ASSESSING THE IMPACT OF THE FARM ROAD PROGRAM ON REDUCING OPERATIONAL COSTS FOR PEPPER FARMERS IN PURBALINGGA REGENCY

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Abstract

This study examines the impact of the Farm Road Program on reducing operational costs for pepper farmers in Purbalingga Regency, Indonesia. The program, a government initiative, was designed to enhance agricultural efficiency by constructing new roads in agricultural areas across 14 districts. These farm roads aim to facilitate better access to markets, inputs, and other essential services, ultimately reducing transportation time and costs for farmers. A key novelty of this research is the inclusion of government policy specifically the program as a variable influencing the operational costs of pepper farming. This study quantitatively evaluates the impact of the program on pepper farmers' expenses. Based on data collected from participating pepper farmers, the findings reveal that the program successfully reduced operational costs by IDR 913,333, representing a 22% decrease compared to pre-program costs. The analysis employed a paired t-test to determine the statistical significance of this reduction. The results of the t-test showed a p-value of less than 0.005 (p = 0.000), indicating that the reduction in operational costs is statistically significant. This finding confirms the effectiveness of the program in achieving its intended goal of reducing farmers' costs and improving their overall agricultural efficiency.In conclusion, the program demonstrates its value as an effective government policy intervention for enhancing the financial sustainability of pepper farmers by lowering operational costs and promoting more efficient farming practices.

Keyword: Cost Reduction, Government Policy, , Pepper Farming

PENDAHULUAN

Agriculture plays a crucial role in providing food and industrial raw materials worldwide. Farmers, the backbone of this sector, face challenges such as high operational costs (Biagini & Severini, 2022; Edjah, Wu, & Tian, 2022; Severini, Zinnanti, Borsellino, & Schimmenti, 2021). Agriculture is the main source of food for society. Agricultural products such as rice, wheat and corn are sources of essential carbohydrates and proteins that support human life. Maintaining the success of the agricultural sector means ensuring sufficient and stable food availability for all people, preventing hunger, and realising national food security. The agricultural sector contributes significantly to the economy of many countries, especially developing countries. Agriculture absorbs a large labour force, especially in rural areas, and helps reduce unemployment. Farmers and agricultural businesses earn income from harvesting and processing agricultural products. Agricultural products such as sugarcane, palm oil, and rubber are processed into raw materials for various industries, such as processed food.

The initiative to construct agricultural roads substantially lowers the operating expenses incurred by farmers. The existence of sufficient agricultural roads facilitates better and quicker access to farms, thus lowering transportation expenses for tools and production supplies, including fertilizers, seeds, and other agricultural implements. Optimal road conditions enable farmers to use

automobiles with superior fuel economy, in contrast to traversing damaged or challenging roads that need more time and incur more costs.

Agricultural roads enhance the distribution of harvests to markets or storage facilities, enabling farmers to minimize crop damage during transit. Efficient transportation routes eliminate farmers' dependence on costly transportation services often necessitated by inadequate road conditions. This enables farmers to sell their crops directly to the market, eliminating middlemen and thereby enhancing their profit margins. The existence of quality agricultural roads decreases operating expenses while enhancing time efficiency and farmer output.

The operational expenses incurred by farmers encompass various elements, such as the acquisition of seeds, fertilizers, and pesticides, alongside the investment in agricultural machinery, labor remuneration, and the upkeep of land. This increase in operational costs can be a serious obstacle to the sustainability of agricultural businesses, especially for small and medium farmers who have limited financial resources (Nitta, Yamamoto, Severini, Kondo, & Sawauchi, 2022),(Barry, Escalante, & Bard, 2001),(Bojnec & Fertő, 2019). One agricultural commodity that requires high operational costs is pepper. Pepper farming requires considerable operational costs, which can reach 20%(Naufal, Krisnamurthi, & Baga, 2022),(Rajabasa Bandar Lampung, 2016). Today, Indonesia is still one of the world's leading pepper producers, with an annual production of around 80,000 tons. Indonesian pepper is widely exported to various countries, especially Europe and America. However, the pepper farming sector in Indonesia still faces several challenges, such as plant disease pests, lack of adoption of modern technology, and fluctuating prices. On the other hand, there are great opportunities to increase the production and quality of Indonesian pepper. The government alongside with various related parties continues to strive to increase pepper productivity. This has been done through farmer counseling, development of superior varieties, and infrastructure development. With joint efforts, it is hoped that pepper farming in Indonesia can return to glory and make a significant contribution to the national economy, especially for the welfare of pepper farmers in various regions in Indonesia.

The Unitary State of the Republic of Indonesia through the ministry of agriculture makes various policies in the agricultural sector, one of which is the Farm Business Road program. The Farm Road Program, abbreviated as , is an infrastructure development program in the form of roads in agricultural areas with the aim of facilitating the mobility of agricultural machinery tools. Production facilities and agricultural production results from and to agricultural land, so as to reduce operational costs incurred by farmers (Direktorat, Prasarana, Sarana, & Pertanian, 2018).

The program, initiated by the Ministry of Agriculture, aims to build roads in agricultural areas to reduce operational costs and improve farmers' incomes (Direktorat et al., 2018). Farmers in Indonesia are faced with the problem of high operational costs such as transportation costs for machinery, fertilizer and laborPurbalingga Regency is one of the districts that implements the Program since 2021 (Direktorat et al., 2018). The program in Purbalingga Regency is implemented in Kejobong sub-district with the majority of agricultural commodities being pepper farming. This program aims to be able to reduce costs and increase the efficiency and income of Purbalingga highland farmers. With the existence of government policy programs that support agricultural infrastructure, it will really help reduce farmers' operational cost(Adamopoulos, 2011; Wang, Martha, Liu, Lima, & Hertel, 2024)

Focused and in-depth research is expected to be able to answer how much impact the program has on improving the welfare of pepper farmers. This study aims to analyze the

impact of the program on reducing operational costs and increasing incomes for pepper farmers in Purbalingga Regency, introducing government policy as a novel variable. Previous research that discussed reducing farmers' operational costs was (Mahendra, Suprapto, & Barima, 2021; Mahendra & Suwarni, 2023). The analysis was conducted by comparing operational costs and farmers' income before the program and after the program, so that its significance could be known. The benefit of the results of this research is that it can be a reference for the government in designing and implementing programs related to agriculture.

RESEARCH METHOD

This research method is quantitative descriptive. The variables analyzed in this study are the Farm Business Road Program, the operational costs of pepper farmers before and after the Farm Road program. The location chosen is the right sub-district where the farm road program is implemented, namely Kejobong District. The selected samples were pepper farmers directly affected by the program.

The selection of responders is done via a process known as purposive sampling selection. The respondents who were chosen are those whose gardens are impacted by farm access roads. Additionally, private garden ownership and land acreage are taken into consideration in order to maintain the integrity of the study. In addition, the age of the plants is taken into consideration when selecting the individuals who will reply to the survey.The farmers selected to be respondents in this study were pepper farmers with the same land ownership, the same land area and the same plant age.

The sampling method continued by focusing on 15 pepper farmers with private land ownership, the area of land owned; 0.9-1 Ha and the age of the pepper plant is 4 years old. The study was conducted from March to April 2024. This study focuses on the analysis of the decrease in operational costs of pepper farmers after the existence of the Farm Business Road. The data analysis method in this study begins with the Normality Test with Kolmogorov Smirnov test, then if the data is normally distributed, a t test will be carried out to see how the significance and difference in operational costs incurred by pepper farmers. To assist researchers in analyzing data, researchers use the help of IBM SPSS software. The SPSS program is used to calculate comparison tests of two averages properly and precisely IBM SPSS software is very commonly used in testing data in research due to its high level of accuracy (Čaplová & Švábová, 2020). The test formula is as follows:

$$t = \frac{\overline{x1} - \overline{x2}}{\sqrt{n1-1+n2-1\left(\frac{1}{n1}+\frac{1}{n2}\right)}}$$

$\overline{x1}$= Average operational costs of pepper farmers before

$\overline{x2}$= Average operational costs of pepper farmers after

n1= Number of samples of pepper farmers before

n2= Number of samples of pepper farmers after

The hypothesis used is H0 = no significant difference while H1 = there is a significant difference, where:

1. If the value (sig.) >0.005, then H0 is accepted, which means that there is no significant difference between the operational costs of pepper farmers before and after the program.
2. If the value (sig.) ≤0.005, then H0 is rejected and H1 is accepted that there is a significant difference between the operational costs of pepper farmers before and after the program.

RESULT AND DISCUSSION

Characteristics Respondent

Table 1. Characteristics Respondent

Characteristics	Category	Sample Size (n=15)	Percentage (%)
Farmers Age	<50 Years Old	3	20
	>50 Years Old	12	80
Plant Age	<4 Years Old	0	0
	>4 Years Old	15	100
Gender	Male	15	100
	Female	0	0
Land Acrage	<0,9 Ha	0	0
	>0,9-1Ha	15	100

As can be observed from the table that is located above, the number of farmers who are younger than fifty years old is just three, which accounts for twenty percent of the whole sample. The low number of young farmers in the Kejobong district and the districts around it is owing to the fact that the younger generation in these areas prefers to engage in commerce in other regions or to relocate to Jakarta in order to find employment. The pepper plants that the farmers have been cultivating have reached a percentage of one hundred percent over the course of four years, which indicates that these plants are currently producing peppers. Due to the fact that males are the ones who own the property and are the ones who cultivate the agricultural fields, the total gender of the farmers is shown as being one hundred percent male. For the purpose of minimizing the potential for study bias brought on by variations in land area, it has been found that land sized between 0.9 and 1 hectare is owned by one hundred percent of the population.

Impact The Farm Business Road Program

The Farm Business Road Program, hereinafter abbreviated as , is a development program of government assistance programs to highland farmers in Indonesia. The government implemented assistance programs to highland farmers in Indonesia for 14 selected districts (Mahendra, Dwi, Kinding, Alfiyya, & Safitri, 2022). The form of this program is the construction of new roads in agricultural areas to increase the efficiency of farmers in running their farms. The Farm Road Program is a form of infrastructure development assistance implemented by the Director General of Facilities and Infrastructure of the Ministry of Agriculture. Agricultural assistance programs from the government can help increase economic growth in remote rural areas (Aker, 2010; de Janvry, Fafchamps, & Sadoulet, 1991; Gelaw, Kassa, Abebaw, Kassa, & Abdelkadir, 2023; Mathenge, Smale, & Tschirley, 2015). It is important to emphasize how this program aligns with broader agricultural policies and goals set by the Ministry of Agriculture

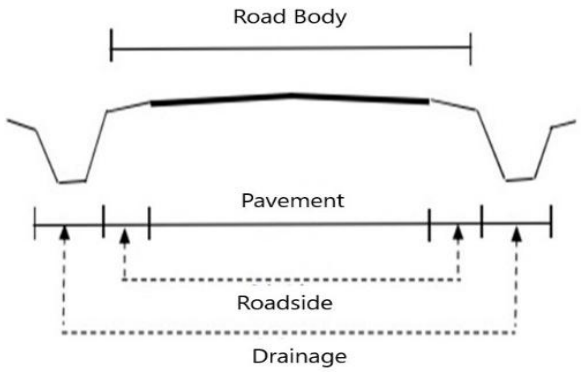

Figure 1. Farm Business Road Sketch Source: Technical Guidelines of the Ministry of Agriculture 2018

Is one of the Ministry of Agriculture's strategic programs that aim to improve accessibility and mobility in agricultural areas. The program focuses on building roads in agricultural areas that connect farmland with village roads, main roads, or markets. Purbalingga government selects villages that will receive assistance from the farm road program based on community aspirations and significant infrastructure needs.

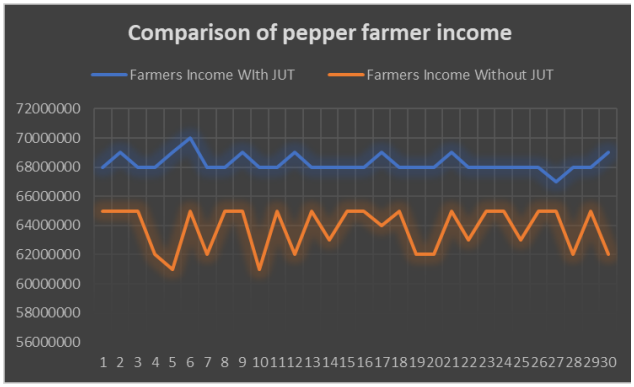

Figure 2. Comparison of pepper farmer income

Source : Primary Data Processed 2024

From the comparison picture above, it appears that the average income of pepper farmers after the program has increased. The increase in pepper farmers' income was influenced by the reduction in operational costs that occurred because farming roads had been built which could increase the efficiency of pepper farmers. The smooth running of the program is certainly not without challenges. The following are the challenges faced by the Purbalingga government in the initial stages of implementing the farming road program (), including lack of funds, limited resources, inadequate communication, inadequate facilities and infrastructure, and poor disposition (Dinkominfo, 2024).

The program is implemented through cooperation between the central government, local governments, and communities. Ministry Of Agriculture provides funds for the construction of , while local governments and communities are responsible for their construction and maintenance. The main goal of the program is to build 3 million kilometers of across Indonesia within 5 years (2020-2024).

In order to see the difference in the average operational costs incurred by pepper farmers, a descriptive analysis was carried out with the following results. Open new business opportunities: can open up new business opportunities in the agribusiness sector, such as transport services and agro-processing. The results of interviews with local farmers stated that there had been an increase in the price of plantation land due to the construction of agricultural roads. According to local farmers, another positive impact of the agricultural road is that it opens up access for farmers to open new land that was previously unproductive land.

After the road infrastructure is built, of course the price of agricultural land there will also increase as the income of pepper farmers increases. Other businesses can also be carried out, such as opening food and drink stalls for pepper farming workers.

	N	Minimum	Maximum	Mean
After	15	2800000	3800000	3340000.00
Before	15	4100000	4500000	4253333.33
Valid N	15			

Source: Primary Data Processed 2024

From table 1, it can be seen that the average operational costs incurred by pepper farmers before were Rp 4,253,333 in 1 hectare for one harvest. With the program, the average operational costs incurred by pepper farmers are IDR 3,340,000 or can be said to decrease by IDR 913,333,-. The program implemented to help farmers has succeeded in reducing the operational costs of pepper farmers by Rp 913,333, - or 22% from before. The construction of is expected to provide several benefits, among others:

Streamlining the transport of production facilities: making it easier for farmers to transport fertilizers, pesticides, seeds, and agricultural machinery (alsintan) to the farm.

Easier transport of harvest: Harvests can be more easily and quickly transported from the farm to the market or processing center.

Lower transport costs: Lower transport costs can increase farmers' profits.

Increased agricultural productivity: Easier access to inputs and markets can increase agricultural productivity.

Modern irrigation systems, farm access roads, and grain storage facilities are examples of agricultural infrastructure development that

significantly supports farmers' operating efficiency. For instance, farmers can minimise output costs by reducing their reliance on costly or inefficient water supplies using an effective irrigation system. Additionally, farmers may transport their harvests more quickly and affordably thanks to the installation of farm access roads. In addition to lowering operating expenses, this infrastructure makes agricultural products more competitive in domestic and global markets.

The development of a more sustainable agricultural ecosystem is also promoted by government initiatives that aid in infrastructural development(Ptacek et al., 2024). For instance, farmers can preserve the quality of their harvest and lower post-harvest losses by having storage warehouses equipped with temperature control systems. As a result, farmers can earn more money while increasing their efficiency and minimising losses. Additionally, this program strengthens national food security and has a positive multiplier effect, generating jobs in the building and infrastructure management industries. The secret to successfully lowering farmers' operational burdens and raising agriculture sector production at the same time is the adoption of uniform regulations that are based on local needs. The reduction in operational costs greatly helps farmers in developing their farming businesses (Asiedu-Ayeh, Zheng, Agbodah, Dogbe, & Darko, 2022; Michels, Bonke, Wever, & Musshoff, 2024; Yang, Liang, Xue, Zhang, & Xue, 2024)(Pendapatan dan Kesejahteraan Petani Kelapa Dalam di Kecamatan Keritang Kabupaten Indragiri Hilir Shorea Khaswarina, Yulida, Rapiqi, & Salamah, 2024). The construction of roads in pepper plantation areas through the program will facilitate farmers' access to various operational needs, such as fertilizers, pesticides, seeds, and agricultural machinery (alsintan). This can save time and transport costs, which have been one of the main components of pepper farmers' operational costs.

The will facilitate the transport of pepper crops from the farm to the market or to the processing centre. This will minimise damage and loss of crops during the transportation process, thereby improving crop quality and maximising farmers' profits. In addition, better logistics efficiency can also help reduce the cost of transporting the harvest. The not only focuses on road infrastructure development, but also opens up new economic opportunities for communities around pepper plantations. The Tanzanian government's policy of focusing on developing agricultural infrastructure has also had a positive impact on reducing operational costs borne by farmers(Mtaturu, 2024). The development of s can encourage the emergence of new businesses in the fields of transport services, logistics, and processing of agricultural products. This can increase community income and contribute to economic growth in rural areas.

The programme is a strategic step that can help pepper farmers reduce operational costs, improve logistics efficiency, and open up new economic opportunities. With optimal and sustainable implementation, the programme is expected to contribute to the improvement of pepper farmers' welfare and the advancement of the pepper farming sector in Indonesia.

The analysis continued on normality testing on both groups of data to see the normal distribution.

Table 3. Normality Test Results

	After	Before
N	15	15
Normal Parameters[a,b]	3340000.00	4253333.33
	252982.213	112546.287
Most Extreme Differences	.197	.282
	.197	.282
	-.194	-.184
Asymp. Sig.	.122[c]	.213[c]

Source: Primary Data Processed 2024

From the table above, you can see the results of asymp. The sig. of both data groups is >0.005 so that both data can be said to be normally distributed. Normality test is

considered important because, the normal distribute data can be test by next parametric test. Parametric test in this study use the t test.
Normality testing was aided by IBM SPSS software with formulas developed by Kolmogorov Smirnov. The accuracy of normality testing with Kolmogorov Smirnov can be accounted for(Boral, Sarkar, & Ghosh, 2023; 'Kolmogorov–Smirnov type testing for structural breaks: A new adjusted-range based self-normalization approach - ScienceDirect', n.d.; Ohunakin et al., 2024).
The next analysis is to see the significance of the decrease in operational costs caused by the program. To see the significance of the decrease in operational costs, a t test was carried out. The t-test can be performed because the normality requirements on the data have been reached.

Tabel 4. Paired t Test Result

	Sig. (2-tailed)
Pair 1 After - Before	.000

Source: Primary Data Processed 2024

The results of the paired t test get a Sig. <0.005 number, which is 0.000 with the interpretation that there is a significant decrease between the operational costs incurred by pepper farmers before and after the program. In the long term, the construction of farming roads is a form of government investment in the agricultural sector in Indonesia. Increasing access for farmers with road infrastructure can certainly reduce transportation costs, harvesting costs and maintenance costs for farmers' gardens.

The reduction in operational costs that must be incurred by pepper farmers will have a positive impact on the development of the farmer-level economy statistically and broad implications for the agricultural community as a whole, such as a positive and significant influence on the welfare of the community in the villages served, improving transportation access in agricultural areas, thus facilitating the mobility of agricultural tools and machinery, increasing economic growth in the areas it passes through, and directly improving community welfare through employment and infrastructure development.

Reducing the cost component incurred by farmers can increase the economic strength of farmer households(Guo, Wang, Meng, Dong, & Gu, 2023; Melendres, Lee, Kim, & Nayga, 2022; Toledo-Hernández et al., 2020)(Reformasi Pertanian Meningkatkan Kemakmuran Petani Indonesia, Zainurossalamia, Widayanti, & Caisar Darma, 2024). Government policies aimed at improving the welfare of farmers are needed to strengthen a country's economy (Adzawla et al., 2024; Liu & Liu, 2024; Quiroga, Suárez, Santos-Arteaga, & Rodrigo, 2024). For Indonesia, where the majority of the population relies on the agricultural sector, government policies in the agricultural sector will greatly impact the improvement of the welfare of Indonesian farmers. Meanwhile, this study proposed the policy recommendations based on the study results that can improve the effectiveness of the program, such as active community participation, cooperation between technical institutions, research, and development to support the program, use of information technology to monitor and manage the program, build adequate infrastructure to support agricultural activities including irrigation, conduct strict supervision and evaluation, provide certificates and awards to managers who perform well in implementing the program. Purbalingga rural farmers are farmers who still maintain the culture of mutual cooperation, so that when there is damage to the farming road they will work together to repair it and even spend personal funds for it.

CONCLUSION

The Farm Road Program is a form of infrastructure development assistance implemented by the Director General of Facilities and Infrastructure of the Ministry of Agriculture. The program implemented to help farmers has succeeded in reducing the operational costs of pepper farmers by IDR

913,333, - or 22% from before. The average operational costs incurred by pepper farmers before were Rp 4,253,333 in 1 hectare for one harvest. With the program, the average operational costs incurred by pepper farmers are IDR 3,340,000 or can be said to decrease by IDR 913,333,-. The results of the paired t test get a Sig. <0.005 number, which is 0.000 with the interpretation that there is a significant decrease between the operational costs incurred by pepper farmers before and after the program. The reduction in operational costs that must be incurred by pepper farmers will have a positive impact on the development of the farmer-level economy.

Suggestion

This study indicates significant advantages from the program aimed at the agriculture industry in Indonesia. Consequently, the proposal is to enhance the network of agricultural access roads and improve road condition by including superior drainage systems.

ACKNOWLEDGMENT

The author express gratitude to Nusa Cendana University for its provision of resources and assistance for the conduct of this study

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UPLAND PROGRAM IN INCREASING THE INCOME OF HIGHLAND FARMERS IN PURBALINGGA REGENCY. *Journal of Agri Socio Economics and Business*, 4(02), 171–180. Retrieved 17 May 2023 from https://doi.org/10.31186/JASEB.04.2.171-180

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