



Welfare Level of Organic Rice Farmers Based on Good Service Ratio, Farmer Household Income Exchange Rate, And Farmers Exchange Rate in Central Java and Yogyakarta, Indonesia

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Abstract

Organic rice farming is receiving greater attention from the community due to their increasing awareness of healthy food consumption patterns. This study aimed to determine the level of welfare of organic rice farmer households in Central Java and Yogyakarta. Sampling was carried out using proportional stratified random sampling from five districts for a total of 150 respondents. Data analysis used the good service ratio (GSR), farmer household income exchange rate (FHIER), and farmer exchange rate (FER) approaches. Farming households with GSR values of 0.36 and FER values of 108.66, respectively are classified as prosperous. Meanwhile, farmers are still classified as not prosperous because of the FHIER values of 0.89. The results also show that incomes from organic rice farming contributed to around 31.51% of household incomes. Therefore, farming is feasible to be developed because it has the potential as a source of income for the welfare of farmer households. In addition, the results of the study can be used by stakeholders in supporting productivity, welfare, and even the food security of farmers to encourage economic growth.

Keywords: Organic rice, Welfare, GSR, FHIER.

مستوى رفاهية مزارعي الأرز العضوي بناءً على نسبة الخدمة الجيدة، وسعر صرف دخل أسرة المزارع، وسعر صرف المزارعين في جاوة الوسطى ويوجياكارتا، إندونيسيا

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الخلاصة

تكتسب زراعة الأرز العضوي اهتماماً متزايداً من المجتمع نظراً لوعيه المتزايد بالعادات الغذائية الصحية. هدفت هذه الدراسة إلى تقييم مستوى رفاهية أسر مزارعي الأرز العضوي في جاوة الوسطى ويوجياكارتا. جمعت العينات باستخدام طريقة العينات العشوائية الطبقية المناسبة عبر خمس مقاطعات، والتي شملت 150 مستجيباً. استخدم تحليل البيانات أساليب نسب الخدمة الجيدة (GSR) ومعدل صرف دخل أسرة المزارع (FHIER) وسعر صرف المزارع (FER). يعتبر حال الأسر الزراعية التي تبلغ قيم GSR و 0.38 FHIER و 1.22 على التوالي مزدهرة. ومع ذلك، لا يزال المزارعون يصنفون على أنهم غير مزدهرين بسبب قيم FER البالغة 0.72 و باللغة 13.67، مما يشير إلى أنهم يعتمدون فقط على دخل الزراعة، وهو ما لا يكفي لتغطية نفقات الأسرة. كشفت النتائج أن زراعة الأرز العضوي تساهم بنحو 18.95% في دخل الأسرة، وهذا يشير إلى أن الزراعة لديها إمكانات للتطوير كمصدر دخل لتحسين رفاهية أسرة المزارع. وعلاوة على ذلك، فإن نتائج الدراسة يمكن أن تساعد أصحاب المصلحة في تعزيز الإنتاجية والرفاهية والأمن الغذائي للمزارعين، وبالتالي تعزيز النمو الاقتصادي.

كلمات مفتاحية: الأرز العضوي، الرعاية الاجتماعية، GSR، FHIER

Introduction

Indonesia is an agrarian country because many Indonesians make a living as farmers. This is because Indonesia's geographical conditions are very supportive of agricultural activities, such as fertile soil, tropical climate, and sufficient rainfall throughout the year (8 and 27). The agricultural sector has an important role in supporting the Indonesian economy, such as providing jobs, increasing national food security, and reducing poverty (2, 14 and 15). With food security, Indonesia's agricultural sector can become the main food supplier for the domestic and international markets (17).

Organic agriculture in Indonesia has been experiencing significant development, especially in rice production (6 and 7). This agricultural practice is in great demand

because its food products are free from pesticide residues and can meet the demand for healthy food (5 and 12). These agricultural practices also support environmental sustainability as they can maintain soil fertility, conserve water resources, and reduce greenhouse gas emissions (1, 3 and 20). In addition, education and training related to organic rice farming practices are increasingly being carried out with full support from the government through subsidies which makes conventional farmers switch to organic farming practices (18 and 50). Organic rice farming practices not only focus on increasing production but also tend to increase people's income, improve the standard of living and welfare of farmers (16). This can be seen from the level of productivity and income level of organic rice farming in terms of supporting national economic growth (19).

The increasing productivity and income of farmers from organic rice farming has the potential for household income and can affect the welfare of farmer households. This can be seen from the success rate of the organic farming system for households that can produce added economic value due to easy market access and relatively good price stability. In addition, farmer welfare is not only seen from income but also other aspects such as expenditure for consumption and non-consumption as well as for the sustainability of the farming business itself. Farmers who can consistently carry out organic rice farming practices tend to have good household economics because they do not depend on chemical inputs, even though there are expensive certification costs. The existence of expensive certification is balanced by the efficiency of long-term agricultural management and good product selling value.

Central Java and Yogyakarta are two regions that have focused on the development of organic agriculture, especially rice crops. Magelang Regency, Central Java, can be used as an example of the largest organic rice farming area in Indonesia covering a land area of 2,000 hectares. This success is mainly due to cooperation between farmers and local stakeholders in realizing a more environmentally friendly sustainable agricultural system. These efforts will help increase farmers' incomes, which also affects their level of welfare. In addition, strengthening the organic farming system is also aimed at increasing land productivity and efficiency of organic input use which has an impact on household welfare levels. Welfare is not only economic but also covers all aspects, such as social and ecological. Previous research has not clearly explained the relationship between organic rice farming and the welfare of farmers as the main actors in the activity. Therefore, this study aims to examine the income and welfare of organic farmers households in Indonesia, especially in Central Java and Yogyakarta. The development of organic rice farming is explored not only from economic but also from social, educational, and ecological aspects.

Materials and Methods

Research Location: This study uses a quantitative descriptive research method to illustrate the level of welfare of farmer households. The selection of the research location was based on considerations, such as the number of organic rice farmer groups, agricultural land area, income level, and government policies and support. The research location includes two districts in Yogyakarta, namely Bantul Regency and Sleman Regency, and three districts in Central Java, namely Magelang Regency, Sragen

Regency, and Karanganyar Regency. Based on data from the Yogyakarta Agriculture and Food Security Service, organic land covers around 29.20 Ha, and based on data from the Central Java Agriculture Service, it is more than 1 million Ha. Through these data, it is concluded that the selection of research locations has a wide scope of organic agriculture in Indonesia. In addition, with a large scale of land, it is hoped that this research will provide a clearer picture of the welfare of organic rice farmers.

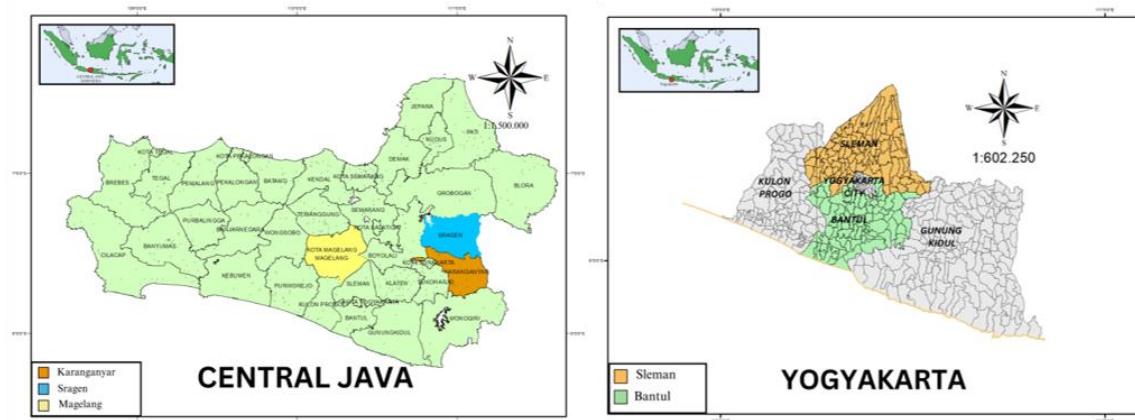


Fig. 1: Study Location.

(Source: The Authors).

Table 1: Number of Respondents.

Research Location	Number of Respondents
Bantul, Yogyakarta	30
Sleman, Yogyakarta	30
Magelang, Central Java	30
Sragen, Central Java	30
Karanganyar, Central Java	30
Total	150

Sampling procedure and data collection: This study uses an interview method based on a questionnaire. Proportional stratified random sampling was used in this study whereby the area was divided into five districts with the sample size for each location proportional to the population, namely 30 respondents per location, giving a total of 150 respondents (Table 1). Data collection was done by looking at the existence and activities of farmer groups as active organic farming actors. The data covered farmer characteristics, such as age, education, farming experience, land ownership, and number of family dependents. Other data included the form of farming inputs and household expenditures for both consumption and sustainability of farming. The data was then used as a basis for assessing the level of welfare of farmer households.

Table 2: Farmer Household Welfare Indicators.

GSR	FHIER	FER
<p>Food expenditure, such as foodstuffs, side dishes, drinks, or snacks, and non-food expenditure, such as electricity, water, taxes, health, or social.</p> <p>The GSR indicator compares farmers' income allocation for household consumption, both food and non-food. So, if the value is <1, the farmers' household consumption level is better because they can meet their basic needs.</p>	<p>Agricultural income, non-agricultural income, household expenses, both expenditure on food, non-food, and farming.</p> <p>The FHIER indicator measures welfare by looking at the overall economic structure, comparing total income and total expenditure. The result shows whether households have a surplus or deficit in meeting their daily needs.</p>	<p>Organic rice farming income, household expenses, both expenditure on food, non-food, and farming.</p> <p>The FER indicator measures the economic viability of farming activities, namely whether organic rice income is sufficient to cover household and production expenses.</p>

Analysis techniques:

a. Good Service Ratio (GSR)

GSR is one of the criteria for analyzing welfare by comparing food and non-food expenditure (4) so GSR indicator is used to assess consumption efficiency. If food production is greater than non-food, it can be said that farmer households are less prosperous, while if food production is smaller than non-food, farmer households are more prosperous because farmers are already able to meet their food needs, so the spending is focused on non-food items that are considered more diverse. This can be interpreted by the way farmers allocate income for food and non-food needs so that they are met. The calculation of GSR analysis is by looking at the amount of expenditure on both food and non-food within one year. These criteria can be calculated as follows:

$$GSR = \frac{\text{Food Expenditure}}{\text{Non Food Expenditure}} \quad (1)$$

From the GSR analysis, we can determine the following:

$GSR > 1$: household economy is less prosperous

$GSR = 1$: household economy is prosperous

$GSR < 1$: household economy is more balanced

b. Farmer Household Income Exchange Rate (FHIER)

FHIER can be used to analyze well-being by paying attention to the total income and expenditure of households (4 and 7). Income itself can be sourced from income within and outside the agricultural sector. Then, household expenditure can be used to meet both food and non-food needs, and for farming. The calculation of the FHIER analysis can be seen from the overall revenue generated and the expenditure needed within one year. FHIER can be calculated using the formula:

$$FHIER = \frac{\text{Total Income}}{\text{Total Expenditure}} \quad (2)$$

From the FHIER value, we can determine the following:

$FHIER > 1$: farmers' income is greater than expenditure so that their welfare level is included in the prosperous group.

FHIER < 1: farmers' income is smaller than expenditure so that their welfare is included in the group of not yet prosperous.

c. Farmers Exchange Rate (FER)

FER is used to measure the level of farmer welfare. It measures the purchasing power of farmers based on the results of sales or income from their farming business for daily living needs, both for farming and household consumption. FER is used to examine the ratio between the price received by farmers (output) and the price paid by farmers (input) (43). So, FER evaluates the sustainability of a particular farming business and if the result is a surplus (>100) then the income from farming contributes greatly to the welfare of farming household.

FER can be calculated using the formula:

$$FER = \frac{I_t \text{ (farmer price index)}}{I_b \text{ (farmer paid price index)}} \times 100\% \quad (3)$$

From the FER value, we can determine the following:

FER > 100: indicates that the increase in production prices is greater than the increase in consumer goods prices. This means farmers' income rises and exceeds their expenses, placing them in a surplus condition.

FER = 100: farmers are in a break-even position, where the income earned from agricultural production is equal to their household and production expenditures.

FER < 100: indicates that the increase in consumer goods prices is relatively higher than the increase in production prices. As a result, farmers' income declines and falls below their expenses, indicating a deficit condition.

Results and Discussion

A. Characteristics of Farmers: Farmer characteristics can be seen from a social perspective, such as age, gender, education level, and farmer involvement in farmer groups (21). In addition, from an economic point of view, it is seen from how much income and expenditure the farmer's household is, and from a cultural aspect, it is seen from how the farmer carries out a tradition that is often carried out in the village.

Table 3: Organic Rice Farmers in Central Java and Yogyakarta.

Variable	Yogyakarta		Central Java		Total	
	Freq (n = 60)	%	Freq (n = 90)	%	Freq (n = 150)	%
a. Gender						
Male	37	61.67	72	80.00	109	72.67
Female	23	38.33	18	20.00	41	27.33
b. Age						
28 - 43	5	8.33	10	11.11	15	10.00
44 - 59	31	51.67	38	42.22	69	46.00
60 - 76	24	40.00	42	46.67	66	44.00
c. Family members						
2 - 3	33	55.00	42	46.67	75	50.00
4 - 5	22	36.67	37	41.11	59	39.33
>5	5	8.33	11	12.22	16	10.67
d. Education level						
0 - 6	18	30.00	42	46.67	60	40.00
7 - 12	40	43.33	46	51.11	86	57.33
>12	2	26.67	2	2.22	64	2.67
e. Farming Experience (yrs)						
1 - 20.7	18	30.00	24	26.67	42	28.00
20.8 - 40.3	26	43.33	33	36.67	59	39.33
40.4 - 60	16	26.67	33	36.67	49	32.67
f. Land Size						
150 - 3,466	51	85.00	59	65.56	110	73.33
3,467 - 6,783	9	15.00	25	27.78	34	22.67
6,784 - 10,100	0	0.00	6	6.67	6	4.00
g. Land Ownership						
Alone	36	60.00	66	73.33	102	68.00
Rented	5	8.33	3	3.33	8	5.33
Sharing	19	31.67	21	23.33	40	26.67

1. Gender: In agricultural activities, men generally play a more dominant role in physical labor and decision-making (10 and 22) while women are usually involved in post-harvest activities. Table 3 shows that organic rice farmers are dominated by males, with 61.67% in Yogyakarta and 80% in Central Java, resulting in 72.67% male respondents out of 150. This indicates that organic rice farming is still largely dominated by men due to the physical strength required. On the other hand, limited access to the agricultural sector for women may stem from their critical roles in household management (23). However, it is worth noting that in this study, planting activities were predominantly carried out by women with the men involved in land cultivation and harvesting.
2. Age: Age indicates the length of life from human birth to the present (11). In the agricultural sector, productive age groups are essential to support farming productivity, highlighting the need for significant farmer regeneration. Table 3 shows that most organic rice farmers fall within the 44-59 age range (46%), followed by 60-76 years (44%), and only 10% are in the youngest group of 28-43 years. This indicates that organic rice farmers are primarily within the productive to elderly age range. Productive age is associated with the capacity to optimize

work performance, motivation, and adaptability to agricultural innovations (25), as well as being more capable and adaptive to new technologies and innovations in agricultural practices. Nonetheless, this study reveals low participation from the younger generation, posing a challenge for future farmer regeneration.

3. Number of Family Members: The number of family members varies depending on the socio-economic structure and family structure of each farmer. Based on Table 3, the average family size of organic rice farmers is 2-3 members, comprising 50% of respondents. This suggests an ideal family size, as a larger number of household members generally leads to higher household expenditures. Increased expenses can, in turn, affect overall family welfare, since more dependents result in greater financial burdens. Family size also plays a role in farming activities (25), influencing task distribution and enabling farmer regeneration for the sustainability of the family farm.
4. Education Level: Education has a positive role in farming (14), although farmers' education levels vary depending on their access to educational resources. According to Table 3, most farmers have a moderate education level, with 57.33% having 7-12 years of schooling—equivalent to completing high school. Meanwhile, 40% of farmers fall within the 0-6 years education range. This suggests that a sufficient level of education may influence farmers' decision-making, opportunity recognition, and ability to access information. According to Noori et al. (2024) in research conducted in Iraq, farmers with high levels of education are targeted for agricultural conservation because the higher the education of farmers, the higher the adoption rate compared to farmers with low levels of education. In Central Java, particularly Magelang Regency, the adoption of agricultural technologies remains low due to continued reliance on traditional methods. Therefore, improving farmers' education is necessary to enhance their knowledge (25) and skills in particularly in implementing organic farming practices.
5. Farming Experience: Farming experience shows how long farmers have been farming and affects the success of their enterprise (26). Table 3 shows that most organic rice farmers in Central Java and Yogyakarta have between 20.8 and 40.3 years of farming experience (39.33%). This demonstrates that these farmers are quite experienced in addressing challenges and solving problems, making them more capable than less experienced farmers. In organic rice farming, experienced farmers can transfer knowledge to others, promoting collective contribution to the development of organic farming. In this study, Bantul Regency had the most experienced farmers, having adopted organic farming since 2013, whereas Sleman Regency had the least experience, as it is still transitioning to organic agriculture.
6. Land Size: The land size of each farmer varies significantly depending on the geographical conditions and the scale of the farming carried out (26). According to Table 3, most organic rice farmers in Central Java and Yogyakarta own land within the 150-3,466 m² range, comprising 73.33% of respondents. This indicates that land size influences how farmers manage their farms, as those with larger plots are typically more willing to take risks and adopt innovations. Moreover, larger land holdings enhance farming efficiency (24) as farmers can use resources

optimally and also affect the level of yield obtained. Farmers in Indonesia dominantly have a land area of less than 1 hectare due to the agricultural system that is still on a small scale and limited land ownership.

7. Land Ownership Status: The existence of land ownership status shows the difference between land-owning farmers and cultivating farmers or tenants. Table 3 shows that organic rice farmers have their own land of 68%. This means that the land used for farming belongs to them, either from family inheritance or from purchases, so that farmers have full control over the agricultural system implemented (41). By owning land, they can maximize production and profits from selling their products, whereas in renting or working on someone else's land, the agricultural profits are shared, and farmers who own their own land can get a higher income.

B. Cost

1. Farming Input Costs: The cost of production facilities includes inputs that must be spent by farmers to carry out farming (46 and 48). So, it needs to be managed properly to increase productivity and sustainability of farming. Such costs are incurred for the purchase of seeds, fertilizers (liquid or solid), and pesticides (chemical or organic). Better management of costs enhances farming productivity.

Table 4: Average Annual Costs of Farming Inputs.

Production Facilities	Region		Total (IDR)
	Yogyakarta	Central Java	
Seed Varieties			
a. Impari (32 and 64)	91,278	105,323	196,601
b. Menthik (Susu and Wangi)	105,100	71,133	176,233
c. Ciherang	403,515	6,617	410,132
d. Cinta nur	0	29,333	29,333
e. Rojolele	25,463	0	25,463
f. Sembada merah	41,900	0	41,900
g. Padi merah	13,025	0	13,025
h. Others	27,750	0	27,750
Fertilizer			
a. Compost	158,350	495,167	653,517
b. Liquid fertilizer	53,250	24,667	77,917
c. Solid fertilizer	15,000	5,167	20,167
d. Chemical fertilizer	103,750	53,300	157,050
Organic pesticides	9,750	9,875	19,625
Chemical pesticides	0	2,500	2,500
Total	1,048,130	803,082	1,851,212

The production facilities issued include seeds, fertilizers, and pesticides. Based on Table 4, many organic rice farming businesses in Yogyakarta use Ciherang seed varieties for IDR 403,515, while in Central Java Province, the most used are Impari seed varieties for IDR 105,323. The application of fertilizers in organic rice cultivation is primarily composed of compost, with an overall expenditure of IDR 653,517, while pest control relies on organic pesticides costing IDR 19,625. These three production inputs are critical in organic rice farming from planting to harvesting. In the study, it was found that there are still some farmers who still use chemical inputs, although the

percentage is very small, especially in Yogyakarta because farmers are still in the transition period to switch to organic farming.

2. Depreciation Costs: Depreciation is a reduction in the value of a fixed asset over time and how often it is used. The deterioration of equipment can affect farming expenditure (44) due to the cost of maintenance, repair, or replacement to ensure smooth operations. By considering the depreciation cost of the tool, it is indirectly able to increase farming productivity.

Table 5: Average Annual Depreciation Costs.

No.	Tool	Region		Total (IDR)	%
		Yogyakarta	Central Java		
1.	Hoe	39,941	13,459	53,400	27.61
2.	Sickle	15,123	10,307	25,430	13.15
3.	Sprayers	6,885	8,055	14,941	7.72
4.	Scales	2,562	5,223	7,785	4.02
5.	Shovel	6,548	2,543	9,091	4.70
6.	Rake	1,672	2,436	4,107	2.12
7.	Tractor	51,840	18,830	70,670	36.54
8.	Other Equipment	5,889	2,112	8,001	4.14
Total		130,459	62,965	585,648	100.00

Table 5 shows that the highest costs incurred for depreciation is for tractors at 36.54%, while the slowest is for rakes at 2.12%. So, tractors have an important role in organic rice farming balanced with the resulting work efficiency so it requires maintenance costs to ensure that they function optimally. In this study, tractors were used for land processing by all farmers at the research location because the tractors were owned by farmer groups, thus providing easy access for farmers who did not have tractors.

3. Labor Costs: Labor is one of the keys to the success of farming because it has a direct role in all production activities from land cultivation to post-harvest and marketing. In addition, the existence of labor also affects the level of productivity of the farming that is carried out. Labor in the family utilize energy from their own families to reduce the expenses needed. In addition, there are costs of working outside the family by utilizing other people's labor which is then given wages and engine power costs that support higher efficiency in farming (9).

Table 6: Average Annual Labor Costs.

Description	Region			
	Yogyakarta		Central Java	
	Non farm labor (WH)	Total (IDR)	Non farm labor (WH)	Total (IDR)
Land prep	91.8	1,838,850	133.26	2,055,890
Planting	225.6	4,512,000	327.9	6,339,400
Weeding	30.00	16,667	333	1,621,833
Harvest	143.94	3,066,722	308.1	5,933,778
Post-harvest	15.00	16,667	115.2	618,667
Transport	7.65	5,631	36.81	251,242
Total	513.99	9,456,537	1,254.27	16,820,810

*WH = Working Hour

Table 6 shows the average labor costs of organic rice farmers in the two regions. The costs are classified into farm labor, non-farm labor, and machine. In Yogyakarta, the total working hours non-family labor was 513.99 WH, with a total labor cost per year of IDR 9,456,537. The most dominant use of labor was in planting activities because planting requires a lot of energy to collect the results of organic rice production at IDR 4,512,000 per year. Meanwhile, in Central Java, the total working hours of non-family labor is higher than Yogyakarta and reached 1,254.27 WH. The total labor cost in Central Java reached IDR 16,820,810 per year with the most expenses for planting and harvesting.

4. Other Costs: Other costs also need to be incurred for the smooth production process in organic rice farming. Components of these costs include packaging, repair of capital goods, indirect taxes, and others that farmers need to incur (31). With other costs, farmers are also able to ensure the sustainability of organic rice farming in the future by still considering expenses for other costs.

Table 7: Average Other Costs Per Year.

No.	Other Costs	Region		Total (IDR)
		Yogyakarta	Central Java	
1.	Packaging and labelling	49,267	28,281	77,548
2.	Repair of capital goods	410	143,167	143,576
3.	Indirect taxes	616	36,439	37,055
4.	Cash and farmer group membership	508	25,167	25,674
5.	Organic certification fees	275,424	275,424	550,847
6.	Internet/credit	823	7,000	7,823
7.	Rented land	252,500	215,508	468,008
Total		579,124	730,561	1,309,684

Table 7 shows the various other costs that need to be incurred by farmers. The highest miscellaneous costs incurred were for organic certification at IDR 550,847 because certificates are needed to ensure the organicity and quality of products. The lowest costs were for cash and farmer group membership at IDR 25,674. Organic certificates with Indonesian national standards (SNI) are only valid for 3 years and certification costs are borne by the farmer groups that implement. They can also be renewed after the expiry of the validity period.

C. Farmer Household Income: Farmers' household income is divided into farming and non-farming incomes. Farming income is the main activity that is usually carried out and earns a fixed income to meet daily needs. Farming income comes from agricultural activities carried out by family members, from land cultivation to post-harvest, and includes food crops, horticulture, or livestock. This income can provide economic stability for the family in meeting daily living needs and is usually obtained from the marketing of agricultural products. So, income from the agricultural sector provides opportunities for farmers to improve family economic welfare (32). Non-farming income includes that obtained outside of agricultural activities (42), such as employees, entrepreneurs, or traders. Non-farming income is an additional source that can help in meeting household economic needs.

Table 8: Average Annual On-farm and Non-farm Incomes.

Type of Income	Region		Total (IDR)	%
	Yogyakarta	Central Java		
Agriculture			41,044,971	50.86
Organic rice farming	9,439,060	15,991,467	25,430,527	31.51
Livestock	4,400,000	11,214,444	15,614,444	19.35
Non-Agricultural			39,670,444	49.14
Farm labourers	2,060,000	2,176,000	4,236,000	5.25
Freelance workers	4,830,000	2,480,000	7,310,000	9.06
Official	1,220,000	1,333,333	2,533,333	3.16
Traders	11,320,000	7,744,444	19,064,444	23.62
Service	2,400,000	3,306,667	5,706,667	7.07
Pension	800,000	0	800,000	0.99
Total	36,469,060	44,246,356	80,715,416	100.00

Based on Table 8, it can be seen that farmers' sources of income come from farming and non-agriculture. The average annual household income of organic rice farmers in Central Java and Yogyakarta was IDR 80,715,416. Income from the agricultural sector reached IDR 41,044,971 comprising organic rice farming (IDR 25,430,527) and the livestock sector (IDR 15,614,444) or 50.86% of farmers' household income. Meanwhile, income from outside farming is obtained from jobs as farm laborers, freelance workers, employees, traders, services, and pensioners who contribute 49.14% of income. The highest non-farming income was obtained from work as traders, which amounted to IDR 19,064,444 (23.62%) while the lowest was obtained from pension with a value of IDR 800,000 (0.99%).

Therefore, it is concluded that the amount of income of farmer households obtained from organic rice farming is 31.51%, making organic rice farming fairly worthwhile as it can increase the economic stability of farmers. On the other hand, many farmers have jobs outside the farm to meet household needs with large expenses. This shows that organic rice farming is still not fully able to become the main source of livelihood, especially among rural farmers. So, more jobs owned by farmer households require great sacrifices and can improve the welfare of farmers because the income obtained is higher.

D. Farmer Household Expenditure: Farmer household expenditure can be grouped into food expenditure, non-food expenditure, and expenditure on agricultural businesses (45). Farming expenditure is the input value incurred for the production process but does not include the cost of labor in the family, such as for agricultural production facilities, depreciation of tools, labor, land rent, and other costs. Then, household expenditure includes food and non-food expenditure. Food expenditure is a cost incurred for daily needs in the form of food and beverages and basic needs. Then, non-food expenditures are incurred in addition to food needs, which can be in the form of fuel, electricity, taxes, or social activities depending on the preferences and income levels. The amount of expenditure needed can be caused by the number of family members, the need for food and non-food, and others.

Table 9: Average Annual Farmer Household Expenditure (IDR).

Type of Production	Region		Total
	Yogyakarta	Central Java	
Food			16,096,082
Rice	97,000	281,333	378,333
Side dishes	2,750,667	3,044,722	5,795,389
Vegetable	1,181,500	1,074,800	2,256,300
Kitchen Spices	1,979,610	2,158,000	4,137,610
Drink	744,167	670,039	1,414,205
Snacks	488,333	617,444	1,105,778
Fruits	464,600	543,867	1,008,467
Non-Food			44,661,669
Description and Fuel	4,859,200	4,945,733	9,804,933
Tax	2,306,700	2,551,592	4,858,292
Communication	1,314,600	1,467,380	2,781,980
Family	5,981,667	6,198,587	12,180,253
Daily necessities	1,637,000	1,721,333	3,358,333
Health	85,000	347,722	432,722
Social	4,330,000	4,683,333	9,013,333
Miscellaneous fees	996,267	1,235,556	2,231,822
Total food and non-food expenditure	29,216,310	31,541,441	60,757,751
Expenditure for agricultural and non-agricultural businesses	11,214,250	18,417,417	29,631,667
Total household expenditure	40,430,560	49,958,858	90,389,418

Table 9 shows that the expenses needed by organic rice farmers in Central Java and Yogyakarta include food, non-food, and farming items. Food expenses amounted to IDR 16,096,082 which includes the cost of buying rice, side dishes, spices, drinks, and snacks. Non-food expenses amounted to IDR 44,661,669 covering expenses for lighting and fuel, taxes, communication, family, and others. Meanwhile expenses for farming reached IDR 29,631,667 for the purchase of agricultural inputs, organic certificates, labor, equipment depreciation, and others. The amount of household expenses is based on meeting daily needs and farmers can allocate their income not only for food expenses but also for non-food and farming which are no less important. Thus, the income obtained by farmers is allocated to cover household expenses balanced with the ability of farmers to manage expenses wisely so that all household needs can be met.

E. Standard of Living of Farmer Households Based on Welfare Level

1. Good Service Ratio (GSR): GSR can be used to compare food expenditure and non-food expenditure of farmer households. Food expenditure is the value spent on daily needs, such as rice, side dishes, snacks, and drinks. On the other hand, non-food expenditure is that spent on non-food needs, such as fuel, taxes, health, social, and other costs. Based on the calculations, a GSR value of 0.36 was obtained. It can be interpreted that the household economy of organic rice farmers in Central Java and Yogyakarta is more prosperous because the GSR value is < 1 , meaning that farmers can meet their daily needs both for food and non-food.
2. Farmer Household Income Exchange Rate (FHIER): FHIER measures the level of farmers' welfare seen from the comparison of the amount of income and household

expenditure of organic rice farmers. The larger the FHIER the greater the income over expenditure, indicating that farmer households are prosperous. Based on the calculations, the FHIER value was 0.89. This can be interpreted that the household economy of organic rice farmers in the two regions is experiencing a deficit because income is less than expenditure, so the welfare of farmer families has not reached the prosperous level.

3. Farmers Exchange Rate (FER): FER measures the level of farmers' welfare by assessing the contribution of farm income to household expenditures. A higher FER value indicates a surplus condition for the household, where income from farming alone is sufficient to cover both agricultural production and household expenses. The I_t and I_b values were obtained from the BPS (Badan Pusat Statistik) in both regions because these measurements are more indicative of farmers' purchasing power to meet their needs as seen from commodity sales, and this study focuses on organic rice sales. FER measurements cannot be made based solely on research respondents because FER is a macro-household indicator and is usually compiled by the BPS. This is because FER measurements based solely on respondents do not represent regional conditions. FER is aggregate in nature and is based on price indices, while farmers cannot determine commodity prices. The calculations show that the FER value for rice farmers in Central Java and Yogyakarta is 108.66, indicating that their level of welfare is still in a surplus condition. This means that income from farming is sufficient to cover household expenses, as every IDR 100 spent is supported by an income of IDR 108.66. Therefore, rice farming is sufficient to meet household living needs both for consumption and agricultural sustainability.

Discussion:

Based on research by (7) titled, "The role of organic rice farm income on farmer household welfare: Evidence from Yogyakarta, Indonesia", this study discusses the role of organic rice farming on farmer household income which can affect the level of welfare of farmer households. This journal is relevant to our research, namely how farmers' income, both from agriculture and non-agriculture, can improve the welfare of farmer households. In the journal, it is stated that the welfare of farmers has not yet reached the level of prosperity, but the income of the agricultural sector can support welfare by 34.71%.

Similarly, research by Dako et al. (2022) using the agroforestry model shows that the welfare level of the mountain community in Ajaobaki Village District of South Central Timor has not yet reached the prosperous category (56.11%). This is due to the community's tendency to prioritize fulfilling primary needs over consuming service values. On the other hand, in our study, the results of the GSR analysis calculation show a value of 0.36, which means that expenditure on food is greater than on non-food items so that the income generated is met for the food needs of farmer households. So, if viewed from the consumption efficiency aspect (GSR), organic rice farming households in the research area are classified as prosperous households with an average value of $GSR < 1$. With this, organic rice farming reflects good access to services and support from the government and is needed for the sustainability of farming to improve

welfare. From the results of our research, it can be concluded that the average respondent was able to use income to meet both food and non-food needs because both were considered important to be fulfilled. This condition shows that, in terms of consumption, farmers can allocate their expenditures for non-food purposes because their household food needs are already sufficiently met. However, when viewed from the perspective of GSR, it is only able to describe the ability of farmers to determine household consumption priorities without considering overall income. Therefore, from an overall economic perspective, organic rice farmers must be able to earn a higher income than their total household expenditure in order to be categorized as a prosperous household.

Organic rice farming in Central Java and Yogyakarta obtained a FHIER value of 0.89, meaning that income is less than expenditure, and thus the farmer households are classified as unprosperous. In contrast, research by (28) found that the welfare level of IPFF farmers in Tasikmalaya reached the prosperous category, with a score of 1.45. This indicates that farmers can utilize their income for food and non-food expenditures. The low FHIER value in our study may be caused by the marketing results of agricultural products which are still not balanced with the high cost of living, so farmers have difficulty meeting their needs. In other hand, the low FHIER value may be since not all organic rice production is sold, as some is retained for personal consumption. As a result, farmers still must incur costs for organic rice cultivation, but their income is lower than their farming costs. In addition, it can be caused by farmers who are still hesitant to diversify products and marketing scopes, especially in organic rice that has not yet expanded so that it can hinder the development of organic rice farming practices. Therefore, what needs to be done is for farmers to seek additional income, undergo training on more efficient and bold agricultural practices to take risks, expand market reach, and support from the government for the sustainability of organic farming.

On the other hand, research by (12) shows that the amount of farmers' income is obtained from the level of diversification of livelihoods to mitigate risks and increase their income. (10) mentioned that both agricultural and non-agricultural income has a positive relationship with welfare. Another study (13) found that the organic rice market has good potential if it is balanced with a stable market, institutional and government support, and an established value chain. This is because organic farming requires extensive and relatively expensive expertise, which is still a significant burden for small farmers, especially the cost of organic certification. In addition, the domestic organic rice market in Indonesia is still weak due to high product prices, so efforts are needed to stabilize prices and market demand. This finding is further supported by (33), which indicates that the market dynamics of rice have great potential when supported by government involvement through well-designed policies accompanied by educational and transparent promotional strategies. This is because consumers tend to prefer and rely on high-quality products, clear and reliable information, and prices that are aligned with product quality. The novelty of this study is in the use of GSR and FHIER as indicators of household welfare and used in the context of organic farming which is still not widely practiced in Indonesia. In addition, this study also analyzes the

sources of income and expenditure of farmers in detail so that it can provide a clearer picture, especially in organic rice farming.

The correlation between GSR and FHIER with the welfare of farmer households, namely by using the GSR indicator, can describe how efficient farmer expenditure is for consumption and non-consumption. From the calculations, the GSR value was 0.36 indicating that farmers prioritize meeting consumption needs over others. This is related to welfare because farmers can manage expenditures for priority needs. Meanwhile, the FHIER indicator describes the allocation of farmer income for household expenditure and, at 0.89, indicates that households are still not prosperous. This is because the amount of income is still inadequate to meet household expenditure, both consumption and farming. In conclusion, with a good GSR value, while the FHIER is low, the level of farmer income is still not enough to meet all needs. Hence, what needs to be done is a policy that encourages business diversification, especially in organic farming and easy access to agricultural production inputs.

The demographic profile of farmers is also used as a factor in measuring the level of welfare of farmer households. Farmers in Central Java and Yogyakarta have a productive age range of 44-59 years (45.33%), so they can optimize the level of productivity in the agricultural sector (Diana et al., 2024) as well as a sufficient level of education able to help them adopt the latest agricultural techniques. The results show that 57.33% of farmer respondents already have enough knowledge so that it does not hinder innovation. However, education programs also need to be carried out so that the sustainability of organic farming practices is balanced with support from the government. Then, farmers who have side jobs can improve household welfare to meet high household needs. This is directly proportional to the higher income obtained and the level of needs to be met, and thus farmers need to implement good financial management based on the household priority scale.

This study shows that measuring the level of household welfare of farmers is influenced by many factors and the analysis show that organic rice farming in Central Java and Yogyakarta can support household welfare by 31.51% of total income. In addition, the role of the government or other stakeholders is also important in efforts to develop organic farming practices to support farmers. Therefore, in ensuring the success of this practice, government support is needed in the form of production input subsidies and policies that support agriculture. Also, marketing networks needs to be expanded to reach consumers, as well as training and education on the application of the latest agricultural technology. By implementing these measures, the sustainability of organic agriculture is increasingly directed so that it can improve farmers' welfare and food security in the long term.

Conclusions

Annual organic rice farming income in Central Java and Yogyakarta was IDR 80,715,416 per year and is sourced from both agriculture and non-agriculture activities. In addition, the income is also balanced by farmer household expenditure of IDR 90,389,418 which is used for food, non-food, and organic rice farming. The existence of a gap between income and expenses has provided welfare for farmer households. This is shown by the level of welfare of organic rice farmer households in the two

regions as reflected in the GSR of 0.36, which indicates prosperity, FHIER of 0.89 indicating less prosperity, and FER value of 108.66 indicating prosperity. Although the analysis shows that the prosperous level has not been reached, incomes from organic rice farming is fairly good in meeting daily needs. However, additional innovation and diversification of livelihoods is required so that the level of welfare can be enhanced. These findings can be considered by local stakeholders in supporting productivity, welfare, and even food security for farmers in order to encourage economic growth.

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No Supplementary Materials.

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