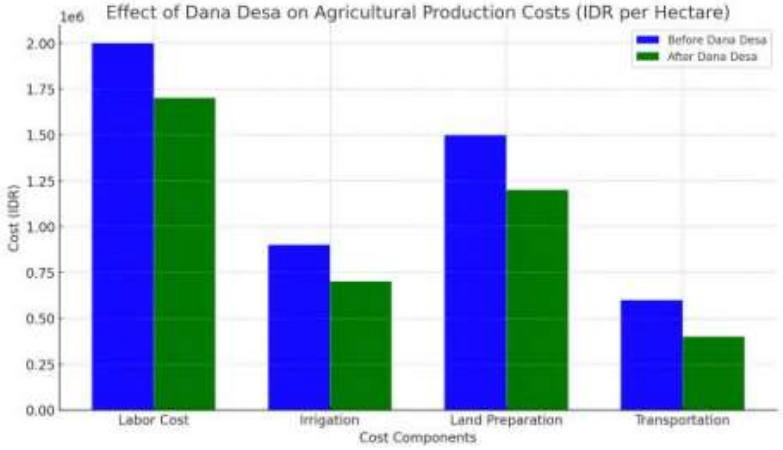


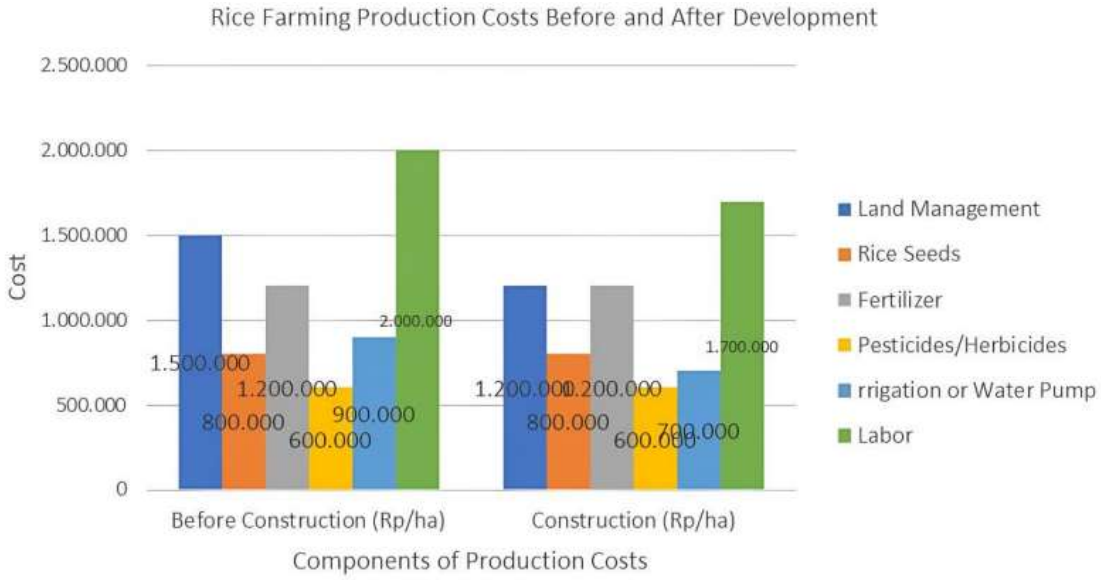
Figure 1. Graph of differences in farming costs before and after the construction of farming roads and irrigation canals

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Biaya	Equal variances assumed	1,793	,183	-1,403	134	,163	-2222382,353	1583524,000	-5354316,909	909552,203
	Equal variances not assumed			-1,403	131,402	,163	-2222382,353	1583524,000	-5354881,291	910116,585

Figure 2. Hasil analisis t-Test: Paired Two Sample for Means Terhadap Perbedaan Total Biaya Usahatani Padi Sebelum dan Sesudah Penggunaan Dana Desa.

Based on figure 2, it is known that there is no significant difference in production costs between the two groups (before and after the construction of farming roads and irrigation canals using the Village Fund budget). Although the average cost of one of the groups was lower, the difference was not statistically significant at a 95% confidence level. These results are consistent with previous literature highlighting the importance of government investment in the infrastructure sector (Helm, 2010) to improve agricultural cost efficiency (Aenunnisa et al., 2022; Reddy, 2022). Increasing access to infrastructure can reduce production costs in rural areas (Shamdasani, 2021; Wu et al., 2019). The findings in this study reinforce the argument that the allocation of Village Funds focused on the development of critical infrastructure has a direct impact on reducing the production cost of rice farming, while increasing overall efficiency.

Variabel yang Berkontribusi pada Efisiensi Biaya Produksi



The construction of irrigation canals and farming roads has a significant impact on the efficiency of rice farming production costs. Before the development, the total production cost per hectare reached Rp 7,000,000, per hectare, but after the construction the cost decreased by 11.43% to Rp 6,200,000 per hectare. The largest decrease occurred in the irrigation component or water pump which was reduced to 22.22%, because the existence of irrigation channels makes it easier to distribute water, reducing the need for pumps. Land tillage costs have also been reduced by 20%, due to access to farming roads that make it easier to transport tools and materials to land locations. This shows that infrastructure development interventions provide real benefits in increasing the efficiency and productivity of farmers.

Implikasi Kualitatif terhadap Pengelolaan Dana Desa

From the thematic analysis of qualitative data, it was found that the Village Fund program not only provides economic benefits, but also social benefits. Irrigation development, which is one of the main allocations of the Village Fund in Bicak Village, Mojokerto, has brought about a wider positive impact, especially related to the increase in community solidarity and a sense of belonging to the village project. Farmers involved in irrigation construction reported that in addition to reducing labor costs for irrigation, they also felt more responsible for the maintenance of the facility. This jointly managed irrigation project fosters a sense of collective ownership which ultimately leads to stronger collaboration between farmers and village communities. This creates a tighter social network, where mutual assistance in the maintenance and renewal of infrastructure becomes part of the accepted social norm.

Data from interviews with 68 rice farmers involved in the Village Fund program shows that 72% of respondents feel more connected to their fellow farmers and village officials since the irrigation program began. They reported an increase in communication between farmers that was previously limited to market and production affairs. Furthermore, 64% of respondents stated that they cooperate more often in irrigation maintenance activities, which they did not do previously as shown in table 1. These findings are relevant to the concept of sustainable development, which focuses not only on economic aspects but also on social and environmental aspects. Village Fund (Jatmiko, 2020; Simatupang et al., 2021), through the development of infrastructure such as irrigation, plays an important role in creating collective awareness and creating social dynamics that support the maintenance of public facilities. The concept of sustainable development prioritizes the integration of social, economic, and environmental aspects, which is reflected in the active participation of the community in maintaining the facilities they have and feeling the benefits (Amane et al., 2023; Wicaksono et al., 2022).

Good management of Village Funds has also been proven to be able to encourage a paradigm shift from communities that were initially less involved to more proactive, which in turn strengthens the social and economic resilience of village communities. Therefore, the social implications of the Village Fund program can be considered as equally important as the economic benefits generated, creating a more inclusive and sustainable environment.

Table 1. Results of interviews with rice farmers.

Aspects Felt by Farmers	Percentage of Respondents	Description
Increasing Community Solidarity	72%	Farmers feel more connected to other farmers and village officials.
Increased Joint Ownership of Projects	68%	A sense of responsibility for the maintenance of irrigation infrastructure.
Collaboration in Infrastructure Maintenance	64%	Increased cooperation in the maintenance of irrigation and other facilities.
Improved Communication Between Farmers	70%	Communication between farmers is more frequent, related to management and irrigation.
Desire to Participate in Village Projects	61%	Increased participation of farmers in other village projects.

This study makes a significant theoretical contribution by revealing how a community-based approach through Village Fund allocation can improve agricultural efficiency, especially in the context of developing countries. In practical terms, these findings provide important insights for policymakers to optimize the Village Fund and similar programs, emphasizing the importance of transparency, community involvement, and prioritization on the development of basic infrastructure that can directly reduce farmers' production costs. The success of this program not only has an impact on the economic aspect, but also strengthens community solidarity that supports agricultural sustainability.

One of the main limitations of this study is its limited scope to Bicak Village, which may not be representative of the characteristics of other regions in Indonesia. Therefore, further research in different regions with different social and economic backgrounds will be indispensable to expand the generalization of these findings. In addition, long-term studies are needed to evaluate the sustainable impact of the Village Fund program on farmers' well-being and their economic resilience, as well as to explore the potential for policies that can be more effective in the long term.

CONCLUSIONS

This study shows that the Village Fund has a significant role in reducing the production cost of rice farming in Bicak Village, Mojokerto, Indonesia. The use of funds directed to support the provision of agricultural infrastructure, such as irrigation and road access, has proven to be able to increase production efficiency. The results of the analysis indicate that there is a reduction in the cost burden on farmers, especially in the aspect of procurement of production facilities and transportation of crops. In addition, the active participation of the community in the planning and implementation of the Village Fund program also encourages the sustainability of the benefits produced. However, this effectiveness is still influenced by good governance, transparency, and accountability in the use of funds. Thus, optimizing the use of Village Funds through a more integrated and local needs-based approach is the key to improving the welfare of farmers and supporting sustainable agricultural development.

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