

ANALYSIS OF RICE FARMERS' RESPONSE TO THE USE OF COMBINE HARVESTER MACHINES IN RICE CROPS AT KECAMATAN KUPANG TIMUR, KABUPATEN KUPANG
(Analisis Respon Petani Padi Terhadap Penggunaan Mesin Panen Kombinasi Pada Tanaman Padi Di Kecamatan Kupang Timur Kabupaten Kupang)

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ABSTRACT

This study aims to analyze rice farmers' responses to the use of combine harvester machines in Kecamatan Kupang Timur, Kabupaten Kupang. Using a descriptive quantitative approach, data were collected through a Likert-scale survey involving 84 farmers in Desa Oesao and Desa Naibonat. This study measures two main dimensions of farmers' response, namely knowledge level and attitude toward the use of combine harvesters. The results show that farmers' responses were highly positive, with 76.20% of respondents strongly agreeing and 23.80% agreeing with the use of the machine. Farmers had good understanding of the machine's functions, benefits, and operational advantages, although several technical aspects were still understood at a moderate level. Farmers' attitudes were also highly positive, particularly regarding time efficiency, reduced harvest losses, and reduced labor requirements. Factors influencing farmers' responses included age, education level, farming experience, non-formal training, and land size. This study recommends strengthening training programs, increasing access to mechanization services, and optimizing the role of farmer groups to support broader and more sustainable technology adoption.

Keywords: Combine Harvester, Agricultural Mechanization, Farmer Response, Rice Farming.

ABSTRAK

Penelitian ini bertujuan untuk menganalisis respons petani padi terhadap penggunaan mesin pemanen kombinasi (*combine harvester*) di Kecamatan Kupang Timur, Kabupaten Kupang. Dengan menggunakan pendekatan kuantitatif deskriptif, data dikumpulkan melalui survei berskala Likert yang melibatkan 84 petani di Desa Oesao dan Desa Naibonat. Penelitian ini mengukur dua dimensi utama respons petani, yaitu tingkat pengetahuan dan sikap terhadap penggunaan mesin pemanen kombinasi. Hasil penelitian menunjukkan bahwa respons petani sangat positif; sebanyak 76,20% responden menyatakan sangat setuju dan 23,80% menyatakan setuju terhadap penggunaan mesin tersebut. Petani memiliki pemahaman yang baik mengenai fungsi, manfaat, dan keunggulan operasional mesin, meskipun beberapa aspek teknis masih dipahami pada tingkat sedang. Sikap petani juga sangat positif, terutama terkait efisiensi waktu, pengurangan kehilangan hasil panen, dan berkurangnya kebutuhan tenaga kerja. Faktor-faktor yang memengaruhi respons petani meliputi usia, tingkat pendidikan, pengalaman bertani, pelatihan non-formal, dan luas lahan. Penelitian ini merekomendasikan penguatan program pelatihan, peningkatan akses terhadap layanan mekanisasi, serta optimalisasi peran kelompok tani guna mendukung adopsi teknologi yang lebih luas dan berkelanjutan.

Kata kunci: mesin panen kombinasi, mekanisasi pertanian, respons petani, usahatani padi

INTRODUCTION

In the national economy, the agricultural sector plays a role as a producer of food, a provider of raw materials for the industrial sector, a source of foreign exchange, a source of investment, and a supplier of labor. Lowland rice is a crop generally cultivated by many rural households. For most of Indonesia's population, rice farming products are a very important commodity because of their function as a staple food and source of calories. Demand for rice production indirectly affects other food commodities (Mamondol & Sabe, 2016). Rice production in 2024 declined, as the harvested area of rice reached approximately 10.05 million hectares,

decreasing by 167.57 thousand hectares or 1.64% compared with the harvested area in 2023, which was 10.21 million hectares. Thus, rice production in 2024 amounted to 53.14 million tons of GKG (Gabah Kering Giling), decreasing by 838.27 thousand tons or 1.55% compared with rice production in 2023, which amounted to 53.98 million tons of GKG (BPS NTT, 2024).

Rice production in Nusa Tenggara Timur (NTT) in 2024 declined due to reduced harvested area and extreme weather conditions, which were also influenced by land conversion and extreme climate conditions. The impact of the decline in rice production in NTT in 2024 was estimated at 7.81%. This condition will affect food consumption, particularly rice, among the population of NTT in 2024, which decreased to 7.81 percent. Therefore, the solution that can be implemented is to address climate change by improving more efficient agricultural technologies and practices, as well as collaboration among the government, farmers, and business actors in the agricultural sector, because the decline in rice and rice-grain production in NTT needs attention in order to strengthen food security in the region (BPS NTT, 2024).

Agricultural rice production in this region is relatively high. The area of lowland rice fields in Kabupaten Kupang in 2021 was approximately 16,498 ha, in 2022 approximately 15,479 ha, and in 2023 approximately 18,609 ha. During the last five years from 2019 to 2023, the highest rice production occurred in 2023 with production of 83,408 tons. According to BPS NTT data, the harvested area of rice in NTT in 2024 was predicted to decrease to 167.83 ha. This decline was estimated to be caused by extreme weather conditions and land-use conversion (BPS Kabupaten Kupang, 2023). Harvesting is a strategic effort to increase rice production. The contribution of the harvesting system to increasing rice production can be reflected in reduced harvest losses and the achievement of grain or rice quality. Harvesting is an activity carried out to collect crop yields, starting from cutting rice plants to threshing the grain.

The use of combine harvesters in the harvesting process can not only reduce rice grain losses during harvesting but also make harvest time more efficient and expand the harvestable area. The working capacity of the combine harvester is higher than manual harvesting, and yield losses are also lower, namely 2.4–6.1%, compared with manual methods that produce average yield losses of up to 9.4% (Listiana et al., 2020). The results of Hendayana (2019) stated that farmers' responses at the attitude/decision level toward the use of combine harvesters were in the high to very high category. This indicates that farmers are highly responsive to the use of this machine because they believe in the benefits that will be obtained from its use, and some of them have already experienced these benefits. However, it is also possible that some farmers still choose to harvest rice manually because they consider it still feasible and have other supporting factors. Therefore, some farmers' decisions remain balanced between using combine harvesters and continuing manual harvesting.

The purpose of this article is to analyze rice farmers' responses to the use of combine harvesters in Kecamatan Kupang Timur, Kabupaten Kupang, viewed from the aspects of farmers' knowledge and attitudes, and to identify the factors influencing these responses, including age, education level, farming experience, non-formal education, and land size. The analysis results are expected to provide an objective description of farmers' acceptance level of harvesting mechanization technology and to serve as consideration for the government, agricultural extension workers, and related stakeholders in formulating policies and developing effective and sustainable agricultural mechanization.

METHODS

This research was conducted in Kecamatan Kupang Timur, Kabupaten Kupang. Farmers at the research location generally carry out rice farming using combine harvesters. The research was conducted during April and May.

The population in this study consisted of rice farmers in Kecamatan Kupang Timur, Kabupaten Kupang, covering two Desa, namely Desa Oesao and Naibonat, with a population sample frame of 500. Therefore, to determine the sample size in this study, the Slovin formula was used as follows:

$$n = N / [1 + N(e)^2]$$

Where:

n = the number of samples sought;

N = population size;

e = margin of error of the population size (10%).

$$\begin{aligned}
 n &= 500 / [1 + 500(10\%)^2] \\
 &= 500 / [1 + 500(0.01)^2] \\
 &= 500 / [1 + 500(0.01)] \\
 &= 500 / (1 + 5) \\
 &= 500 / 6 \\
 &= 84
 \end{aligned}$$

Thus, based on the Slovin formula calculation, the result was 83.333, which means that the researcher needed 83.33 samples for this study, rounded up to 84 respondents.

Data Collection Methods

The research method applied in this study was descriptive quantitative research, with data obtained from field survey activities and the collection of several literatures from related parties as well as several references used as the basis for analysis and calculation. The farming survey was conducted by distributing questionnaires containing a list of questions to respondents that had been prepared beforehand. The data collection techniques used in this study were:

1. Observation, namely a data collection technique carried out by directly observing activities conducted by respondents. Observation was conducted to directly observe the use of combine harvesters by farmers.
2. Interview, namely a direct data collection technique in the form of question-and-answer sessions with respondents. The instrument used in this activity was a list of questions (questionnaire) as an interview guide.
3. Literature study, namely a data collection technique sourced from books, journals, and research results related to this study.

Data Analysis Method

According to Kinnear and Husein Umar (2009), the Likert scale is related to statements about a person's attitude toward something, for example agree-disagree, like-dislike, and good-not good. This study used a Likert scale with intervals of 1–5.

For the first objective regarding farmers' responses to the use of combine harvester machines, the analysis used to determine farmers' responses to the use of combine harvesters was descriptive analysis using Likert-scale scores to see farmers' responses in using combine harvesters. Respondents' responses were classified into five classes, namely:

1. Strongly agree with a score of 5;
2. Agree with a score of 4;
3. Moderately agree with a score of 3;
4. Less agree with a score of 2;
5. and disagree with a score of 1.

The score value of each response is:

$$1:5 = 1/5 \times 100\% = 20\%$$

$$2:5 = 2/5 \times 100\% = 40\%$$

$$3:5 = 3/5 \times 100\% = 60\%$$

$$4:5 = 4/5 \times 100\% = 80\%$$

$$5:5 = 5/5 \times 100\% = 100\%$$

For the second objective, to determine the factors considered by rice farmers in using combine harvesters as rice harvesting equipment in Kabupaten Kupang, the frequency value of each question was calculated using the following formula:

$$F = T \times P_n$$

Where: T = total number of respondents;

P_n = selected Likert score value.

The formula for calculating the ideal score is as follows:

$$\text{Ideal Score} = \text{Highest Score} \times \text{Number of Respondents}$$

Formula for calculating percentage (%):

$$\text{Percentage (\%)} = \text{Total score} / \text{Ideal score} \times 100$$

Formula for calculating the Likert-scale assessment interval:

$$\text{Interval} = 100 / \text{Number of score levels}$$

Then, the Likert-scale assessment interval was converted into the following criteria levels:

1. Very responsive/very high with a percentage range of 84–100%;
2. Responsive/high with a percentage range of 68–83%;
3. Moderately responsive/moderate with a percentage range of 52–67%;
4. Less responsive/low with a percentage range of 36–51%;
5. and not responsive/very low with a percentage range of 20–35%.

RESULTS AND DISCUSSION

The climate in Kabupaten Kupang, as in other places in Indonesia, consists of only two seasons, namely the dry season and the rainy season. In general, from June to September, wind currents originate from Australia and contain little water vapor, causing the dry season. Conversely, from December to March, wind currents contain a large amount of water vapor originating from Asia and the Pacific Ocean, resulting in the rainy season. The boundaries of Kabupaten Kupang are as follows:

1. East: Kabupaten TTS and Ambeno/Timor Leste
2. West: Kabupaten Rote Ndao and the Sawu Sea
3. North: Sawu Sea, Ombai Strait
4. South: Indian Ocean

The number of kecamatan in Kabupaten Kupang is 24, and one of them is Kecamatan Kupang Timur. Kecamatan Kupang Timur is a Kecamatan in Kabupaten Kupang, Provinsi Nusa Tenggara Timur. The capital of this Kecamatan is Kabupaten Kupang. The area of Kecamatan Kupang Timur is 160.99 km², and the maize commodity area cultivated in Kecamatan Kupang Timur is 2,651.4 hectares. The population of Kecamatan Kupang Timur is 32,585 people. Kecamatan Kupang Timur has 4 kelurahan and 8 desa. The boundaries of Kecamatan Kupang Timur are as follows: the northern part borders Kecamatan Sulamu and Kecamatan Fatuleu Tengah, the eastern part borders Kecamatan Fatuleu and Kecamatan Amabi Oefeto, the southern part borders Kecamatan Amarasi and Kecamatan Taebenu, and the western part borders Kupang Bay. Kelurahan Oesao is one of the kelurahan in Kecamatan Kupang Timur, Kabupaten Kupang. Maize farming is the main agricultural activity cultivated by farmers in Kelurahan Oesao.

Respondent Characteristics

a) Farmers' Age

The study by Wanda Aulia et al. (2025) shows that age influences the decision to use combine harvesters, where younger farmers are more open to trying modern technology because they consider efficiency, harvest time, and labor reduction. In the context of this study, most respondents were within the productive age range, supporting the high positive response to the use of combine harvesters.

Table 1. Number of Respondents Based on Age in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

No	Age	Number (Persons)	Percentage (%)
1	23 – 32	13	16%
2	33 – 42	16	20%
3	43 – 52	29	35%
4	53 – 62	25	29%
5	63 – 72	1	1%
Total		84	100

Source: Primary Data After Processing, 2025

Respondents who used combine harvesters at the research location showed that the 43–52 year age group had the highest percentage, namely 35%, because the age range of 43–52 years is considered an ideal period for farming, while the 63–72 year age group had the lowest percentage, namely 1%.

b) Education Level

Table 2. Respondents' Education Level in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

No	Education Level	Number (Persons)	Percentage (%)
1	No Schooling	11	13.10
2	Elementary School	32	38.10
3	Junior High School	15	17.86
4	Senior High School	25	29.76
5	Bachelor's Degree	1	1.19
Total		84	100%

Source: Primary Data After Processing, 2025

Based on respondent data, the distribution of formal education levels among farmer respondents in Desa Oesao and Naibonat was dominated by elementary school graduates, totaling 32 persons with a percentage of 38.10%. The smallest number of respondents was at the bachelor's degree level, with 1 person or 1.19%; furthermore, respondents with junior high school education totaled 15 persons or 17.86%, respondents with senior high school education totaled 25 persons or 29.76%, and respondents who had not attended school totaled 11 persons or 13.10%.

Factors Influencing Farmers' Responses

a) Farming Experience

Farmer respondents in Desa Oesao and Naibonat showed that farming experience of 13–22 years had the highest percentage, namely 33%, while farming experience of 43–52 years had the lowest percentage, namely 3%. Thus, farming experience greatly influences farmers in carrying out farming activities. Research by Soekartawi (2002) states that experience greatly affects farmers' mindsets and decision-making in facing various challenges in the field. More experienced farmers tend to have better technical skills, understand climate patterns, and are able to manage risks more effectively. Soekartawi's theory (2020) shows that the majority of farmers have farming experience in the range of 7–8 years with the highest percentage of 54.71%, while farming experience of 0–5 years has the lowest percentage of 38%. Thus, farming experience greatly influences farmers in conducting farming activities.

c) Land Size

According to Ardiansyah (2020), the use of combine harvesters can reduce harvesting costs by up to 30% compared with manual harvesting methods or stationary threshing machines. The larger the land managed, the greater the efficiency benefits felt by farmers, thereby encouraging a high level of acceptance of this technology. In this study, farmers with larger land areas showed a more positive response to the use of combine harvesters because of their need to accelerate harvest time and optimize operational costs.

Table 3. Respondents' Land Size in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

No	Land Size (Ha)	Number (Persons)	Percentage (%)
1	0.6 – 1.4	18	22%
2	1.5 – 2.2	14	16%
3	2.3 – 2.9	16	19%
4	3.0 – 3.7	2	2%
5	3.8 – 4.5	34	41%
Total		84	100

Source: Primary Data After Processing, 2025

The largest land-size category, namely 3.8–4.5 hectares, was the group with the highest number of respondents, totaling 34 persons or approximately 41% of total respondents. This largest percentage explains that many farmers own relatively large land areas, making their need for mechanization, such as the use of combine harvesters, increasingly important to support harvest labor efficiency. The land-size category of 0.6–1.4 hectares was in the next position with 18 respondents or 22%. This indicates that some farmers still manage small-scale

land, although the number is not as large as the widest land group. The 2.3–2.9 hectare category had 16 respondents or 19%, and the 1.5–2.2 hectare category had 14 respondents or 16%. Both categories indicate that a considerable number of farmers are in a representative medium land-size category. Meanwhile, the 3.0–3.7 hectare category had the fewest respondents, namely only 2 persons or about 2%. This means that only a small number of farmers belonged to this land-size group.

Factors Considered by Rice Farmers Regarding the Use of Combine Harvesters as Rice Harvesting Equipment in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

Response is the way a person reacts to something as a result of a particular stimulus. The differences between the use of combine harvesters and manual harvesting constitute one of the factors considered by rice farmers regarding the use of combine harvesters as follows:

a) Combine Harvester Machine

The use of combine harvesters integrates the entire harvesting process into one stage of work. This machine is able to cut, thresh, and clean grain simultaneously, so work that is usually carried out by many people can be completed by one operator and several technical assistants. By using a combine harvester, harvesting on 1 hectare of land can usually be completed in only 1–2 hours using 3 workers consisting of 1 driver and 2 assistants.

b) Manual Harvesting

Manual harvesting is highly significant because mechanization makes the harvesting process much slower. In the manual harvesting method, farmers must carry out several stages separately—cutting rice plants, tying, transporting, threshing, and cleaning grain. Each stage requires a large amount of labor and a relatively long time. Generally, manual harvesting on 1 hectare of land can take 2–3 days and require 8–12 workers, or even longer if labor is limited or weather conditions are unfavorable.

In addition, there are three ways in which reactions can be expressed: as a level of knowledge (understanding) and as an attitude (interest). The responses of rice farmers in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang, toward the use of combine harvesters, paying for or being too expensive to buy the offered product.

Table 4. Response at the Knowledge Level (Understanding) of Farmers in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

No	Knowledge Indicator (Understanding)	Score	Percentage	Criteria
1	Information on combine harvester service providers	389	77.8%	Responsive
2	Combine harvester rental cost	339	67.8%	Moderate
3	The use of combine harvesters can reduce harvest losses	402	80.4%	Responsive
4	Combine harvesters can save harvesting process time	328	65.6%	Moderate
5	The role of government or the private sector related to the use of combine harvesters	419	83.8%	Very Responsive

Source: Primary Data After Processing, 2025

Based on the research results, farmers' responses at the knowledge level (understanding) toward the use of combine harvesters in Desa Oesao and Desa Naibonat were categorized from moderate to very responsive. Farmers understood the existence and working system of combine harvester services, with a percentage of 77.8 percent (responsive). Understanding of machine rental costs was in the moderate category (67.8 percent), indicating that farmers generally knew the cost level but not in depth. Most farmers also understood that the use of combine harvesters does not reduce yields, and can even minimize yield losses, with a percentage of 80.4 percent (responsive). Understanding related to harvesting time efficiency was in the moderate category (65.6

percent), influenced by field conditions and machine availability. Meanwhile, the roles of government and the private sector in supporting the use of combine harvesters were very well understood by farmers, with a percentage of 83.8 percent (very responsive).

Table 5. Response Based on Farmers' Attitudes (Interest) in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

No	Indicator of Farmers' Attitudes (Interest)	Score	Percentage	Criteria
1	Farmers' response to the presence of combine harvester service users in Kecamatan Kupang Timur	364	72.8%	Responsive
2	Farmers' response to the benefits of using combine harvesters	386	77.2%	Responsive
3	Farmers' response to the existence of combine harvesters	400	80%	Responsive

Source: Primary Data After Processing, 2025

Based on the indicators of farmers' attitudes (interest), farmers' responses to the use of combine harvesters in Kecamatan Kupang Timur were generally in the responsive category. Farmers' response to the presence of combine harvester service users obtained a percentage of 72.8 percent, indicating farmers' interest in the availability of modern harvesting services in the region. The response to the benefits of using combine harvesters reached 77.2 percent, reflecting farmers' positive attitudes toward the efficiency and advantages obtained from using this technology. Meanwhile, the response to the existence of combine harvesters obtained the highest percentage of 80 percent, indicating an increasingly good level of acceptance and interest among farmers toward modern harvesting technology.

Then, the Likert-scale assessment interval was converted into the following criteria levels:

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3. Moderately responsive/moderate with a percentage range of 52–67%;
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b) Education Level

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c) Land Size

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Table 8. Respondents' Land Size in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

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b) Manual Harvesting

Manual harvesting is highly significant because mechanization makes the harvesting process much slower. In the manual harvesting method, farmers must carry out several stages separately—cutting rice plants, tying, transporting, threshing, and cleaning grain. Each stage requires a large amount of labor and a relatively long time. Generally, manual harvesting on 1 hectare of land can take 2–3 days and require 8–12 workers, or even longer if labor is limited or weather conditions are unfavorable.

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No	Knowledge Indicator	Score	Percentage	Criteria
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	(Understanding)			
1	Information on combine harvester service providers	389	77.8%	Responsive
2	Combine harvester rental cost	339	67.8%	Moderate
3	The use of combine harvesters can reduce harvest losses	402	80.4%	Responsive
4	Combine harvesters can save harvesting process time	328	65.6%	Moderate
5	The role of government or the private sector related to the use of combine harvesters	419	83.8%	Very Responsive

Source: Primary Data After Processing, 2025

Based on the research results, farmers' responses at the knowledge level (understanding) toward the use of combine harvesters in Desa Oesao and Desa Naibonat were categorized from moderate to very responsive. Farmers understood the existence and working system of combine harvester services, with a percentage of 77.8 percent (responsive). Understanding of machine rental costs was in the moderate category (67.8 percent), indicating that farmers generally knew the cost level but not in depth. Most farmers also understood that the use of combine harvesters does not reduce yields, and can even minimize yield losses, with a percentage of 80.4 percent (responsive). Understanding related to harvesting time efficiency was in the moderate category (65.6 percent), influenced by field conditions and machine availability. Meanwhile, the roles of government and the private sector in supporting the use of combine harvesters were very well understood by farmers, with a percentage of 83.8 percent (very responsive).

Table 10. Response Based on Farmers' Attitudes (Interest) in Desa Oesao and Desa Naibonat, Kecamatan Kupang Timur, Kabupaten Kupang

No	Indicator of Farmers' Attitudes (Interest)	Score	Percentage	Criteria
1	Farmers' response to the presence of combine harvester service users in Kecamatan Kupang Timur	364	72.8%	Responsive
2	Farmers' response to the benefits of using combine harvesters	386	77.2%	Responsive
3	Farmers' response to the existence of combine harvesters	400	80%	Responsive

Source: Primary Data After Processing, 2025

Based on the indicators of farmers' attitudes (interest), farmers' responses to the use of combine harvesters in Kecamatan Kupang Timur were generally in the responsive category. Farmers' response to the presence of combine harvester service users obtained a percentage of 72.8 percent, indicating farmers' interest in the availability of modern harvesting services in the region. The response to the benefits of using combine harvesters reached 77.2 percent, reflecting farmers' positive attitudes toward the efficiency and advantages obtained from using this technology. Meanwhile, the response to the existence of combine harvesters obtained the highest percentage of 80 percent, indicating an increasingly good level of acceptance and interest among farmers toward modern harvesting technology.

CLOSING

Conclusion

Based on the research conducted on 84 rice farmer respondents in Desa Oesao and Naibonat, Kecamatan Kupang Timur, the following conclusions were obtained:

1. Farmers' responses to the use of combine harvesters were classified as high, both in terms of knowledge and attitude. Most farmers understood the functions, benefits, and efficiency of this machine in the harvesting process, particularly in saving harvest time and reducing harvest losses. Farmers' responses to the use of

combine harvesters were very positive. A total of 76.20% of farmers stated that they strongly agreed, and 23.80% stated that they agreed with the use of this machine. This indicates that the majority of farmers have a high level of acceptance of this technology because it is considered helpful in saving harvest time, reducing yield losses, and decreasing dependence on human labor.

2. Factors influencing farmers' responses include age, formal education, and non-formal education. Farmers with sufficient farming experience and large land areas tend to be more open to the use of this machine. Factors considered by farmers in using combine harvesters include: harvest time efficiency; reduction of harvest losses; savings in labor costs; the size of land managed; and farming experience and access to information or extension services.

Suggestions

1. Extension and training for farmers regarding the use, maintenance, and long-term benefits of combine harvesters need to be improved by agricultural extension workers and related agencies.
2. Support from the government and private sector, whether in the form of equipment subsidies, easier rental access, or technical assistance, is highly necessary to encourage more equitable technology adoption among farmers, particularly those with large land areas.

REFERENCES

- Aulia, W., Widiyantono, D., & Utami, D. P. (2025). Keputusan Petani dalam Penggunaan Mesin Combine Harvester di Desa Wonoboyo Kecamatan Ngombol Kabupaten Purworejo. *Surya Agritama: Jurnal Ilmu Pertanian dan Peternakan*, 14(1).
- Boy, D., dkk. (2024). Analisis Produktivitas Petani Menggunakan Mesin Combine Harvester. *Jurnal Inovasi Pertanian*, 10(2), 78–89.
- Badan Pusat Statistik Kabupaten Kupang. 2023. Kabupaten Kupang Dalam Angka. Kupang.
- Badan Pusat Statistik Provinsi NTT. 2024.
- Fatimah, U., dkk. (2024). Pengaruh Penggunaan Mesin Combine Harvester terhadap Efisiensi Panen Padi di Indonesia. *Jurnal Teknologi Pertanian Modern*, 12(1), 45–55.
- Hendayana, R. 2019. Persepsi dan adopsi teknologi: landasan teoritis dan praktik pengukuran. Jakarta IAARD Press.
- Husein Umar. 2009. Metode Penelitian Untuk Skripsi dan Tesis Bisnis. Jakarta: Rajawali Persada.
- Listiana, I., & Ranga, K. (2020). Respons Petani terhadap Penggunaan Combine Harvester pada Waktu Panen Padi Sawah di Kabupaten Pringsewu Provinsi Lampung. *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian*, 23(3), 259–269.
- Londa, V., Kase, A., & Manu, S. (2021). Respon Petani terhadap Penggunaan Combine Harvester dalam Meningkatkan Efisiensi Panen di Wilayah Indonesia Timur. *Jurnal Teknologi Pertanian*, 12(2), 78–85.
- Mamondol M. dan F. Sabe. (2016). Pengaruh Luas Lahan Terhadap Penerimaan, Biaya Produksi, Dan Pendapatan Usahatani Padi Sawah Di Desa Toinasa Kecamatan Pamona Barat. *Jurnal Ilmu Sosial dan Ilmu Politik* Vol. 10(3): 267–294.
- Soekartawi. (2002). Prinsip Dasar Ekonomi Pertanian. Jakarta: RajaGrafindo Persada.