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How Can Rice Farmers Gain Profit? An Analysis of Sharecropping Practice among Farmers, Landowners, and Laborers in Sukadiri Subdistrict of Tangerang

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ABSTRACT The production of rice as one of the main staple foods in Indonesia has been affected by changes in land-use that has led to a shift in land ownership. It is necessary to discuss whether the profit-sharing applied among farmers, landowners, and laborers provides benefits for farmers. This study aims to determine the characteristics, income, and efficiency of lowland rice farming with both a 50:50 crop sharing between farmers and landowners, and an 80:20 crop sharing between farmers and laborers. This study is based on survey and interviews on the sharecropping practice among rice farming community in the dry season (April – September) tahun 2022 in Sukadiri Subdistrict of Tangerang. Farming parameters are explained descriptively, and the farm efficiency is determined by the revenue-cost (R/C) ratio. A total sample of 44 farmers was determined purposively and proportionately. The findings demonstrated that rice farming gained a total income on the explicit cost of IDR7.311.519 per hectare. The R/C ratio of explicit cost for the sharecropping system is 4,76. Suppose the sharecropping system is replaced with a rent cash payment, the R/C ratio for total cost is 0,83 which results in a loss. This study concludes that the combination of 50:50 crop sharing with the landowner and 80:20 crop sharing with double-tapping laborers is beneficial for the existence of rice farming.

KEYWORDS *Double-tapping labor; Farming; Rice; R/C ratio; Sharecropping.*

INTRODUCTION

Rice is the staple food for about 273 million people in Indonesia. One of the rice producers is Tangerang Regency with a total of 327.146 tonnes of dry-milled grain (Central Bureau of Statistics, 2022). Rice production in that region is mainly supported by farmers in Sukadiri sub-district, where 25.241 tonnes of dry-milled grain is produced every year. The performance of farming in that area is exceptionally intriguing, given that most farmers have no longer land and serve as sharecroppers with no legal claim to the area they oversee.

Sharecroppers exchange a share of their production to access the land (Baah & Kidido, 2020; White & Wijaya, 2022). The pre-study indicated that a private corporation owns the farmer's land and acquires the half of production. In practice, sharing fifty percent of the harvest is a common reference in sharecropping (Ahmed & Billah, 2018; Quijada et al., 2022).

It is newsworthy that sharecroppers who are involved in cultivation buy labor power at certain points of time in a year (Sahay, 2020). It is called a double-tapping system. The laborers perform various tasks, such as

weeding, watering, and applying fertilizers and pesticides. The job is performed at a piece rate and paid using harvest in a 1:4 yield ratio for labor and farmer. The definition of a system where the sharecroppers employ other laborers and pay them by crop-sharing may be similar to a mechanism described by Mouris & Setiawan (2019) as a managerial tenancy system.

The mechanism of labor used in rice farming may be different in every land area (Bahagia et al., 2020; Quijada et al., 2022). Besides the sharecropping system, farming may also be carried out on a land lease basis (cash rent tenant). In the sharecropping system, farmers do not own the land, do not have the freedom to determine the crops planted, and do not have the authority to sell the entire yields, while rent-tenant farmers applied the opposite (Mukhamedova & Pomfret, 2019; White & Wijaya, 2022).

There are important differences in how labor inputs are organized, how decisions on the costs are divided between landowner and farmer, and how the procedure of revenue transfer between parties. Some studies argued that sharecropping disadvantages farmers (Baah & Kidido, 2020; Bahagia et al., 2020), while others believe it benefits farmers (Ahmed & Billah, 2018; Quijada et al., 2022). Exploring these gaps allows us to contribute to two mechanisms in the literature on sharecropping and rental land cropping: first, their contribution to the revenue-cost ratio, and second, their implications for rural rice farming and smallholder survival.

The empirical literature exploring income efficiency across sharecropping combined with a double-tapping system is less common, but there are few studies examining farmers' income in the sharecropping system. Research by Ginting et al. (2017) and Sabri et al. (2019) focused on the income efficiency of sharecropping with the positive ratio between revenue and cost. Additionally, Fitriah et al. (2018) conclude that landowner farmers are more profitable, with an R/C ratio of 1,59, compared to tenant farmers, tenants, and mortgage farmers, whose R/C ratios are 1,56; 1,55, and 1,56 respectively.

Other researchers focused on the characteristics of sharecropping. Ahmed & Billah (2018) and Mouris & Setiawan (2019) examined the impact of sharecropping on farmlands, while Quijada et al. (2022) found that sharecropping shows higher technical efficiencies compared to fixed-rental arrangements. However, there is no detail emphasizing how laborers are employed.

Despite that, the authors conclude that the evidence is unclear to support significant revenue-cost analysis for the sharecropping system with double-tapping labor, arguing that the systems may be profitable for tenant farmers. This research differs from previous studies in terms of sample selection and assessment of the double-tapping labor. The study aimed to analyze farmers' income gained from the sharecropping system and to simulate the income when sharecropping is replaced by a rent cash payment in rice farming.

The research collected data on lowland rice farming during the dry season (from April to September 2022) in Sukadiri sub-district, Tangerang Regency, Indonesia. The research area was selected on purpose; considering that the region is the largest rice grower in Tangerang (Central Bureau

of Statistics, 2022). The object of the study is sharecroppers, whose harvested crop was given as payment to laborers and a landowner. The laborers were employed for four activities, thus named double-tapping labor, while the landowner is a construction company.

There are 2.403 rice farmers in the studied area, but less information determines them as sharecroppers. There is no exact number of farmers who act as sharecroppers, hence the *proportional sampling* (Nazir, 2003:289) is carried out in Eq (1).

$$n = \frac{N.\acute{p}(1-\acute{p})}{(N-1)\,D + \acute{p}(1-\acute{p})} \qquad (1)$$

$$\text{where } D = \frac{B^2}{4} = \frac{(0{,}15)^2}{4} = 0{,}005625$$

$$n = \frac{N.\acute{p}(1-\acute{p})}{(N-1)\,D + \acute{p}(1-\acute{p})}$$

$$n = 43{,}657 \approx 44$$

Where D = limit of error, B = precision value, n = a minimum number of samples required (individuals), N = total population, ṕ = proportion. The number determined for the bound of error is 15% which implies the confidence interval is 85%. Following Nazir (2003), the proportion 0,5 is used since it represents the highest variability that can be expected in the population.

Qualitative methods were used to define the characteristics of rice farmers, which were provided descriptively as age, education level, farming experience, land area, land ownership status, *et cetera*. Quantitative methods were used to examine the variable cost and revenue and to define the efficiency of rice farming. The R/C ratio is applied to measure income efficiency and to determine whether rice farming in that area is feasible and profitable (Soekartawi, 2016).

Quantitative analysis was applied to measure the profitability index of farmers by taking into account income, revenue, and production costs. Income is the difference between total revenue and total production cost (Soekartawi, 2016). The income is formulated in Eq (2).

$$\pi = TR - TC \qquad (2)$$

Where, π = profit per hectare of rice production (IDR/ha), TR = total revenue (IDR), and TC = total production cost (IDR). Farming revenue is calculated by multiplying the total product sold by its unit price (Soekartawi, 2016). This study computed both explicit and implicit revenue. Explicit revenue is obtained from the deduction of production to crop-sharing value for the landowner and double-tapping labor. In contrast, implicit revenue is counted as potential earnings from total production including the yields that have been shared with the landowner and double-tapping labor.

Total cost is an accumulation of total variable costs and total fixed costs (Moon et al., 2020). The total variable cost is calculated as the input per unit price (i) multiplied by the inputs used for rice production, i = 1, 2, 3, ...n. Hence, the formula for rice farming income is combined in Eq (3).

$$\Pi = (Y_i.Py_i) - (\sum(P_{xi}.X_i) + TFC) \qquad (3)$$

Where, π = Profit per hectare of rice production (IDR/ha), Py = per unit price of yield (IDR), Py_i = Quantity of yields (kg/ha), X_i= input used for rice production, i = 1, 2, 3, ...n, P_{xi}= per unit price of input (variable) (IDR), and TFC= total fixed cost involved in rice production.

Explicit costs and implicit costs associated with the acquisition of farming inputs will be discussed in this study. The classification of explicit and implicit cost components is determined by the form of payment used to acquire production inputs (Moon et al., 2020; Soekartawi, 2016). Family labor, depreciation costs of agricultural equipment, and land rent are variables commonly not paid in cash, hence categorized as implicit costs. On the other hand, some variables such as vehicle rental, fertilizers, pesticides, and daily-wage workers are categorized as explicit costs since they are paid in cash.

It is more convincing to justify the economic feasibility of rice farming by its ratio compared to the currency value. Hence, the revenue-cost analysis (known as the R/C ratio) is conducted here. The formula developed by Soekartawi (2016) is written consequently in Eq (4).

$$A = TR/TC \quad (4)$$

Where, α = notation of comparison between cost and revenue, TR = total revenue (IDR), TC = total cost (IDR). The determination of R/C is separated into two forms, namely a) Type I, where the R/C is determined only by cash payment, and b) Type II, where the R/C also calculates the unpaid cooperative distributions such as family labor, free seed supply, and other implicit costs (Type II) (Soekartawi, 2016).

This study provides the calculation of both types of R/C ratio; thus, the decision-maker has insight from different perspectives. Research judgment will consider among results, i.e.: (1) suppose the R/C ratio is equal to one, suggesting that the farming is at the breakeven point; (2) suppose the R/C ratio is less than one, indicating that the farming system is detrimental; and 3)suppose the R/C ratio is more than 1, the farming is desirably profitable. It is parameterized that the higher the value suggests, the bigger the profit earned (Moon et al., 2020).

DISCUSSION

Rice Cultivation in Sukadiri

Rice cultivation in the study area is carried out traditionally with the help of simple tools and machines. Like most forms of rice cultivation (Kleinhenz et al., 2013; Quijada et al., 2022), activities are performed with land preparation, seed sowing, transplanting, land preservation, harvesting, and post-harvesting.

Rice farming requires adequate land preparation, including land clearing, weeding, pre-irrigation, plowing and harrowing, and leveling. Pre-irrigation was performed to make it easier to cultivate and soften the soil (Shelley et al., 2016). The rice seed was sown 20 days before the transplanting process. Small plots that comprise four percent of the land area were used to sow seeds. The free seeds were supplied freely by the Government Research Center. As rice seeds entered the 3 to 4 leaves stage, tiller formation began. The transplanting stage was carried out with a technique that involved putting the roots in the L shape, which sought to promote optimal root growth (Kawengian et al., 2019).

The list of land preservation activities included watering, suppressing weeds, and applying fertilizers and pesticides. Fertilization was performed twice during the season, carried out on days 7 and 25 after transplanting seedlings. Weeding was conducted to suppress weeds that

grew around (Alagbo et al., 2022). Rice was irrigated to prevent the land from drying out. Pesticides were sprayed only when pests and diseases attacked plants; however, paddy fields in the studied area were not significantly affected by numerous pests.

Rice was harvested once the plant had withered and the grains had turned yellow, on average of 100 days after planting. Rice is traditionally harvested using sickles and cutlasses. The harvested crop was laid down and sun-dried on mats. To prevent pest infestations, concurrent harvesting was performed on a single parcel of land. The harvested rice grain was immediately carried to the mill for threshing. The rice milling was conducted two times; thus, the grain was cleaner.

Table 1. Descriptive Statistics on Sample Characteristics of Households

No.	Characteristics of Farmers	Category	Range	Number of farmers	Percentage
1.	Age (years)	Millennial Generation	26 – 41	6	14
		Generation *x*	42 – 57	24	55
		Baby Boomers Generation	58 – 76	13	30
		Pre-boomer Generation	≥77	1	2
2.	Education	Did not complete primary education		5	11
		Primary education		24	55
		Mid-high education		9	20
		High education		6	14
3.	Experience (years)	Short experienced	1-10	12	27
		Long experienced	≥11	32	73
4.	Household size	Small	≤ 4	43	98
		Medium	5-6	1	2
		Large	≥ 7	0	0
5.	Size of land area (hectares)	Small	≤ 0,5	8	18
		Midsize	0,6 – 1,9	30	68
		Large	≥ 2	6	14

Source: Primary Data, 2022

Characteristics of Farmers

This chapter summarizes the sample of farmer households, as well as a first glimpse to measure household labor and land management. The following is an explanation of the descriptive statistics listed in Table 1.

Based on age, farmers are classified into the millennial generation, the *x* generation, the baby boomers generation, and the pre-boomer generation, depending on the year of birth. Most farmers are the *x* generation between the ages of 42 and 57 years old. Farmers are still in the productive age range (15 to 64 years) as defined by The Ministry of National Development Planning (2021). The *x* generation is equal to the middle-aged farmer (40-59 years old). Middle-aged groups are more likely to have farming experience (Zhou & Li, 2022), perform a positive work ethic, and are more attentive to wanting balance in their lives (Baah & Kidido, 2020). The working manner is better compared to other generations. It is also stated that below and beyond this range, the farmer may be

too weak for vigorous farming activities or may be too young to experience employing the farm (Baah & Kidido, 2020; Mouris & Setiawan, 2019).

Education is stated to improve an individual's understanding of production techniques (Moon et al., 2020) and commercialization participation (Abdullah et al., 2019). However, this is not the case in the current study since most of the farmers are illiterate. Farmers fall under the poor education category, suggested by a significant percentage of 55 percent of farmers who had education up to primary school. Low education may cause farmers to suffer from technology intrusions, such as using Farmer Cards for subsidies.

However, another research indicates that educational background does not affect farmers' income (Baihaqi et al., 2022). It is believed that an increase in the years of schooling has negative effects on market participation because they try to find non-physical work in the service sector (Sahay, 2020).

Based on farming experiences, farmers are defined as having short-term experience ranging from 0 to 10 years, and long-term experience that conducts farming for more than 10 years. Farmers with short-term experience are less proficient in managing cultivation activities than those with long-term experience (Abdullah et al., 2019; Baihaqi et al., 2022; Moon et al., 2020). This indicates that farmers in the studied area are intuitively and statistically residents with farming experience that affects the right decision-making (Zhou & Li, 2022).

The number of members in this household may cause burden financial burden on families, whereas they do not contribute to any cost reduction in rice farming. There is only one person who is classified as the family laborer, to wit farmer himself. However, wives and children are not involved in rice cultivation activities.

Most farmers manage rice fields on a medium scale in a range of 0,6 – 1,9 hectares (68 percent). Cultivating rice in a minimum area of more than 0,48 hectares is categorized as achieving food compliance standards for farmers, as stated by Nazam et al. (2011). However, the land area in this study is different because the farmers do not own the land and still have to them under sharecropping regulation. Hence, that statement can not be determined yet for the sharecroppers.

The status of land use has a significant and positive influence on productivity. It is stated by a study mentioned that the farmers who rent land have higher average productivity by 0,87 percent than farmers who do not rent land (Waluyati et al., 2020). The ownership of land by farmers in the field is very low, meaning that most farmers work as tenant farmers. Rice farmers have no longer the land after they sold it to various firms and mortgaged it to go-betweens. In this case, the landowners receive rent equal to an agreed-upon share of the net revenue of rice production. It conforms to a study conducted by Ahmed & Billah (2018).

Analysis of Cost Structures

The costs of production are composed of input factors including land, seeds, fertilizer, pesticides, laborers, and farming equipment. Rice field space is crucial to agricultural production (Sahay, 2020). The average

amount of leased land organized by farmers is 1,21 hectares.

Rice farming in the studied area is based on a sharecropping system. Farmers do not pay in cash but deposit up to fifty percent of their yield (unhusked rice) from milled to the landowner. The payment frequency is 2 times according to the rice production period in a year. The cost of land rent depends on the price of grain at the time. The average value of land rent paid through sharecropping is IDR11.532.151.

Seeds are supplied freely by the Agricultural Extension Government Agencies. This agency delivers seeds proportionally according to the cultivated land area, with an average demand of 50 kg per hectare. It benefits farmers since utilizing superior seeds will improve production and rice quality (Kleinhenz et al., 2013; Ya-Jun et al., 2014). In this study, seed costs were categorized as implicit costs, suggesting that farmers did not pay for the seed needed. Nonetheless, the nominal value was still deducted from the total income.

The computed price per kilogram of rice seed is IDR14.000. The average amount of seed given by agencies is 48,22 kg/ha, or equal to IDR670.060. Some farmers may use seeds stored from past harvests for sowing. The average addition of seeds is 1,85 kg/ha; thus, the total value of the seeds stored is IDR25.862. According to Table 2, the total cost of seeds is calculated to be IDR723.355.

For rice farming, all farmers in Sukadiri Sub-district use chemical fertilizers such as NPK and Urea, without adding any organic fertilizers. The Agricultural Extension Government Agency has standardized the levels of fertilizer usage, comprising 100 kg/ha for NPK and 100 kg/ha for Urea. The average application of NPK and Urea fertilizers in the studied area was 127.90 kg/ha and 167.39 kg/ha, respectively. It can be concluded that the NPK and Urea fertilizers used for rice farming overdose the recommended level.

Table 2. Average of Seed Use for Rice Farming per Hectare per Season

The seeds resources	Utilization (kg/ha)	Price (IDR/kg)	Implicit Cost (IDR)
Seed supply from the government	49,82	14.000	675.061
Seed reused from the previous season	1,85	14.000	25.862

Source: Primary data, processed. 2022

Table 3. Rice Farming Fertilizer Needs per Hectare per Growing Season

Fertilizer	Utilization (kg/ha)	Recommendation (kg/ha)	Price (IDR/kg)	Cost (IDR)
NPK	167,39	100	2.139	358.128
Urea	127,90	100	2.442	312.453

Source: Primary data, processed. 2022.

Fertilizers have a significant and positive influence on productivity (Waluyati et al., 2020) but applying excessive amounts of fertilizer leads to soil damage and disrupts microorganisms in the soil (Chandrasiri et al., 2022). Therefore, the texture tends to be more challenging and results in the inhibition of nutrient absorption (Gu & Yang, 2022; Haque & Biswas, 2020). Fertilizer utilization in Sukadiri Sub-district is demonstrated in Table 3.

A study reveals that pesticides also have a significant and positive influence on productivity (Waluyati et al., 2020).

Pesticides control pests such as insects, diseases, and weeds. Rice farming in the study area is frequently attacked by golden snails (*Pomacea 14analiculate*), butterflies, armyworms (*Spodoptera frugiperda*), rodents (*Rodentia*), and stink bugs (*Halyomorpha halys*). Bacterial leaf blasts, tungro, and stem rot are the main diseases. The infestation of weeds such as straw mushrooms (*Volvariella volvacea*), coco grass (*Cyperus rotundus*), and cockspur grass (*Echinochloa crusgalli*) is relatively low.

The rice farmers of the Sukadiri Sub-district used chemical and natural pesticides to control pests. *Deltamethrin 25 g/l*, *Abamectin 18 g/l*, *Chlorpyrifos 500 g/l*, *Dimehipo 410 g/l*, *Phosphoric acid 400 g/l*, and *Difenoconazole 250 g/l*, are the active ingredients contained in several fungicides and insecticides, while *Glyphosate* 555 *g/l* is an active ingredient used to suppress weeds. One of these active ingredients is classified as a hazardous material, which has already been banned in several countries. During the stage of the investigation, we found that one farmer uses that kind of pesticide, thus raising alarming health risks.

The cost of pesticides is considerably low, IDR160.021, identified by a small amount and a low level of intensity. The usage of chemical insecticides is significantly more prevalent than that of herbicides. It supports other research stating that insects are a major constraint in rice production (Shelley et al., 2016).

Chemical insecticides are preferable since they work immediately to kill insects. Although pesticides were used based on predetermined recommendations, farmers must consider the concentrations of potentially toxic elements in rice varieties despite their high concentrations of essential trace elements (Chandrasiri et al., 2022; Jat et al., 2022).

The lowest cost of pesticides applies to herbicides. Farmers tend to suppress weeds physically by pulling them out and cutting them with sickles. Maintaining the integration of weed-competitive cultivars with conventional herbicide/manual weed control practices is also recommended. This integrated weed control efficiency could be attributed to the initial efficacy of the herbicide in inhibiting weed development (Alagbo et al., 2022).

Soekartawi (2016) stated that there are two types of labor: labor outside the family (external labor) and labor from a family member (internal/family labor). In the current study, two types of external labor were initiated, namely daily-wage labor and double-tapping labor. The daily-wage laborers generally get their wages paid in cash (IDR60.000 for about eight hours of work) a day, whereas the double-tapping laborers get their wages paid in the form of grain (Sahay, 2020). Daily-wage labor works only for land preparation and transplanting.

Double-tapping labor conducts a sequence of activities such as weeding, watering, and applying pesticides and fertilizers during the growing season. These four operations are compensated cashless, but sharecropping with a ratio of 4:1 or 80:20 percent between a farmer and double-tapping labor. This means that the laborers receive 1 share and the farmers receive 4 shares.

Since the wages of double-tapping labor are decided into a piece rate, the unit of

workdays (Man-Day) is insignificant to use. The measurement of the laborers is usually expressed in units of time according to the type of labor (Kawengian et al., 2019). Man-day specifically stands for land processing and transplanting. The double-tapping labor incurs the most significant proportion of expenditures in the labor component, equivalent to IDR2.275.616.

Table 4. Rice Farming Labor Output per Hectare per Growing season

Activity	External Labor						Family Labor		
	Explicit Cost (cash)			Implicit Cost (calculated)			Implicit Cost		
	ManDay	Share-cropping (Kg)	Wages (IDR)	Man-Day	Share-cropping (Kg)	Wages (IDR)	Man-Day	Share-cropping (Kg)	Wages (IDR)
Land Processing	1,32	0	883.985	0	0	0	0,69	0	460.935
Transplanting	9,09	0	230.403	0	0	0	0	0	0
Weeding, watering, applying fertilizer and pesticides, harvesting	0	0	0	0	556,83*	2.275.616	11,97	0	718.288
Total	10,41	0	1.114.388	0	556,83	2.275.616	12,66	0	1.179.223

** Crop sharing for double-tapping labor*
Source: Primary Data, processed in 2022

Most of the activities are done by men since rice farming is considered predominantly a men's job and women generally do not work in the fields (Abdullah et al., 2019). The lowest cost in the wage category is IDR230.403 for the transplanting activity performed solely by a few women laborers. Table 4 presents the cost allocation for laborers per season.

The cost of farming equipment refers to the deduction of the economic and practical value every year. The deduction is considered a cost for depreciation. The average depreciation value of farming equipment is IDR33.960 for each growing season. In line with a study conducted by Fitriah et al. (2018), the sprayers bring in the highest depreciation cost at IDR21.081. The least nominal depreciation cost is for a spade-fork as much as IDR118. Farmers rarely use this equipment since they prefer to utilize sickles and cutlasses. Table 5 displays the average depreciation value of farming equipment.

Table 5. Depreciation of Rice Farming Equipment per Hectare per Season

Farming Equipment	Initial Value (IDR)	Residual Value (IDR)	Useful Life (years)	Depreciation (IDR/ha/season)
Hoes	47.785	0	5	4.576
Sprayers	341.753	0	10	21.081
Cutlasses	34.439	0	6	3.904
Sickles	41.320	0	6	4.281
Spade forks	1.414	0	8	118
Total				33.960

Source: Primary data, processed. 2022

Table 6. Analysis of Rice Farming Income per Hectare per Growing Season

Income Analysis 1 Sharecropping 1:1 (50:50%) and double tapping 4:1 (80:20%)			Income Analysis 2 Non-Sharecropping (100% land rent payment)		
Component	**Amount (IDR)**	**Percentage (%)**	**Component**	**Amount (IDR)**	**Percentage (%)**
Revenue			Revenue		
Explicit Revenue	9.256.534	40,1	Total Revenue	23.064.301	100
Implicit Revenue	13.807.767	59,9			
Total Revenue	23.064.301	100			
Explicit Fixed Cost	0	0	Explicit Fixed Cost		
			Land rent (at market rate)	25.000.000	84,5
Explicit Variable Costs			Explicit Variable Costs		
Urea Fertilizer	358.128	2,0	Urea Fertilizer	358.128	1,2
NPK Fertilizer	312.453	1,7	NPK Fertilizers	312.453	1,1
Pesticides	160.047	0,9	Pesticide	160.047	0,5
Daily-wage laborers	1.114.388	6,3	Daily-wage laborers	1.114.388	3,8
			Double-tapping laborers	718.288	2,4
Total Explicit Cost	1.945.015	11,0	Total Explicit Cost	27.663.304	93,5
Implicit Fixed Cost			Implicit Fixed Cost		
Depreciation of equipment	33.960	0,2	Depreciation of equipment	33.960	0,1
Implicit Variable Costs			Implicit Variable Costs		
Double-tapping laborers	2.275.616	12,9			
Family Laborers	1.179.223	6,6	Family Laborers	1.179.223	4,0
Land Rent (Sharecropping)	11.532.151	65,3			
Seeds	723.355	4,1	Seeds	723.355	2,4
Total Implicit Cost	15.710.345	89,0	Total Implicit Cost	1.936.538	6,5
Total Cost	17.655.360	100	Total Cost	29.599.842	100
Income on Explicit Cost	7.311.519		Income on Explicit Cost (at land's market rate)	-4.599.003	
Income on Total Cost	5.408.941		Income on Total Cost	-6.535.541	
R/C on Explicit Cost	4,76		R/C on Explicit Cost	0,83	
R/C on Total Cost	1,31		R/C on Total Cost	0,78	

Source: Primary Data, processed (2022)

Analysis of Rice Sharecropping Income

In this discussion, two forms of analysis are employed: (i) the analysis of farming with 50:50% sharecropping 80:20% double-tapping laborer represents an actual condition at the research location, and (ii) a non-actual condition or a simulation supposes the sharecropping is replaced with a cash payment system. Table 6 represents two scenarios: Income Analysis 1 (actual condition) and Income Analysis 2 (simulation). Income analysis 1, shows that the sharecropping farmer earns income that has been deducted from other expenses, i.e, land lease payments (with a share of 50:50%) and payments for labor (double tapping, with 80:20%).

Income Analysis 2 shows a simulation of farmers acting like pure tenants and do not implement this sharecropping system. These farmers will pay for the land rental using the standard value in the area and pay for

the main labor activities (weeding, watering, applying fertilizer and pesticides, harvesting) using the prevailing daily wage. In analysis 2, farmers must pay the land rent at market rates and laborers at wage rates. Table 6 displays both analyses.

Conducting a 50:50 sharecropping system delivers a higher income, compared to that in a land rent simulation. Higher prices of land impact high production costs that cannot be afforded. A study observed that higher land rent in the form of a fixed amount of cash or a higher crop share demotivated the sharecroppers to supply the optimum level of input and to use land intensively (Ahmed & Billah, 2018). Farmers should exert more effort to increase the quantity and quality of production to pay cash to the landowner (Quijada et al., 2022).

As shown in Table 7, the 50:50% sharecropping system is more beneficial to the farmer. Farmers' revenue is affected by the yield they produce and the right selling price. The greater the amount of yield, the greater the revenue they receive (Moon et al., 2020; Sahay, 2020). Compared to the national average rice yield of 8 tonnes per hectare in 2021 (Central Bureau of Statistics, 2022), the average productivity of rice in the surveyed area is significantly lower (5,6 tonnes per hectare).

The high long-term persistence of chemical fertilizers that exceed the dosage has been suggested as the cause of low rice productivity in the area (Gu & Yang, 2022). Widespread and erratic application of synthetic chemical fertilizers and pesticides is studied to cause the leaching into groundwater that leads to soil and water pollution (Jat et al., 2022). It comprehended Waluyati et al., (2020) and Ya-Jun et al., (2014) who recommend the rational use of pesticides for effective pest management.

Other studies found that socioeconomic factors are responsible for the increase in rice productivity. Compared to the cash tenant farmer, the sharecropping farmer gains less motivation to increase productivity since there is no responsibility for the land cash payment (Ahmed & Billah, 2018; Moon et al., 2020).

Table 7. Rice Farming Revenue per Hectare per Growing season

Revenue	Production (kg)	Price (IDR)	Revenue (IDR)
Explicit revenue	2.265,03	4.087	9.256.534
Implicit revenue			
Double-tapping labor	556,83	4.087	2.275,616
Sharecropping	2.821,87	4.087	11.532,151
Total	5.643,73		23.064.301

Source: Primary Data 2022

The explicit and implicit revenue is accumulated as total revenue. Explicit revenue is a reduction of rice production after the implementation of crop sharing with the landowner and double-tapping labor. Implicit revenue is a share that should be received by farmers before it is distributed to other parties.

The revenue of rice farming in the study area is demonstrated in Table 6. The average selling price of dry milled grain (kg) from farmers to intermediaries is IDR 4.087/ha; on

the other hand, the average volume of rice output in Sukadiri sub-district is 5.643.73 kg/ha. The revenue earned by farmers due to the sharecropping system is IDR9,2 million, whereas the initial revenue from all yields sold would be IDR23,3 million/ha/ growing season. In practice, due to the higher rent to be paid on the leased-out land, the landless or poor households are increasingly getting out of this cash payment system (Sahay, 2020).

Cost, Income, and R/C ratio

In line with other research findings, the highest cost is on the land (Fitriah et al., 2018; Ginting et al., 2017; Sabri et al., 2019). Farmers receive benefits since the rental land paid through sharecropping is lower than that at the market rate, which reaches up to IDR75 million per hectare annually. As previously described, Table 6 shows two analyzes in cost structurize that are (i) a 50:50 sharecropping, and (ii) a simulation of cash rent based on market rate (IDR25 million per growing season). Family labor, seeds, and depreciation of equipment are still classified as implicit costs; on the other hand, the remaining are categorized as explicit costs.

In analysis 1 of Table 6, we examined the cost of farming under a sharecropping system, the total explicit cost experienced by farmers was found to be less than the total cost in analysis 2 of Table 7. The cost saving in production escalates revenues, resulting in a high revenue-cost (R/C) ratio (Ahmed & Billah, 2018; Mouris & Setiawan, 2019). The R/C ratio on explicit cost is 4,76 which demonstrates the conditions of the sharecropping system of 50:50 of rice production. This R/C ratio indicates that for every rupiah spent, farmers create revenue of as much as 4,76 rupiah in return. This value is higher than other research findings with an R/C ratio of 2,22 and 3,88 (Ginting et al., 2017; Sabri et al., 2019). The difference in the grain price and production in every research area is indicated as the main factor.

The cash profit received by farmers is IDR7,31 million per hectare per growing season. Compared to other research findings, this value is relatively higher (Ginting et al., 2017), equal (Sabri et al., 2019), or less (Fitriah et al., 2018) depending on the selling price and productivity in each research location. Suppose the farmer also pays for the other implicit costs, like the depreciation of equipment, wages of family labor, and charge of seeds, the farmer's revenue will be IDR5,40 million. Farmers benefit since seeds are obtained free of charge, while labor and depreciation of equipment are also not calculated.

Analysis 2 of Table 6 shows the simulation when the land rent is based on the market rate and double-tapping labor paid by their man-day (HOK). Most of the production cost is allocated for land rent (84,5%). The high cost of renting land resulted in a loss for farmers since their revenue needed to be increased to pay overall costs (Ahmed & Billah, 2018; Moon et al., 2020). This study found that if the double-tapping labor is paid based on their man-day, the labor costs incurred are much less than the value of 1/5 part of the harvest. The value of the R/C ratio in analysis 2 is also less than 1 (0,83), indicating that conducting a rental system to pay for land has made farming infeasible.

According to this study's findings, farmers have gained two benefits, i.e. (1) by

conducting a land rent based on a 50:50 sharecropping system and (2) by receiving seed aid from the government. In contrast, the wage payment of double-tapping labor by sharing a 1/5 part of production is detrimental to farmers, compared to a man-day cash payment. Overall, it is concluded that the actual condition where farmers conduct sharecropping of 50:50% farmer-landowner and 80:20% farmer-double tapping labor is more efficient in resource use than the simulation where the cash payment is applied. The conclusion that the sharecropping system is beneficial for farmers, supports the statement of other researchers (Ahmed & Billah, 2018; Mukhamedova & Pomfret, 2019; Quijada et al., 2022).

CONCLUSION

The characteristics of rice farming farmers in Sukadiri sub-district are contained with productive age farmers, currently 42-57 years old. The formal education level of farmers is relatively low - led by primary school graduates, although they are included in the experienced category. The average area of land maintained by farmers is 1,21 hectares, placing it in the medium-size category.

An income analysis demonstrates that rice farming with a 50:50 sharecropping system is possible, whereas farmers will incur losses suppose land rent is paid at market rates. The R/C ratio of explicit cost in the sharecropping system is 4,76, indicating that farmers receive a return of IDR4,76 for each spent. The profit obtained is IDR7,3 million per hectare every growing season.

This study indicated that rice yields in Sukadiri Sub-district were relatively low, with an average of 5,6 tonnes per hectare compared to national rice yields of as much as 8 tonnes per hectare. The overuse of chemical fertilizers reportedly causes damage to soil and plants; thus, rice cannot be produced optimally. The usage of organic matter is advised to improve soil ecosystems and increase rice yields in the research area.

This study comprehends two benefits obtained by farmers, i.e. 1) saving on land costs since the profit-sharing value is lower than the market rate for land rental, and 2) saving on seed costs by getting free seeds from the government. Nevertheless, the rice yields are considerably low. A possible explanation for this is not only because of the overdose of chemical inputs but also the less motivation from farmers to gain optimum productivity.

This study suggests that sharecropping would be a reason to preserve the existence of rice farming in the studied area. The wage payment for double-tapping labor by sharing a 1/5 part of production may be detrimental to farmers, compared to a man-day cash payment. However, sharecropping on land between farmers and landowners benefits farmers, while sharecropping on labor provides better income for double-tapping labor. This study concluded that the actual condition where farmers conduct sharecropping of 50:50 farmer-landowner and 80:20 farmer-double tapping labor is more efficient in resource use than the simulation where the cash payment is applied.

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