Competitive and Comparative Advantages Analysis of Organic Rice Farming in Sumberjambe Sub-District Jember Regency

by Linda Ekadewi Widyatami

Competitive and Comparative Advantages Analysis of Organic Rice Farming in Sumberjambe Sub-District Jember Regency

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Abstract. Organic rice agriculture in Jember Regency was first developed in Rowosari Village, Sumberjambe Sub-district in 2012, by "Tani Jaya 2" Farmer Group. The purpose of this research was to analyze the comparative and competitive advantages of organic rice farming in Sumberjambe Sub-District, Jember Regency, as well as the impact of government policies on organic rice farming. A purposive sampling method was carried out during this research and the members of "Tani Jaya 2" Farmer Group, Rowosari Village, Sumberjambe Sub-district, which runs organic rice farming was the sample of it. The analysis method used in this research was PAM (Policy Analysis Matrix). The results show that organic red rice farming in Sumberjambe Sub-district, Jember Regency had a comparative and competitive advantages which indicate by the organic rice farming competitiveness. The result of PAM analysis show that the policy impact on the output of organic rice farming had a positive impact on organic red rice farming, and the impact of tradable input policies had a negative impact on organic red rice farming. It can be concluded that the government policies on tradable input and output, while non-tradable inputs gave a positive impact on organic red rice farming in Sumberjambe Sub-district.

1. Introduction

Sustainable agriculture is the implementation of sustainable development concept in the agricultural sector. The principle of sustainable agricultural management are multicultural, respecting biodiversity and local wisdom, utilizing local materials, not depending on external materials, not exploiting the nature, suitable with the culture, the choices and farmers abilities. Organic farming is in accordance with sustainable agricultural development. Organic agriculture is a way of cultivating agriculture by relying on inputs and production facilities of organic materials without using synthetic chemicals, engineering of Genetically Modified Organisms and all external inputs that reduce land quality [1].

Indonesian organic agriculture development program from the Ministry of Agriculture is to encourage the realization of agriculture that is resilient, competitive, sustainable, environmentally friendly and encourages the contribution increase of the agricultural sector to the national economy through increasing Gross Domestic Income, exports, creating jobs, reducing poverty, and improving society's welfare as well as defending the interests and protection of Indonesian farmers and agriculture in the international trade system [2].

Organic rice farming in Jember Regency was started in 2012 in Rowosari Village, Sumberjambe Sub-district. Organic rice cultivation in Rowosari Village, Sumberjambe Sub-district was carried out by the members of "Tani Jaya 2" Farmers Group (*Poktan*). The current land area for certified organic rice farming was 14 hectares. Due to the abundant water sources in the village, the growing season throughout the years became the rice commodity only. This organic rice farming had an organic certificate from the Sesoliman Organic Certification Institute (LeSOS) [3].

2. Research Methods

Policy Analysis Matrix (PAM) method was used to analyze efficiency and competitiveness which includes competitive and comparative advantages, and also the impact of government policies on organic rice farming. The PAM matrix table can be described in table 1 [4].

Table 1. Policy Analysis Matrix.

Description	Revenue	Cost		Profit
		Input Tradable	Input Non Tradable	
Private Price	A	B	C	D
Social Price	E	F	G	H
Divergence Effect	I	J	K	L

Sumber : Monke E A and S R Pearson 1989 [4]

In the PAM table above, it can be showed that Private Profit, Social Profit, Transfer Output, Transfer Input, Domestic Factor Transfer used to calculate Private Profitability and Social Profitability; Domestic Resources Cost (DRC) Ratio; Private Cost Ratio (PCR). The impact of government policies on input and output in the PAM table can be seen from the Nominal Protection Coefficient Output (NPCO) indicator; Nominal Protection Coefficient Input (NPCI); Net Policy Transfer (NPT), Effective Protection Coefficient (EPC), Profit Coefficient (PC), and Subsidy Ratio to Producers (SRP). The DRC and PCR formulas were as follows [5]:

$$DRC = \frac{Social\ Input\ non\ Tradable\ Cost}{(Social\ Revenue - Social\ Input\ Tradable\ Cost)} \quad (1)$$

$$PCR = \frac{Private\ Input\ non\ Tradable\ Cost}{(Private\ Revenue - Private\ Input\ Tradable\ Cost)} \quad (2)$$

3. Results and Discussion

This research uses the PAM to analyze the competitive and comparative advantages and the impact of government policies on organic rice farming in Rowosari Village, Sumberjambe Sub-district, Jember Regency. The results of Policy Analysis Matrix (PAM) on organic rice farming in Rowosari Village, Sumberjambe Sub-district, Jember Regency show the calculations results regarding revenue, the costs including tradable input and non-tradable input costs (domestic factors), and rice farming profits at private and social prices.

3.1 The Efficiency of Organic Red Rice Farming in Sumberjambe Sub-district, Jember Regency.

Farming efficiency in PAM can be seen from the profitability indicator. Private profitability is the difference between revenue and production costs calculated based on prices received by producers, while social profitability is the difference between revenues and production costs calculated based on social prices. The efficiency of rice farming shows that the production factors in the form of tradable and non-tradable inputs (domestic factors) which were managed optimally obtaining maximum production output, which is reflected in high levels of profit. The results of PAM which shows the value of private and social profitability on organic rice farming in Rowosari Village, Jember Regency are shown in table 2.

Table 2. Profitability Value of Organic Red Rice Farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency, During the Growing Season on October 2019 to January 2020.

	Output	Tradable Input	Domestic Factors	Profit
Private	32,820,000	375,000	17,413,333	15,031,667
Social	29,756,063	337,500	16,766,736	12,651,827
Divergence	3,063,937	37,500	646,597	2,379,840

Source: Secondary and Primary Data Processed (2020)

The private profitability value of the organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency was IDR 15,031,667 per hectare. This value shows that the profit received by the organic red rice farmers in Sumberjambe Sub-District was IDR 15,031,667 per hectare. The social profitability value of the organic red rice farming in Sumberjambe Sub-District, was IDR 12,651,827 per hectare, which means that farmers' profits calculated based on the social prices or profits that should be received by the organic red rice farmers were 12,651,827 per hectare. Because the value of social profitability was positive, it can be inferred that the organic red rice farming in Rowosari Village, Sumberjambe Sub-District, had an economic efficiency.

Organic red rice farming in Rowosari Village, Sumberjambe Sub-District can be inferred to be efficient because organic rice farmers were able to properly allocate the use of production costs to fulfill the production input needs, production facilities and labor, also obtaining a profitable selling price of the organic red rice production. The organic red rice production were sold to farmer groups and continued by the rice milling process. From these process, they got a profit sharing of 20%. Organic red rice farming handled by *Tani Jaya II* Farmers Group (*Poktan*), Rowosari Village, Sumberjambe Sub-District had a Standard Operating Procedure (SOP), which includes selection of cultivation location, land preparation, seedling, planting, maintenance, harvesting, post-harvest handling, grain drying, storage and milling, selling and shipping of the organic rice to consumers.

3.2 *Competitive Advantages of Organic Red Rice Farming in Sumberjambe Sub-District, Jember Regency.*

Competitive advantage can be seen from the value of private Cost Ratio (PCR). The results of PAM analysis especially in the competitive advantage of organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency are shown in table 3.

Table 3. Results of PAM and Private Cost Ratio (PCR) Value of Organic Red Rice Farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency During the Growing Season on October 2019 to January 2020 (per Ha).

	Output	Tradable Input	Domestic Factors	Profit
Private	32,820,000	375,000	17,413,333	15,031,667
Social	29,756,063	337,500	16,766,736	12,651,827
Divergence	3,063,937	37,500	646,597	2,379,840
		PCR = 0.537		

Source: Secondary and Primary Data Processed (2020)

The PCR value of the PAM analysis was 0.537, which means that to produce one unit of value added output of organic red rice farming in Rowosari Village, Sumberjambe Sub-District with private prices, domestic resource costs or non-tradable input were required of 0.537. The PCR value was more than 1, this value indicates that the organic red rice farming in Sumberjambe Sub-District had a competitive advantage.

The competitive advantage of organic red rice farming in Rowosari Village, Sumberjambe Sub-District was due to the efficient use of non-tradable inputs with optimal organic red rice production management, besides that the price of organic rice received by farmers was also able to provide private profits for the farmer. Organic red rice farming in Rowosari Village, Sumberjambe Sub-

District uses domestic factors, including organic fertilizers made by farmers from manures, organic agricultural lime, organic pesticides made by Tani Jaya II (*Poktan*) from natural ingredients derived from nature, and labor in rice farming which was includes land processing workers, bund repair workers, seedlings and rice planting workers, maintenance workers (weed cleaning, fertilizing, and spraying), as well as harvesting activities, irrigation, capital and land.

3.3 Comparative Advantages of Organic Red Rice Farming in Sumberjambe Sub-District, Jember Regency.

Comparative advantage measures the competitiveness of rice farming based on social prices or prices in perfectly competitive market conditions. The comparative advantage in rice farming can be seen from the DRC (Domestic Resources Cost) value. The results of PAM analysis especially in the comparative advantage value of organic red rice farming in Sumberjambe Sub-District, Jember Regency are shown in table 4.

Table 4. Results of PAM and Domestic Resources Cost (DRC) Value of Organic Red Rice Farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency During the Growing Season on October 2019 to January 2020 (per Ha).

	Output	Tradable Input	Domestic Factors	Profit
Private	32,820,000	375,000	17,413,333	15,031,667
Social	29,756,063	337,500	16,766,736	12,651,827
Divergence	3,063,937	37,500	646,597	2,379,840
	DRC = 0.570			

Source: Secondary and Primary Data Processed (2020)

The DRC value of organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency was 0.570, this value indicates that the organic red rice farming in Sumberjambe Sub-District had a comparative advantage. The DRC value was 0.570, indicating that the organic red rice in Rowosari Village, Sumberjambe Sub-District, Jember Regency was economically efficient in using the domestic resources. This also means that the fulfillment of domestic demand for organic rice is better produced domestically than importing from other countries. The DRC value of organic red rice of 0.570 indicates that to increase the organic rice output value, after deducted by the cost of social tradable inputs, a domestic resource cost of 0.570 was required.

Comparative advantage in PAM analysis was analyzed using tradable input costs and domestic factors in perfectly competitive market conditions (social prices). The calculation of social prices for domestic factors, tradable output and input was reflected in the shadow price or based on the estimate of social opportunity cost, those shadow price was used to adjust to the international market price. Tradable input of the organic red rice farming in Rowosari Village was the organic red rice seeds. The shadow price of the seeds was assumed to be calculated from the actual private price at the research location deducted by the value added tax (VAT) of 10%.

The components of domestic resource costs in organic rice farming include organic fertilizers, organic agricultural lime, organic pesticides, labor, as well as harvesting activities, irrigation, capital and land. The domestic factors that cannot be traded internationally, such as labor, land and capital, were estimated to have their shadow prices using various assumptions that have been used in previous PAM researches. The estimation of the shadow price for the labor price of rice farming was assumed to be untrained labor. As the result, the government policy which was in the form of a minimum wage rate and a conversion of 0.8 from the actual wage rate is used to calculate the social wage rate [6]. The shadow price for capital interest was obtained from BNI retail credit interest rate, which was used as a credit lending institution for farmers. It was 9.95% per year deducted by an inflation rate of 3.03%. As the result, the shadow price value of capital interest was 6.92% per year and the rate interest per growing season was 2.307%. Land social price was approximated by the land rent value [7], those

shadow price of land rent was assessed by the land rent value which was calculated every season at the research site. The shadow exchange rate was calculated by dividing the rupiah exchange rate by the standard conversion factor (SCF) [8]. From the calculation results, the shadow exchange rate of the rupiah was Rp. 14,628,885 / US $. Shadow prices for other domestic factors such as harvesting costs and irrigation costs were assumed to be the same as actual prices.

The shadow price or social price of organic fertilizer was assumed to be the same as the private price, with the consideration that there was no government intervention on the organic fertilizer [9]. It made from a cow dung and used by themselves. An organic pesticides used by farmers were also made by the members of farmer groups from natural materials derived from the environment, such as leaves and microorganisms. The shadow price or social price of organic pesticides was assumed to be the same as the private price, with the consideration that there was no government intervention on organic pesticides made by farmer group members. The shadow price for organic agricultural lime was also assumed to be the same as the private price, considering that there was no government intervention on the price of agricultural lime.

The shadow price of tradable output, specifically of organic red paddy was based on the social price of organic red rice which will later be converted into organic paddy rice [10]. The product traded on the international market was organic rice, so that the shadow price of the organic red rice was calculated based on the CIF price imported from Vietnam, because there was still imported organic rice in Indonesia. The import price of organic red rice (FOB price) originating from Vietnam at the world level in 2019/2020 was 660 US $ / to The world price of organic red rice (FOB price) was added to the freight and insurance cost and converted to the shadow exchange rate (SER) in rupiah [11]. The CIF Price in domestic currency was Rp. 9,868.35 / kg, and then added with handling and transportation costs, multiplied by the processing conversion factor (paddy-rice) by 60%, and deducted by the cost of rice milling and distribution costs to the farmer level, from the calculation of the social price adjustment of rice import, the social price of the organic red rice was obtained of Rp 5,951.21 / kg at the farmer level.

3.4 The Impact of Government Policy on Organic Red Rice Farming in Sumberjambe Sub-District, Jember Regency.

3.4.1 The Impact of Government Policy on Organic Red Rice Farming Output in Sumberjambe Sub-District, Jember Regency. The impact of output price policies and market mechanisms will affect output prices at the farmer level. The ratio used to measure the impact of output (output transfer) policies in PAM analysis is Nominal Protection Coefficient on Output (NPCO). The value of NPCO on organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency were shown in table 5.

Table 5. Output Transfer of Organic Rice Production Output on Organic Red Rice Farming in Rowosari Village, Jember Regency, During the Growing Season on October 2019 to January 2020 (per Ha).

	Output	NPCO
Private	32,820,000	
Social	29,756,063	**1.103**
Divergence	3,063,937	

Source: Secondary and Primary Data Processed (2020)

The NPCO value was 1.103 which means that government policy towards output makes the output price of organic red rice 10.3% higher than the social price. This value means that the organic red rice farming in Rowosari Village, Sumberjambe Sub-District has receives a positive impact from the policies and output market mechanism in 2019/2020. The output policy obtained by organic rice farmers was came from the policy of "Tani Jaya II" Farmer Group which provides 20% profit sharing of the rice milling process, thereby increasing the output revenue received by organic rice farmers, and

related to the government policy, according to Jakiyah [12], there was no government policy regarding the output price of organic rice commodities.

The analysis results show that the revenue received by farmers at private prices was higher than the revenue calculated by social prices. The revenue received by farmers at the private price was IDR 32,820,000 per hectare, while the revenue at the social price was IDR 29,756,063 per hectare, this means that the organic red rice farmers in Rowosari Village, Sumberjambe Sub-District got a positive impact from the output policy. The output transfer on organic red rice farming in Sumberjambe Sub-District, Jember Regency caused by the output protection from the policy was IDR 3,063,937 per hectare.

3.4.2 The Impact of Government Policy on Tradable Inputs and Domestic Factors of Organic Red Rice Farming in Sumberjambe Sub-District, Jember Regency. The impact of government policies on tradable inputs in PAM analysis shown by the value of the Nominal Protection Coefficient on Input (NPCI). The value of NPCI on organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency can be seen in table 6.

Table 6. Transfer of Tradable Inputs of Organic Red Rice Production in Rowosari Village, Sumberjambe Sub-District, Jember Regency, During the Growing Season on October 2019 - January 2020 (per Ha).

	Output	Tradable Input
		Seed
Private	32,820,000	375,000
Social	29,756,063	337,500
Divergence	3,063,937	37,500
	NPCI = 1.111	

Source: Secondary and Primary Data Processed (2020)

The NPCI value of 1,111 means that the government policy towards tradable inputs causes the tradable input price of the organic red rice farming to be 11.1% higher than the social price. This NPCI value means that the domestic price of tradable inputs was higher than the social price, so it can be said that the organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency received the negative impact of government policies and the input market mechanism in 2019/2020, or did not receive input protection from the government.

The tradable input of the organic red rice farming was the organic red rice seeds. The private price for the tradable input of the organic red rice seeds was higher than the social price, because the private price of the organic red rice seeds was also included the tax policy, namely a value added tax (VAT) of 10%.

Policies for domestic factors (non-tradable inputs) in organic rice farming are almost the same as government policies on tradable inputs, which will cause social factor prices to differ from private prices. Domestic factors used in organic rice farming include organic fertilizers, organic agricultural tome, organic pesticides, labor, harvesting activities, water management activities, capital and land. The results of the PAM analysis showing the impact of government policies on domestic factors on red organic rice farming in Rowosari Village, Sumberjambe District, Jember Regency can be seen in table 7.

Table 7. Analysis of the Impact of Government Policies on Domestic Factors on Red Organic Rice Farming in Rowosari Village, Jember Regency, Planting Season October 2019 - January 2020 (per Ha).

	Organic Agriculture Lime	Organic Fertilizer	Organic Pesticide	Soil Processing	Labour	Water Seeting	Harvesting	Land	Capital	Total
Private	150,000	3,000,000	500,000	1,000,000	3,425,000	300,000	1,500,000	7,038,333	500,000	17,263,333
Social	150,000	3,000,000	500,000	1,000,000	2,740,000	300,000	1,500,000	7,000,000	576,736	16,616,736
Divergence	**0**	**0**	**0**	**0**	**685,000**	**0**	**0**	**38,333**	**-76,736**	**646,597**

Source: Secondary and Primary Data Processed (2020)

The results of the PAM analysis on the impact of government policies on domestic factors show that the domestic factor of labor has a higher price than the social price, indicating that the government provides policy protection for agricultural laborers. The labor in farming is included in the untrained labor, the wage rate for untrained workers in farming generally does not reflect the actual level of social wages, this difference is caused by the existence of government policies, such as provisions on minimum wages, provisions on wage levels This minimum causes the level of wages received by trained workers to be received by the actual level of wages, so that with government policies rice farmers must pay domestic work factors more expensive than the social price, or can state that government policies increase production costs that should be incurred by farmers at social prices. . The divergence caused by government policies on red organic rice farm labor is Rp. 685,000 / ha, which means that farmers have to pay domestic labor factor costs of Rp. 685,000 / ha, which are expensive for social costs.

The domestic factor of working capital in rice farming has a private price that is higher than the social price. The difference in private and social prices is due to differences in private interest rates and social interest rates that should be received by farmers. The nominal or private interest rate in this study uses the BNI Bank People's Business Credit (KUR) interest rate, where BNI Bank provides capital loan assistance to organic rice farmers to carry out their farming activities of IDR 25,000,000 per one planting season, with an interest rate. a loan of IDR 500,000, or 2%. The social interest rate is the Bank BNI retail interest rate of 9.95% per year reduced by an inflation rate of 3.03% in the 2019 period, so the social interest rate used in this study per one growing season is 2.307%. The social interest rate, which is greater than the nominal interest rate, indicates that the government provides a subsidized policy towards the interest rate received by farmers. The divergence in working capital due to the policy of subsidizing loan interest rates for farming was –Rp 76,736 per hectare.

The domestic factor of land has a private land price that is more expensive than the social price, this is because the calculation of the domestic land factor for the private land price calculates the land tax that must be paid by rice farmers, while the social price for land rent is assumed to be the same as the private price. The divergence in land production factors in rice farming is IDR 38,333 / Ha, which means that farmers have to pay a land tax for their farming land of IDR 84,204 per Ha.

The organic fertilizer used by farmers is manure from cow dung that the farmers make themselves. The shadow price or social price of organic fertilizer is assumed to be the same as the private price, considering that there is no government intervention on the organic fertilizer or manure. Organic pesticides used by farmers are also made by members of farmer groups from natural materials derived from the environment, such as leaves and microorganisms. The shadow price or social price of organic pesticides is assumed to be the same as the private price, with the consideration that there is no government intervention on organic pesticides that are made by farmer group members. The shadow price for organic agricultural lime is also assumed to be the same as the private price, considering that there is no government intervention on the price of agricultural lime. Other domestic factors such as

land cultivation, water regulation, and harvesting have private prices equal to social prices, because it is assumed that there is no government intervention in the use of these domestic factors.

3.4.3 The Impact of Government Policy to the Input and Output of Organic Red Rice Farming in Sumberjambe Sub-District, Jember Regency. The output and input policies on organic red rice farming in Sumberjambe Sub-District, Jember Regency relatively can be seen from several indicators such as Net Protection Transfer (NPT), Profitability Coefficient (PC), Effective Protection Coefficient (EPC), and Subsidy Ratio to Producer (SRP). The results of PAM analysis showing the impact of government policies to the input and output of the organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency can be seen in table 8.

Table 8. Net Protection Transfer (NPT), Profitability Coefficient (PC), Subsidy Ratio to Producer (SRP) and Effective Protection Coefficient (EPC) of the Organic Red Rice Farming in Rowosari Village, Jember Regency, During the Growing Season on October 2019 to January 2020 (per Ha).

	Output	Tradable Input	Domestic Factors	Profit	PC	SRP	EPC
Private	32,820,000	375,000	17,413,333	15,031,667			
Social	29,756,063	337,500	16,766,736	12,651,827	**1.188**	**0.080**	**1.103**
Divergence	3,063,937	37,500	646,597	2,379,840			

Source: Secondary and Primary Data Processed (2020)

The Net Protection Transfer (NPT) value of rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency was 2,379,840 per Ha, those positive NPT value indicates that there was no transfer of surplus from rice farmers to other parties, in other words, the government policies have had a positive impact on organic red rice farming. The Profitability Coefficient (PC) value was 1.188, this indicates that government policies on tradable inputs and outputs, also the domestic factors in organic rice farming increase the producer or farmer revenue by 18.8%, so that the organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency got a bigger profit than they would be received, or it can be said that the government's policy on relatively input and output had a positive impact on organic red rice farming.

The value of Subsidy Ratio to Producer (SRP) on organic red rice farming was 0.080. This value indicates that the net transfer or the difference between private and social benefits is 8% of the social income, this also shows that the existence of policies on organic red rice farming had a positive impact on farmers because the private benefits received by farmers were higher than their social benefits. PAM analysis results show that the EPC value was 1.103, which means that the existence of policies on tradable inputs and outputs causes the added value received by rice farmers to be 10.3% higher than without the existence of policies.

4. Conclusion

The conclusions of the results and discussion of this research are:
1. Private and social profitability of the organic red rice farming in Rowosari Village, Sumberjambe Sub-District, Jember Regency were Rp. 15,031,667 and Rp. 12,651,827, these positive value show that the organic red rice farming business had an efficiency.
2. PAM analysis results for PCR values was 0.537 which indicates that organic red rice farming had a comparative advantage, and the DRC value was 0.570 which means that organic red rice farming had a comparative advantage.
3. The results of impact analysis of government policies on organic red rice farming in Sumberjambe Sub-District, Jember Regency, show a NPCO value of 1.103, which indicates that government policy on tradable output had a positive impact on organic red rice farming. The NPCI value was 1,111, indicating that government policy on tradable inputs had a negative impact on organic rice

farming. It can be concluded that the government policies on tradable input and output, also non-tradable inputs gave a positive impact on organic red rice farming in Sumberjambe Sub-district.

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