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Effect of Paddy Price on the Income of Rice Farmers in Kiaea Village in Southeast Sulawesi

Rahmat Hidayat[1], Bahari Bahari[2], Haji Saediman[3*], Agustono Slamet[4]
[1,2,3,4]*Department of Agribusiness, Faculty of Agriculture, Halu Oleo University, Kendari, Indonesia*

***Abstract*: This study examines how paddy (unhusked rice) prices influence the income of rice farmers in Kiaea Village, South Konawe District, Southeast Sulawesi, Indonesia. A survey of 39 rice farmers (out of 351 total farmers in the village) was conducted using simple random sampling. Data were collected through direct interviews with farmers using structured questionnaires. Descriptive income analysis was combined with multiple linear regression to evaluate the effect of the current year's farm-gate paddy price and the previous year's price on farmers' income. The results show that the average production per farmer was around 6.2 tons of paddy per planting season, yielding the mean net income of about IDR 24,831,686 per season. Regression analysis indicates that paddy price variables jointly have a statistically significant impact on farm income. In particular, the previous year's paddy price had a positive and significant influence on farmers' income, while the current year's price showed no significant effect. These findings imply that farmers make production decisions based on expected prices (as reflected by the prior year's price), and that sustained improvements in farm income may require stable or rising paddy prices before planting. The government's floor price policy for paddy appears to motivate increased production and can enhance farmer incomes, but complementary measures are needed to address the many other factors affecting income.**

***Keywords*: effect, income, paddy, price, rice.**

1. Introduction

Rice is the most strategic agricultural commodity, serving as the staple food for the majority of Indonesians [1]-[3] and a key source of employment and income in rural areas [4]. Because of its importance, the welfare of rice farmers is a major concern in Indonesia's development initiatives [5]. Unfortunately, many paddy farmers continue to have only modest welfare levels [6], [7]. A recent study noted that the average household income from farming accounts for only about 30% of total family income among paddy farmers, indicating that their farm earnings are often insufficient [4]. Various factors such as limited landholding size, rising costs of inputs, and inefficiencies in production and marketing contribute to this situation [4], [7], [8]. Moreover, the structure of the rice market tends to disadvantage farmers as they have low bargaining position and paddy is typically sold through multiple intermediaries [4], [9]. There is a considerable gap between the farm-gate price of paddy and the retail price of rice, meaning that low prices at the farm level significantly reduce farmers' incomes. As the prices of basic necessities continue to rise, depressed farm-gate prices undermine farmers' purchasing power and overall welfare [4]. Ensuring remunerative prices for producers is therefore critical for improving the livelihoods of rice farmers and sustaining their motivation to produce this staple crop.

One of the key determinants of farmer income is the price received for their agricultural products. In the context of rice farming, the paddy price (price of unhusked rice at the farm level) directly affects farmers' revenues [10]. A higher selling price per kilogram of paddy, all else being equal, will increase a farmer's income, whereas low prices at harvest can push farm income below subsistence levels [11]. Indeed, ensuring farmers receive a fair price is often seen as essential to rural welfare. Governments frequently intervene in grain markets to stabilize or support prices for this reason [12], [13]. In Indonesia, the government maintains a floor price policy, known as the Government Purchasing Price (*Harga Pembelian Pemerintah*, HPP), whereby the state logistics agency intervenes to buy paddy at a minimum price during the main harvest season [14], [15]. The aim of this policy is to prevent farm-gate prices from falling too low at harvest and thereby protect farmers' incomes. If market prices drop below the floor, the government purchases the excess supply at the HPP to increase the price. This policy reflects the broader principle that farmers should earn a price sufficient to cover production costs and a reasonable margin [13], [16].

Despite these interventions, paddy prices in Indonesia can still be volatile and often dip during harvest time [17]. Such seasonal price fluctuations mean that farmers' income may rise and fall unexpectedly, contributing to income instability and uncertainty in the agricultural sector. Indeed, farmer welfare is often closely linked to these price dynamics; when paddy prices are depressed at harvest, farmers' profits shrink, exacerbating rural poverty, whereas better prices can improve their economic situation. Recent official data in South Konawe Regency show a modest upward trend in paddy prices over the past few years; the average farm-gate price of dry unhusked rice (*Gabah Kering Giling*, GKG) increased from about IDR 4,870 per kg in 2020 to IDR 4,953 per kg in 2022. While this increase is relatively small (around 1.7%), it indicates efforts to improve price levels for farmers. The core question, however, is how strongly such price changes translate into farmers' actual

*Corresponding author: saediman@yahoo.com

incomes.

Prior research on the relationship between rice prices and farmer welfare has yielded mixed findings. Lestari [18], for example, identified paddy price as one of the key factors influencing the well-being of rice farmers in Laba Village, Masamba District, suggesting that higher selling prices tend to improve farmers' welfare. On the other hand, Gapari [19] found that an increase in rice prices did not significantly improve the welfare of farmers in Sukaraja Village. In Gapari's study, although a minority of tenant farmers reported higher incomes after a rice price hike, the majority of land-owning farmers saw their net income decline or remain unchanged, and input costs (such as fertilizer and pesticides) rose sharply. The implication is that simply raising output prices may not automatically benefit farmers if accompanied by rising production costs or if farmers are also consumers of rice. A related analysis by Makbul et al. [20] highlights this dual effect: an increase in rice price boosts farm revenue by lifting paddy prices, but it also raises household expenditure on rice for farming families who must purchase rice for consumption. Thus, the net impact on farmer welfare can be ambiguous, especially for smallholders who are often net buyers of rice or face higher input expenses. These studies underline the importance of examining not just prices in isolation, but the overall context of costs, production, and consumption when evaluating farmer welfare.

Another important consideration is the time-lagged effect of prices on production decisions and income. Economic theory suggests that agricultural prices in one period can influence outcomes in subsequent periods due to production cycles and farmers' expectations [21], [22]. Farmers often base their planting and input decisions on the prices they experienced in the previous season. In other words, current production (and thus current income) may partly be a response to the prior price environment. Miller & Meiners [23] and Nicholson & Snyder [24] have noted that agricultural commodity prices are frequently influenced by lagged prices, in part because of seasonal cycles and adaptive expectations. This phenomenon is observed in rice farming; during periods of high prices, farmers tend to increase output in the next season, whereas following a price crash, farmers might cut back production. Therefore, analyzing the effect of both the current year's price and the previous year's price on farmer income can provide insight into these dynamics.

Kiaea Village, located in South Konawe District in Southeast Sulawesi, is known as a rice-producing area, primarily cultivating irrigated lowland rice (*sawah*). However, like many rural communities, farmers in Kiaea face challenges in achieving adequate income from rice farming. The village's farming population is relatively large (351 rice farming households), but farm sizes are moderate and productivity is constrained by various factors. Preliminary observations suggest that fluctuations in paddy price have been a concern among local farmers, who reported that during some seasons the selling price of paddy barely covers their costs. In light of this, understanding the relationship between paddy price and farmer income in this specific locale is crucial for developing interventions to improve farmer welfare.

Based on the above background, this study aims to determine the influence of paddy price on the income of rice farmers in Kiaea Village. In particular, we investigate both the effect of the current year's farm-gate paddy price and the previous year's paddy price on farmers' net income from rice cultivation. This research will also discuss the implications of the findings for agricultural price policy and farmer welfare improvements.

2. Materials and Methods

The research was conducted in Kiaea Village, Palangga District, South Konawe Regency, located in Southeast Sulawesi, Indonesia. Kiaea Village was purposefully chosen (*purposive sampling*) because it is a significant producer of paddy (unhusked rice) in the region, known for its irrigated rice fields and active farming community. The study took place over the period of July 2024 to December 2024, covering one main rice growing season and the corresponding harvest.

The population of this study consisted of all rice farmers in Kiaea Village, totaling 351 farmers (households). From this population, a sample of farmers was drawn for detailed study. The Slovin formula was used to determine an appropriate sample size of 39 farmers. These 39 rice farmers were then randomly selected from the village's farmer list.

The study relied on both primary and secondary data. The primary data were obtained directly from the sampled farmers through field surveys. We conducted face-to-face interviews using a structured questionnaire. The questionnaire collected detailed information on each farmer's demographic profile, production details, input use, production costs, and the revenue from selling paddy. Critically, farmers were asked about the selling price of their paddy in the current season (2024) and the price they received in the previous year's season (2023). The income from rice farming was computed as total revenue from paddy sales minus the total production costs for that season [25], [26].

The analysis was conducted in two main parts, namely descriptive analysis of farm income and related variables, and econometric analysis to test the effect of paddy price on income. We first analyzed the profile of the respondent farmers and key farming variables using descriptive statistics. Next, we calculated the average production, costs, revenue, and income of the sampled farms. Production is measured in kilograms of unhusked rice (paddy) per farmer per season, and revenue is the total sales from that paddy (price × quantity). Costs were divided into fixed costs (depreciation of equipment like tractors, tools, etc.) and variable costs (expenses on seeds, fertilizers, pesticides, hired labor, fuel, etc.) to understand the cost structure. By subtracting total costs from total revenue, we obtained each farm's net income from rice farming for the season. These figures were averaged across the sample to report the typical income level.

To address the research objective, we employed a multiple linear regression model examining the influence of paddy price on farmer income. The dependent variable is the income from rice farming (Y), measured in Indonesian Rupiah (IDR) per season for each farmer. The primary independent variables are:

- X_1: Current year's paddy price (the selling price of paddy received by the farmer in the 2024 season, in IDR per kg).
- X_2: Last year's paddy price (the price the farmer received in the previous season, 2023, in IDR per kg).

These two price variables allow us to capture both the immediate effect of the price in the income equation and the lagged effect representing price expectations from the prior year. The regression model can be expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (1)$$

where β_0 is the intercept, β_1 and β_2 are the coefficients for the current and lagged price respectively, and ε is the error term. We anticipated β_1 and β_2 to be positive, as higher paddy prices should, in theory, increase farm income.

The regression analysis was performed using SPSS software. Prior to running the regression, the data were checked for basic assumptions to ensure that the relationships appeared linear and examined variance inflation factors (VIF) to check for multicollinearity between X_1 and X_2. Given that both X_1 and X_2 are measured in the same units and are likely correlated, multicollinearity was monitored. We also tested the normality of residuals and homoscedasticity to validate the model assumptions.

The hypothesis testing in the regression used a significance level $\alpha = 0.10$ (90% confidence) for determining statistical significance. This slightly relaxed significance level was chosen in line with the exploratory nature of the study and the relatively small sample size, as it increases the power to detect an effect in the presence of potentially high variability. We report both the F-test for the overall regression model and t-tests for the individual regression coefficients. The F-test checks whether the two price variables jointly have a significant effect on income. The t-tests check the significance of each independent variable.

Additionally, the coefficient of determination (R^2) and the adjusted R^2 are reported to indicate the proportion of variance in farmers' income explained by the model. A higher R^2 would imply that paddy prices are a major determinant of income, whereas a low R^2 would suggest that other factors (outside of paddy price) account for most income variation.

3. Results and Discussion

A. Profile of Respondent Farmers

The demographic and socio-economic characteristics of the sampled farmers help contextualize the income results. The age distribution of rice farmers in Kiaea Village is skewed towards the middle-aged group. The vast majority (92%) of respondents were in the productive working age range of 15-64 years, with an average age of about 49 years. Only a small fraction (8%) were above 65 years old, and none were below 15. This indicates that most rice farmers are in their prime working age, which is a positive sign for the adoption of labor-intensive or innovative farming practices. Younger and middle-aged farmers are generally considered more open to new techniques and better able to handle the physical demands of agriculture. All respondents were male, reflecting the local norm of male household heads managing the rice fields, although family labor (including women's labor) plays a role in various farming tasks.

In terms of education level, the sample showed relatively low formal education attainment. About 18% of the farmers had not completed primary school, and the largest group (43%) had only a primary school (elementary) graduation. Around 31% had finished junior high school, and only 8% had completed senior high school. None of the farmers had higher education (college/university). This indicates that the typical farmer in Kiaea has basic literacy and numeracy but may lack advanced knowledge or exposure to modern agricultural science. According to Bachri et al. [27], farmers with limited education often have lower capacity to absorb new innovations, whereas higher education can facilitate easier information seeking and better management decisions. The implication is that extension services and training in the village need to be tailored to a relatively basic educational level, emphasizing hands-on demonstration and simple communication of ideas to improve farming outcomes.

The farmers' experience in rice farming is quite extensive on average. A large majority (about 77%) of the farmers have over 10 years of experience cultivating rice. Only 5% of respondents had less than 5 years of farming experience, and 18% had 5-10 years. The average farming experience was approximately 26 years. This suggests that rice farming knowledge has been accumulated over generations in the village and that the farmers are quite familiar with traditional practices and seasonal cycles. While high experience often correlates with better intuition and skill in farming, it can also mean that some farmers might be set in their ways, potentially resistant to change unless clear benefits are demonstrated. Nonetheless, the combination of generally middle-aged and well-experienced farmers provides a workforce that is seasoned and potentially receptive to productivity improvements if guided appropriately.

Household composition is another relevant aspect. The family size of the farmers was assessed by the number of dependents in the household. We found that the majority of farming families are of small size, with four or fewer members. Specifically, about 82% of respondents had "small" families (≤4 members), 13% had "medium" families (5–6 members), and only 5% had "large" families (7 or more members). The average number of dependents was around three persons per household. This indicates that most farmers support a relatively modest number of family members, which could mean lower household consumption needs compared to larger families. A smaller family size might allow a greater portion of farm income to be allocated to savings or reinvestment, whereas larger families might require more of the income for immediate consumption. In Kiaea's case, the predominance of small families suggests that if farm incomes rise, there is potential for farmers to improve their living standards or invest in their farms, as the dependency burden is not excessively high.

B. Farm Structure and Cost-Revenue Structure

1) Landownership and Farm Size

Land is a critical asset for rice farmers. Almost all respondent farmers owned or managed their paddy fields (owner-cultivators and some tenant-cultivators under informal arrangements). The distribution of landholding sizes revealed that the vast majority of farmers operate what can be classified as *medium-sized* rice farms. About 97% of sampled farmers had between 0.5 and 2 hectares of rice land, while a tiny 3% had more than 2 hectares, and none had less than 0.5 hectares. The average farm size was approximately 1.4 hectares. This means most farmers are managing a moderate plot of land that is neither very small nor very large. An average of 1.4 ha of irrigated rice land per household is slightly above the national average for smallholder rice farms in Indonesia, which is often around 1 ha or less. Having a medium-sized holding could provide some economies of scale in using machinery (e.g., hiring a tractor for land preparation is feasible) and in applying inputs efficiently. However, it is still a limited land area in terms of generating high absolute income. Farmers cannot rely on scale alone and must optimize yield and price to increase earnings. Generally, these landholdings in Kiaea are fragmented into a few plots but are all within the village's irrigated perimeter, which allows two cropping seasons per year, depending on water availability. The data suggest that under current conditions, Kiaea farmers are typically cultivating around 1.4 ha per season, which classifies them as small to medium farmers in the broader context.

2) Production and Yield

In the recent season under study (2024 main season), the farmers achieved an average paddy production of about 6.2 tons per farm or 4.3 tons per ha. This figure represents the output per farm for one cropping cycle. This yield is within a reasonable range for irrigated rice in Indonesia, though slightly below the optimal potential yields. It suggests that while production practices are decent, there may still be room for improvement through better seeds, improved pest management, or more efficient input use to push yields closer to 5–6 tons/ha, which are seen in higher-performing regions.

3) Revenue (Gross Income)

The farm-gate selling price of paddy that farmers received in the 2024 season averaged IDR 5,120.51 per kilogram. This is the price for dry unhusked rice (GKG) of the quality produced, after post-harvest handling like drying. With the above production levels, the average gross revenue (sales of paddy) per farmer was IDR 32,264,358 in that season. In other words, a typical farmer earned about 32.26 million rupiah (approximately USD 2,100) from selling paddy in the harvest. This revenue figure can fluctuate each season depending on yield and price; in our study year, the price was moderately high by recent standards (the government's floor price HPP was around IDR 4,200, and market prices were at IDR 5,120 for the better-quality GKG). Farmers reported that the paddy price had indeed risen compared to the previous year. In 2023, the average paddy price received was around IDR 4,703 per kg, so by 2024 it increased to about IDR 5,121, which is roughly an 8.9% increase in nominal terms. Such an increase would directly boost revenue if production was at least maintained.

4) Costs of Production

To understand net income, we analyzed the cost components in detail. On average, the total production cost per farm per season was IDR 7,432,673. This total cost can be broken down into fixed costs and variable costs:

1. *Fixed Costs*: These include expenses that do not depend on the output volume in the short term, primarily the depreciation (annualized cost) of farming tools and equipment. The common tools in Kiaea's rice farming include hand tractors (or mini tillers), sickles, sprayers, tarpaulins for drying, and hoes. Farmers generally own simple tools and sometimes jointly own or rent larger equipment like tractors. Depreciation was calculated for those who own equipment. The data show that the depreciation of a hand tractor is the largest fixed cost, averaging IDR 1,983,665 per season. The total fixed cost came to about IDR 2,246,529 per season on average. This indicates that fixed costs are a minor portion of total cost (less than one-third of the total), reflecting the fact that most cost in rice farming is operational (variable) rather than capital.
2. *Variable Costs*: These are costs proportional to the production activities each season, including seeds, fertilizers, pesticides, labor, and fuel. On average, variable costs totaled IDR 3,125,231 per season. Among these, labor cost was the most significant component, averaging around IDR 1,166,154. Labor costs encompass hired labor for land preparation, planting, weeding, and harvesting (noting that family labor is not directly monetized but some farmers hire additional help especially during transplanting and harvest). The high share of labor cost aligns with the labor-intensive nature of rice farming and local wage rates. The next major expense was chemical fertilizer, followed by fuel, pesticides, and seeds. It is worth noting that rising input prices have been a concern. For example, fertilizer subsidies have been reduced in recent years, and there have been changes in the distribution system, causing fertilizer prices to increase [28]. Farmers in Kiaea have felt these trends, which can squeeze their profit margins if output prices do not rise correspondingly.

Combining fixed and variable costs gives the total cost. The data we compiled show that total cost per season per farm is around IDR 7.43 million.

5) Net Income

Finally, the net income from rice farming is calculated as revenue minus total cost. With an average revenue of IDR 32.26 million and average cost of IDR 7.43 million, the average net income per farmer per season comes out to about IDR 24,831,686. This is the key figure representing the earnings of a farmer from one cropping cycle (roughly the main harvest of the year). In US dollar terms, this is roughly USD 1,600-1,700 at the exchange rate during the study. An income of IDR 24.8 million per season per farm is a moderate figure: it suggests that

rice farming provides a significant portion of household income, but many families might still supplement this with other income sources (other crops, livestock, off-farm work, etc.) to meet all their needs. In fact, considering the typical family size (3-4 members), this seasonal income might translate to only a few million rupiah per family member per month, which is around or slightly above the rural poverty line. This aligns with the broader observation that many Indonesian rice farmers have only modest welfare levels, as mentioned previously.

It is important to highlight that income variability is quite significant among farmers. The figures above are averages; individual outcomes depend on yield achieved and costs incurred. For instance, a farmer who got a higher yield (say 7 tons) or a better price (perhaps selling later at IDR 5,200) would have earned more than the average, whereas someone hit by pest problems (yield only 5 tons) or who had to buy water in a dry spell (increasing cost) could earn substantially less. The profit margin in our study appears fairly high on average, with roughly 77% of revenue remaining as profit. This high margin suggests either that many inputs are undervalued (e.g., family labor not counted fully) or simply that 2024 was an especially good year in terms of price and yield alignment. It raises a cautious note: if input costs were to rise or if yields drop, that margin can erode quickly.

C. Impact of Paddy Price on Farmer Income

To quantitatively assess the influence of paddy prices on farmers' incomes, we estimated a multiple linear regression model with farmers' net income as the dependent variable and two independent variables: the current year's paddy price (2024) and the previous year's paddy price (2023). Table 1 summarizes the regression outcomes, including the coefficients, significance levels, and model fit statistics

The F-test for the model resulted in F = 2.592 with a p-value of 0.098. This p-value is slightly below the threshold of 0.10, meaning that at the 90% confidence level, the two price variables together have a statistically significant effect on farmer income. However, the significance is marginal (not significant at the conventional 5% level), indicating that price is not an overwhelmingly dominant factor in explaining income variation, but it is not negligible either. This aligns with expectations that price matters, but many other factors are in play.

The model's R^2 is 0.126 (with an adjusted R^2 of 0.077 when accounting for the number of predictors). This implies that approximately 12.6% of the variation in rice farming income among the sampled farmers is explained by the combination of the current and last year's paddy prices. Conversely, about 87.4% of the variation in income is due to other factors not included in this simple model. Such other factors could include differences in yield (which arise from soil fertility, farming practices, weather, etc.), variations in cost efficiency, farm size differences, and other socio-economic factors like labor availability or farmer skill. The relatively low R^2 is not surprising given the complexity of agricultural incomes. It indicates that while price is a relevant factor, it alone cannot predict income with high precision. This finding highlights the importance of other determinants of farm income. It is consistent with the views of Suratiyah [29], who noted that farm incomes are influenced by a host of internal factors (such as land size, labor, farmer's experience, and management) and external factors (such as output prices and input availability). In our case, price accounts for only a small portion of the income variance, underscoring that improving farmer livelihoods might require a multifaceted approach, not just price interventions.

The coefficient β_1 for the 2024 paddy price is 28,629.607, but its t-statistic is –0.368 with a p-value of 0.715, which is not statistically significant. This indicates that, holding the previous year's price constant, the variation in the current year's farm-gate price among farmers did not have a discernible linear effect on their income. In other words, farmers who sold paddy at a slightly higher price in 2024 did not necessarily earn more income than those who sold at a slightly lower price, once last year's price is accounted for. This result may seem counterintuitive at first, as one would expect a higher selling price to yield higher income. However, there are plausible explanations in this context as follows:

The first explanation is the minimal price variation across farmers. Since all farmers in the village sell in the same local market conditions, the current year's price (X_1) might not vary much from farmer to farmer. In our data, the average was IDR 5,120/kg; almost everyone would have sold around that price (with perhaps minor differences of a few hundred rupiah if some sold earlier or later). Such low variability means X_1 does not have much leverage to explain differences in income. Essentially, 2024 was a uniform market for all, so current price cannot explain why one farmer earned more than another. That difference came from output and costs, not price per kg, since price per kg was roughly the same for all.

Another reason was timing and determination of income. By the time of harvest (when current price is realized), the production quantity is already determined by past decisions and factors. If every farmer gets the same market price at harvest (especially if there are only a few buyers, an oligopsony situation as noted in the village, where many farmers sell to a handful of traders), then the only drivers of income differences in the current season are yield and cost differences, not price per se. Our regression's lack of significance for X_1 reflects that common price reality.

Econometric multicollinearity with X_2 could be another

Table 1
Regression results for effect of paddy price on farm income

Independent Variable	Coefficient (β)	t-statistic	p-value
Constant (Intercept)	1.5217 × 10^8	-0.550	0.586
Current year paddy price (X_1)	2.8629 × 10^4	-0.368	0.715
Last year paddy price (X_2)	1.4255 × 10^4	2.277	0.029*

*Note: Dependent variable is farmers' income (IDR per season). *indicates significance at α = 0.05 (p < 0.05). The model's F-statistic = 2.592 with p = 0.098 (significant at 10% level). R^2 = 0.126, Adjusted R^2 = 0.077*

reason. If last year's price was high, it is likely this year's price is also relatively high (as part of a trend). If both move together, the regression might have difficulty distinguishing their individual effects with a small sample. Here, the insignificance of X_1 might partly be due to X_2 capturing the meaningful variation.

The current season's paddy price did not show a significant direct effect on income in our cross-sectional data. This does not mean price is unimportant. It rather suggests that within the single season and single village scope, price was almost a constant for everyone and thus not the differentiating factor in earnings. It also suggests that any price effect on income might be indirect or already capitalized through production decisions earlier.

The coefficient β_2 for the 2023 paddy price is 14,255.055, and its t-statistic is 2.277 with a p-value of 0.029. This is statistically significant at the 5% level (and also at 10%), marked by * in Table 1. This result indicates that the previous year's paddy price had a positive and significant impact on the current income. Specifically, the coefficient value suggests that for each 1 IDR increase in last year's paddy price (per kg), the current year's income increases by about IDR 14,255 on average, holding the current price constant. Given the scale, a more interpretable view is that if last year's price had been, say, IDR 200 higher, the model would predict current income to be about IDR 2.85 million higher (200 × 14,255). This positive relationship supports the hypothesis that farmers who experienced higher prices in the previous season ended up earning more in the current season.

The significance of X_2 over X_1 suggests a lagged effect and expectation mechanism at work. One likely explanation is that farmers who enjoyed a good paddy price last year had higher profits, which could have enabled them to invest more in the subsequent season. It could also be that a high price last year encouraged farmers to maintain or increase their production (for instance, not leaving any field idle, or intensifying efforts) in anticipation that prices would remain rewarding. Conversely, if last year's price was poor, some farmers might have been discouraged or constrained, perhaps skimping on fertilizer or not being able to afford as much labor, leading to lower yield or quality this year, and thus lower income. This dynamic is in line with economic theory on supply response that farmers respond to price incentives, but with a time lag due to the agricultural production cycle. Our finding is empirically consistent with studies from other contexts, such as Hu et al. [30] and Jin et al. [13] on Chinese rice farmers, who also found that expected prices (often proxied by lagged prices) influence farmers' planting decisions.

Another interpretation of X_2's significance is related to market timing and sales strategy. Some farmers might have a practice of storing paddy and selling it later. If a farmer got a higher price last year, it could be because he sold later or to a different buyer, indicating perhaps a better marketing strategy or access. That same farmer might apply similar savvy in the current year (though our model holds current price constant, which complicates the story). However, it is less likely that X_2 reflects the farmer's individual marketing skills; it more plausibly represents the general pricing environment and the decisions farmers made in response to it.

It is also notable that the significance level was strong (p 0.03). This gives confidence that the effect is real despite the small sample. Essentially, a higher lagged price is associated with significantly higher current income, confirming that price incentives carry over season-to-season in rice farming.

In addition, our field observations indicated that farmers sell their paddy to a limited number of local collectors or mills, which constitutes an oligopsonistic market structure (many sellers, few buyers). In such a scenario, the buyers have some power in setting prices, and prices tend to be uniform and not highly competitive [31]. This situation can cause the current price effect to be muted (as seen with X_1). Farmers often cannot negotiate much for a better price in the current harvest. Usually, they take what the market offers, which is similar for everyone. However, the previous year's price might reflect broader policy changes or market shifts (for instance, if the government raised the HPP last year, or if there was a supply shortfall leading to higher prices). Those macro factors benefiting last year carry into improved farmer capacity this year. The insignificance of current price might also suggest that within the village, price does not vary enough to create winners and losers, whereas productivity and cost management do vary and likely explain who has higher income. This hints that improving farmer income in Kiaea might depend as much on boosting production and controlling costs as on ensuring good prices, since prices are somewhat externally controlled.

4. Conclusion

The rice farming households in Kiaea Village earn a moderate income from their paddy cultivation. On average, each farmer produced around 6.2 tons of paddy in the 2024 main season and earned a gross revenue of approximately IDR 32.26 million. After deducting production costs (averaging IDR 7.43 million), the mean net income per farmer was about IDR 24.83 million per planting season. The data also confirmed an increase in the farm-gate paddy price compared to the previous year. However, despite the price rise, farmers' overall welfare remains a concern, as the income is just around subsistence level for an average family. This highlights the continual need to improve productivity and reduce costs to boost net incomes further.

Both the current year's paddy price and the previous year's price were found to have a joint significant influence on farmers' income (with 90% confidence). The current year's paddy price (X_1) did not show a statistically significant effect on income in the sample. This implies that, within the village and season studied, farmers who sold paddy at a slightly higher price did not necessarily earn more profit than those who sold at a slightly lower price. The lack of impact is attributed to the fact that all farmers faced nearly the same market price in 2024 (local market conditions equalized X_1 for everyone) and variations in income were instead driven by differences in yield and cost.

The previous year's paddy price had a significant positive effect on the current year's income. This indicates that a higher

paddy price in the past season led to higher income in the present season. In our findings, last year's price was the dominant factor among the two. This underscores the role of price expectations and inter-seasonal decisions. Farmers responded to last year's favorable prices by likely improving or expanding production, which in turn raised their incomes, whereas if last year's prices were low, incomes suffered in the subsequent season.

In conclusion, the hypothesis that paddy price influences rice farmer income is supported, but the influence is mostly evident through lagged price effects. Rice farmers' incomes in the study area are responsive to prior price signals, confirming that farmers are forward-looking and that economic incentives work in the expected direction. Nevertheless, to improve the welfare of these farmers significantly, stakeholders must address the multitude of other factors affecting farm productivity and profitability in addition to maintaining favorable price policies.

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