

THE ROLE OF P4S PERMATA HIJAU IN INCREASING HORTICULTURAL FARMERS' PRODUCTION AND INCOME AT DESA NOELBAKI, KECAMATAN KUPANG TENGAH, KABUPATEN KUPANG

(Peran P4S Permata Hijau Dalam Meningkatkan Produksi Dan Pendapatan Petani Hortikultura Di Desa Noelbaki, Kecamatan Kupang Tengah, Kabupaten Kupang)

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ABSTRACT

Pusat Pelatihan Pertanian dan Perdesaan Swadaya (P4S/The Self-Help Agricultural and Rural Training Center) is a farmer-based institution that plays a role in improving farmers' capacity, production, and income. This study aims to analyze the role of P4S Permata Hijau as a facilitator and mediator, calculate horticultural farm income, and examine the relationship between the role of P4S and farmers' production and income in Noelbaki Village, Central Kupang District, Kupang Regency. The research method used was descriptive quantitative with a census technique involving 33 farmer members of P4S. Data were analyzed using a Likert scale, farm income analysis, and the Spearman Rank correlation test. The results show that the role of P4S Permata Hijau is categorized as highly influential, with a score of 83.84%. Horticultural farming, including chili, tomato, watermelon, and melon, generates high income and is feasible to develop, with chili being the most profitable commodity. The correlation test indicates that the facilitator role has a very strong and significant positive relationship with production and income ($r_s = 0.819$; Sig. < 0.05), while the mediator role has a strong and significant positive relationship ($r_s = 0.626$; Sig. < 0.05). In conclusion, P4S Permata Hijau plays an important role in increasing farmers' production and income and supports the development of more productive and sustainable horticultural farming.

Keywords: Horticulture, P4S, facilitator role, mediator role, production, farmer income

ABSTRAK

Pusat Pelatihan Pertanian dan Perdesaan Swadaya (P4S) adalah lembaga berbasis petani yang berperan dalam meningkatkan kapasitas, produksi, dan pendapatan petani. Penelitian ini bertujuan untuk menganalisis peran P4S Permata Hijau sebagai fasilitator dan mediator, menghitung pendapatan pertanian hortikultura, dan menguji hubungan antara peran P4S dengan produksi dan pendapatan petani di Desa Noelbaki, Kecamatan Kupang Tengah, Kabupaten Kupang. Metode penelitian yang digunakan adalah deskriptif kuantitatif dengan teknik sensus yang melibatkan 33 anggota petani P4S. Data dianalisis menggunakan skala Likert, analisis pendapatan pertanian, dan uji korelasi peringkat Spearman. Hasil penelitian menunjukkan bahwa peran P4S Permata Hijau dikategorikan sangat berpengaruh, dengan skor 83,84%. Pertanian hortikultura, termasuk cabai, tomat, semangka, dan melon, menghasilkan pendapatan tinggi dan layak dikembangkan, dengan cabai sebagai komoditas yang paling menguntungkan. Uji korelasi menunjukkan bahwa peran fasilitator memiliki hubungan positif yang sangat kuat dan signifikan dengan produksi dan pendapatan ($r_s = 0,819$; Sig. $< 0,05$), sedangkan peran mediator memiliki hubungan positif yang kuat dan signifikan ($r_s = 0,626$; Sig. $< 0,05$). Kesimpulannya, P4S Permata Hijau memainkan peran penting dalam meningkatkan produksi dan pendapatan petani serta mendukung pengembangan pertanian hortikultura yang lebih produktif dan berkelanjutan.

Kata kunci: Hortikultura, P4S, peran fasilitator, peran mediator, produksi, pendapatan petani

INTRODUCTION

The horticulture sector in Indonesia has a strategic role in supporting food security, job creation, and the improvement of rural community income. Horticultural commodities, such as vegetables and fruits, have high economic value and continuously increasing demand in both domestic and export markets. In 2023, the agricultural sector contributed 13.57% to the national Gross Domestic Product

(Ministry of Finance, 2023), and the horticulture subsector became one of the important drivers because of the upward trend in demand. Nevertheless, horticultural farmers still face various constraints, including limited access to modern agricultural technology, low quality of human resources, limited capital, and weak farmer institutions (Usna et al., 2025).

As one empowerment strategy, the government encourages the establishment of Pusat Pelatihan Pertanian dan Perdesaan Swadaya (P4S/The Self-Help Agricultural and Rural Training Center), which are training institutions established, owned, and managed by farmers for farmers, as stipulated in Regulation of the Minister of Agriculture of the Republic of Indonesia Number 33 of 2016. P4S functions as a facilitator in improving technical skills and farm management knowledge, as well as a mediator that connects farmers with access to technology, markets, financial institutions, and government agencies (Alam et al., 2021).

In addition to functioning as a facilitator and mediator, P4S also has a strategic role in improving farmers' capacity and competence. Through training, demonstration plots, and mentoring, P4S not only enhances farmers' technical knowledge but also develops managerial skills, entrepreneurship, and adaptive attitudes toward technological and market changes. According to Fadila and Raden (2025), strengthening farmers' capacity through P4S has been proven to encourage farmers to become more independent, competitive, and capable of managing farming enterprises sustainably. Thus, the existence of P4S Permata Hijau in Noelbaki Village affects not only production and income improvement but also strengthens the competence of horticultural farmers in facing the challenges of modern agriculture.

At the national level, the number of P4S institutions continues to grow. Data from the Ministry of Agriculture (2021) recorded 1,937 active P4S institutions in Indonesia, with 78 of them located in East Nusa Tenggara Province (NTT). In Kupang Regency, there are 18 P4S institutions, one of which is P4S Permata Hijau, established in 2021 in Noelbaki Village. This P4S was founded by nine active farmers and is led by Mr. Octory Gaspersz, an experienced farmer in agribusiness since 1990. Since its establishment, P4S Permata Hijau has conducted training and mentoring in plant nurseries, horticultural cultivation (chili, watermelon, and rice), and livestock and fisheries management. By 2025, its membership had increased to 33 people, including young people interested in agricultural innovation (Apreliani et al., 2023).

The presence of P4S Permata Hijau demonstrates a concrete effort to strengthen farmers' capacity at the local level. Through training and mentoring, farmers are expected to adopt modern cultivation technologies, improve production efficiency, and expand market access (Ichsan et al., 2024). However, field information indicates that some horticultural farmers in Noelbaki Village have not fully applied the training outcomes, particularly in seedling techniques, fertilization, and business-oriented farm management. Limited capital, low human resource capacity, and limited land ownership also remain obstacles that reduce the optimal impact of P4S Permata Hijau. Therefore, this study is important to further examine the role of P4S Permata Hijau as a facilitator and mediator in increasing the production and income of horticultural farmers in Noelbaki Village. The study is expected to provide empirical evidence on the effectiveness of P4S institutions in empowering farmers and to serve as a basis for the government and relevant stakeholders in formulating institutional strengthening strategies for P4S to support sustainable agricultural development in East Nusa Tenggara.

This study aims to analyze the role of P4S Permata Hijau as a facilitator and mediator in increasing horticultural farmers' production and income in Noelbaki Village, Central Kupang District, Kupang Regency. In addition, this study aims to determine the amount of income obtained from horticultural farming managed by assisted farmers and to analyze the relationship between the role of P4S Permata Hijau and the level of farmers' production and income.

RESEARCH METHODS

This research was conducted at P4S Permata Hijau in Noelbaki Village, Central Kupang District, Kupang Regency. Data collection was carried out for two months, from October to November 2025. The types of data collected included primary and secondary data. Primary data were obtained directly from respondents through interviews based on prepared questionnaires, while secondary data were obtained from agencies and institutions related to this research (Mansoben, 2023). According to

Jailani (2023), the data collection techniques used in this research included surveys, observation, in-depth interviews, and documentation studies.

The research hypotheses were formulated as follows: H0: There is no significant relationship between the role of P4S Permata Hijau and the production and income levels of horticultural farmers in Noelbaki Village, Central Kupang District, Kupang Regency. H1: There is a significant relationship between the role of P4S Permata Hijau and the production and income levels of horticultural farmers in Noelbaki Village, Central Kupang District, Kupang Regency.

The research location was determined purposively, considering that Noelbaki Village has a P4S institution that develops horticultural crops. The respondents were determined using the census method, in which all assisted farmer members were used as research samples, totaling 33 respondents. The measured variables were the role behavior of P4S Permata Hijau as facilitator and mediator, the production and income levels of horticultural farmers, and the relationship between the role of P4S Permata Hijau and farmers' production and income. The role of P4S Permata Hijau was measured using a Likert scale with three scoring categories: score 1 = not playing a role, score 2 = playing a role, and score 3 = playing a very important role. Production and income levels were analyzed using farm income formulas, while the relationship between variables was analyzed using the Spearman Rank correlation.

Measurement of the Role of P4S Permata Hijau

- ✓ Calculating the percentage achievement of the minimum score against the maximum score. The lowest score was 1; therefore, the minimum score percentage was $1/3 \times 100\% = 33\%$.
- ✓ Calculating the percentage achievement of the maximum score against the maximum score. The highest score was 3; therefore, the maximum score percentage was $3/3 \times 100\% = 100\%$.
- ✓ The percentage interval was calculated as the maximum score minus the minimum score ($100\% - 33\% = 67\%$).
- ✓ The interval length in percentage was calculated as the interval divided by the number of categories ($67\%/3 = 22\%$).
- ✓ The index formula used was: $\text{Index} = \text{Total Score} / \text{Highest Score Category} \times 100\%$.
- ✓

Spearman Rank Correlation

To determine the relationship between the role of P4S Permata Hijau and the levels of production and income of horticultural farmers, the data were analyzed using Spearman Rank correlation as follows:

$$r_s = 1 - [6\sum d_i^2 / n(n^2 - 1)]$$

where r_s is the Spearman Rank correlation coefficient, d_i is the difference between each pair of ranks, and n is the number of samples. The significance of r_s was tested using the t statistic:

$$t = r_s \sqrt{[(n - 2) / (1 - r_s^2)]}$$

The decision criteria at a 95% confidence level ($\alpha = 0.05$) were: if $t\text{-count} \geq t\text{-table}$, H_0 is rejected, indicating a significant relationship between the role of P4S Permata Hijau and the production and income levels of horticultural farmers; if $t\text{-count} < t\text{-table}$, H_0 is accepted, indicating no significant relationship.

RESULTS AND DISCUSSION

The Role of P4S Permata Hijau in Increasing Horticultural Farmers' Production and Income The Role of P4S Permata Hijau as Facilitator

Based on the data analysis, the role of P4S Permata Hijau as a facilitator in increasing the production and income of horticultural farmers in Noelbaki Village, Central Kupang District, Kupang Regency, had an average score of 3.0 with a maximum score achievement percentage of 84.2%. Compared with the reference category, this value is classified as "highly influential."

Table 1. Distribution of respondents based on the role of P4S Permata Hijau as facilitator

No.	Category	Maximum Score (%)	Frequency (person)	Percentage (%)
1	Not playing a role	33-55	-	-
2	Playing a role	56-77	7	21.21
3	Playing a very important role	78-100	26	78.78
Total			33	100

Based on Table 1, P4S Permata Hijau was assessed very positively by respondents in carrying out its function as a facilitator. Of the 33 respondents involved, 26 respondents (78.78%) rated the institution in the “playing a very important role” category, while 7 respondents (21.21%) rated it in the “playing a role” category. The findings indicate that P4S Permata Hijau has an important facilitator role in assisting horticultural farmers in Noelbaki Village. This role is reflected in cultivation training for watermelon, melon, tomato, and chili; the provision of agricultural facilities such as seedling houses, sprayers, and demonstration plots; and direct technical assistance in the field.

The Role of P4S Permata Hijau as Mediator

Based on the data analysis, the role of P4S Permata Hijau as a mediator in increasing horticultural farmers' production and income in Noelbaki Village had an average score of 2.5 and a maximum score achievement percentage of 83.6%. Compared with the reference category, this value is classified as “highly influential.” The distribution of respondents based on the role of P4S Permata Hijau as mediator is presented in Table 2.

Table 2. Distribution of respondents based on the role of P4S Permata Hijau as mediator

No.	Category	Maximum Score (%)	Frequency (person)	Percentage (%)
1	Not playing a role	33-55	-	-
2	Playing a role	56-77	8	24.24
3	Playing a very important role	78-100	27	81.81
Total			33	100

Based on Table 2, the role of P4S Permata Hijau as a mediator shows a very positive result. Of the 33 respondents, the majority rated the institution as “playing a very important role,” while others rated it as “playing a role.” The study indicates that P4S Permata Hijau also functions as a mediator by connecting farmers with supporting institutions, including the agricultural office, financial institutions, and markets.

Horticultural Farmers' Revenue and Income

According to Maro and Dewi (2020), revenue or production value is the amount of production multiplied by the production price in rupiah (Rp). Production refers to all activities that create and increase the utility of goods and services. Income is one indicator for measuring the welfare of individuals or communities and is received by households from payments for the use of production factors and other sources. According to Ramadhan et al. (2023), income is the amount received by individuals for their work achievements during a certain period, whether daily, weekly, monthly, or annually.

Revenue and Income of Tomato Farming

Tomato farming analysis was measured through revenue (gross value) and net profit after deducting production costs. Based on the study of seven farmers assisted by P4S Permata Hijau, total revenue was recorded at Rp119,500,000, with total profit reaching Rp104,739,000, or an average

income of Rp6,218,000 per farmer. Although tomatoes have high economic value, production varied significantly between 1,000 and 2,000 kg due to the crop's sensitivity to extreme weather and diseases such as fruit rot and bacterial wilt. These differences strongly depend on the effectiveness of cultivation management applied by farmers. Farmers who applied Integrated Pest Management (IPM), plant staking, and intensive pruning tended to achieve higher yields than farmers who were less optimal in disease control. In this context, technical training and marketing support provided by P4S Permata Hijau play a crucial role in helping farmers increase productivity, reduce costs, and optimize selling prices to maintain the financial sustainability of tomato farming.

Table 3. Average revenue and income of tomato farming

Description	Unit	Quantity	Price	Average
Revenue	Rp/kg	800	10,000	8,000,000
Fixed costs				
a. Land tax	Rp			85,000
b. Equipment depreciation	Rp			392,000
Total fixed costs				477,000
Variable costs				
a. Seed	Gram	15	20,000	300,000
b. Fertilizer	Kg	135	2,000	270,000
c. Pesticide	Liter	3	120,000	360,000
d. Mulch	Meter	250	1,500	375,000
Total variable costs				1,305,000
Total costs				1,782,000
Income				6,218,000
R/C				4.5

Source: Primary data analysis, 2025

Revenue and Income of Chili Farming

Chili is a strategic commodity with high economic value but also high cultivation risk due to its vulnerability to pest attacks such as thrips and diseases such as anthracnose. Therefore, key factors in increasing the income of farmers assisted by P4S Permata Hijau include maintenance intensity, particularly integrated pest management, land sanitation, and consistency of care during the long harvesting period of 80-100 days.

Table 4. Average revenue and income of chili farming

Description	Unit	Quantity	Price	Average
Revenue	Rp/kg	1,000	15,000	15,000,000
Fixed costs				
a. Land tax	Rp			85,000
b. Equipment depreciation	Rp			392,000
Total fixed costs				477,000
Variable costs				
a. Seed	Gram	20	40,000	800,000
b. Fertilizer	Kg	170	2,000	340,000
c. Pesticide	Liter	4	120,000	480,000
d. Mulch	Meter	420	1,500	630,000
Total variable costs				2,250,000
Total costs				2,727,000
Income				12,273,000
R/C				5.5

Source: Primary data analysis, 2025

Revenue and Income of Watermelon Farming

Watermelon is a leading commodity because of its relatively short harvesting period, large fruit weight per plant, and stable market demand. In this study, the analysis also aimed to evaluate the effectiveness of P4S Permata Hijau assistance in helping farmers optimize production inputs and market access.

Table 5. Average revenue and income of watermelon farming

Description	Unit	Quantity	Price	Average
Revenue	Rp/kg	900	8,000	7,200,000
Fixed costs				
a. Land tax	Rp			85,000
b. Equipment depreciation	Rp			392,000
Total fixed costs				477,000
Variable costs				
a. Seed	Gram	15	15,000	225,000
b. Fertilizer	Kg	120	2,000	240,000
c. Pesticide	Liter	3	120,000	360,000
d. Mulch	Meter	200	1,500	300,000
Total variable costs				1,125,000
Total costs				1,125,000
Income				6,075,000
R/C				4.5

Source: Primary data analysis, 2025

Revenue and Income of Melon Farming

Revenue and income analysis of melon farming was used to measure financial feasibility and the efficiency of farmers' resource management.

Table 6. Average revenue and income of melon farming

Description	Unit	Quantity	Price	Average
Revenue	Rp/kg	800	8,000	6,400,000
Fixed costs				
a. Land tax	Rp			85,000
b. Equipment depreciation	Rp			392,000
Total fixed costs				477,000
Variable costs				
a. Seed	Gram	10	30,000	300,000
b. Fertilizer	Kg	110	2,000	220,000
c. Pesticide	Liter	2	120,000	240,000
d. Mulch	Meter	150	1,500	225,000
Total variable costs				985,000
Total costs				1,462,000
Income				4,938,000
R/C				4.4

Source: Primary data analysis, 2025

Analysis of Horticultural Farmers' Revenue and Income (Chili, Tomato, Watermelon, and Melon)

Based on the farm analysis of four horticultural commodities, namely tomato, chili, watermelon, and melon, differences were found in revenue, production costs, income, and farm feasibility. In terms of revenue, chili generated the highest revenue of Rp15,000,000 per farmer from 1,000 kg of production at a selling price of Rp15,000/kg, followed by tomato at Rp8,000,000, watermelon at Rp7,200,000, and melon at Rp6,400,000. In terms of production costs, chili also had the highest cost of Rp2,727,000 due to the intensive use of production inputs, while tomato amounted to Rp1,782,000, melon to Rp1,462,000, and watermelon had the lowest cost at Rp1,125,000. Based on net income, chili provided the highest income of Rp12,273,000, followed by tomato at Rp6,218,000, watermelon at Rp6,075,000, and melon at Rp4,938,000. All commodities were considered feasible because they had R/C ratios greater than 1, with chili having the highest R/C ratio of 5.5, followed by tomato and watermelon at 4.5 each, and melon at 4.4. Thus, chili farming is the most profitable and efficient commodity, followed by tomato and watermelon, while melon, although feasible, provides a relatively lower profit level. Therefore, commodity selection should consider price stability, capital availability, and farmers' management capacity.

Relationship Between the Role of P4S Permata Hijau and Horticultural Farmers' Production and Income

Relationship between the Facilitator Role and Farmers' Production and Income Levels

The Spearman Rank correlation test shows that the relationship between the facilitator role and production and income levels is strong and significant. The correlation coefficient between the facilitator role and production was $r_s = 0.819$ with a significance value of $\text{Sig.} < 0.001$ for 33 respondents. This value indicates that the relationship between the facilitator role and production is positive and very strong. In other words, the better the facilitator role performed by P4S, the more farming production tends to increase. Furthermore, the correlation between the facilitator role and income also showed $r_s = 0.819$ with $\text{Sig.} < 0.001$, meaning that the relationship is positive, very strong, and statistically significant. This indicates that improved facilitator performance is followed by increased farmers' income. Therefore, the facilitator role has a real contribution to increasing horticultural farmers' production and income. Thus, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted.

Relationship between the Mediator Role and Farmers' Production and Income Levels

Based on the Spearman Rank correlation test, the mediator role has a significant relationship with farmers' production and income. The correlation coefficient between the mediator role and production was $r_s = 0.626$ with a significance value of $\text{Sig.} < 0.001$ for 33 respondents. This value indicates that the relationship between the mediator role and production is positive and strong. In other words, the better the mediator role performed, the more farming production tends to increase. Furthermore, the relationship between the mediator role and income also showed a correlation value of $r_s = 0.626$ with $\text{Sig.} < 0.001$, indicating that the relationship is positive, strong, and statistically significant. Therefore, strengthening the role of P4S in a sustainable manner is an important strategy for promoting productive and profitable horticultural farming for farmers.

CONCLUSION AND RECOMMENDATION

Conclusion

- 1) The level of the role of P4S Permata Hijau reached the "highly influential" category (83.84%), indicating that farmers have perceived the benefits of P4S in horticultural farming activities.
- 2) Horticultural farming, namely tomato, chili, watermelon, and melon, provides relatively high revenue and income. Revenue that is greater than production costs indicates that horticultural farming in the research location is feasible and profitable to develop. These horticultural commodities make a real contribution to increasing farmers' income.
- 3) The Spearman Rank correlation test with 33 respondents shows that the facilitator role has a very strong and significant positive relationship with farmers' production and income levels ($r_s = 0.819$; $\text{Sig.} < 0.05$). Meanwhile, the mediator role has a strong and significant positive relationship ($r_s =$

0.626; Sig. < 0.05). This confirms that the more optimal the role of P4S as facilitator and mediator, the higher the production and income of horticultural farmers in Noelbaki Village.

Recommendations

- 1) P4S Permata Hijau should continue strengthening training and mentoring programs that focus on horticultural crop cultivation techniques and farm management. In addition, cooperation with government agencies and financial institutions needs to be improved to expand farmers' access to capital, technology, and markets.
- 2) Assisted farmers are expected to actively participate in P4S Permata Hijau activities to increase production and income and to improve farm recordkeeping, including costs, production, and sales, so that profit and farm efficiency can be evaluated.
- 3) The government should support training facilities and infrastructure, including demonstration plots, postharvest equipment, and seedling houses, as well as financing access for assisted farmers. Collaboration between the Kupang Regency Agricultural Office and P4S should also be strengthened in providing subsidized fertilizers, seeds, and continuous technical guidance.

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