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ANALYSIS OF BLACK RICE FARMING COMPETITIVENESS (A CASE STUDY IN MERKARWANGI VILLAGE, CISAYONG DISTRICT, TASIKMALAYA REGENCY, WEST JAVA PROVINCE)

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ABSTRACT

Black rice is a functional food so that it is not only to meet food needs, but also to maintain the health of consumers. For farmers, producing black rice will be more profitable because the selling value is higher than other types of rice. However, not many consumers and farmers are aware of this, resulting in unstable black rice production. In this free trade era, the opportunity to export a commodity or penetrate the international market is getting bigger. Therefore, it is necessary to study the competitiveness of black rice to determine its potential.The purpose of this research was to identify competitiveness through competitive advantage and comparative advantage as well as the impact of government policies. The research design used was quantitative with survey techniques. Data were analyzed using the Policy Analysis Matrix (PAM). The results showed that black rice was competitive both competitively and comparatively, indicated by the value of PCR < 1 = 0.568 and DCR < 1 = 0.521. Therefore, 1) black rice farming was efficient financially and economically, and 2) black rice has the potential to be exported. The impact of government policies on black rice farming has overall reduced farmers' income. In addition, government policies also inhibited black rice exports as indicated by the value of NPCO < 1 = 0.793 and prevented farmers from exporting inputs as indicated by the value of NPCI < 1 = 0.565.

Keywords: Competitiveness, Black rice, Government policy, PAM.

INTRODUCTION

Nowadays, some Indonesian people not only consume rice for fulfilling their food needs, but also to maintain their health (Lisarini and Abdurahman, 2018). There are 3 types of rice that are cultivated in Indonesia, namely white rice, red rice and black rice. One of the best food ingredients to maintain our health in this modern era is black rice (Kushwaha, 2016). Per 100 grams of rice, the fiber content in black rice is 20.1 grams, while in white rice and red rice are 0.2 and 0.8 grams, respectively (Ihsan, 2012). Black rice, known as forbidden rice, contains the best pigment and is different from other varieties of rice. In addition, black rice has a good aroma with a specific and unique appearance. When it has been cooked, the color of black rice turns thick (Stefani, Nurmalina and Rifin, 2017). According to

Kristamtini *et al.* (2017), black rice contains anthocyanins which are antioxidants in the form of vitamin E, B vitamins, magnesium, iron, zinc, and phosphorus. Therefore, black rice can prevent and treat the body from various degenerative diseases (Dewi *et al.*, 2017). In line with the statement of Dewi et al. (2017), (Kristamtini, 2009) stated that black rice is a functional food, namely food that naturally or through certain processes contains one or more compounds that are considered to have physiologically beneficial health. Even the Chinese consider black rice to be a very healthy food (Nosowitz, 2015). People with type 2 diabetes (diabetes suffered after adulthood) are advised to consume rice with a low glycemic index (Indrasari, 2019). Black rice can be an alternative, because the glycemic index of black rice is the lowest compared to the glycemic index of red rice and white rice (Hariati, 2014).

The selling price of black rice is higher than other types of rice. In the form of unhulled rice with a yield of 55-68 percent, black rice grains have the highest selling value of Rp. 10,000 per kilogram in 2016, while the highest prices for red rice and white rice paddy were Rp. 6,000 and Rp. 7,000 (Stefani, Nurmalina and Rifin, 2017).

The high price of black rice will have a good impact on the welfare of farmers because with cultivation techniques that are not much different from other types of rice cultivation techniques, farmers will get greater benefits if they cultivate black rice. Meanwhile, from the consumer side, the benefits of consuming black rice are good for health as described above. However, the demand for black rice is not as much as the demand for other types of rice, especially white rice, because black rice consumption is still limited to certain groups. Various sources reveal that consumers with higher education levels and upper middle income classes are very concerned about the nutritional content of the food consumed. This has an impact on increasing the selling value and demand for functional food products.

Those who consume black rice are only diabetics and the upper middle class who are aware of the nutritional content of the food. The high selling price of black rice and unequal supply have made most consumers reluctant to switch to black rice. Meanwhile, in Indonesia, there are 3,706,236 people diagnosed with diabetes who are over fifteen years old (Kementrian Kesehatan, 2013).

The development of black rice still faces several obstacles. From the farmer's point of view, many farmers are still reluctant to grow black rice. Insufficient demand and consumption patterns of white rice are thought to be the main causes.

In Indonesia, black rice production is spread only in a few regions. In West Java province, which is the national rice granary, there are only a few black rice production centers, including Tasikmalaya Regency. According to (BPS Kabupaten Tasikmalaya, 2015), Tasikmalaya black rice production reached its peak in 2013 at 9 tons, but decreased 34% in 2014 (Table 1). Furthermore, black rice production continued to fluctuate from 2009 to 2014. Hence, there needs to be a stimulus both from the government as a regulator to protect black rice production and also awareness from consumers to consume high nutritional food. However, because of the increasing public awareness of health and the number of diabetics, the demand for black rice is predicted to increase. As a result, black rice production will also increase.

The spread of black rice in the world is still dominated by its country of origin, namely China. According to IRRI (2006) of 17 countries, Indonesia ranks third with a percentage of 7.2% after China (61.6%) and Sri Lanka (8.6%). As a country that has the third largest black rice resources in the world, Indonesia has the potential to develop black rice. Black rice cultivation is relatively the same as other rice cultivation. Hence, various infrastructure, agricultural production facilities, and government investment that will support black rice cultivation are available.

Table 1. Production of Various Types of Rice in Tasikmalaya Regency.

Year	Rice production (kg)		
	Black	White	Red
2009	912.62	29,203.84	15,058.23
2010	2,091.24	66,919.68	34,505.46
2011	3,215.75	10,904.00	53,059.88
2012	8,213.15	262,820.80	135,516.98
2013	9,185.50	293,936.00	151,560.75
2014	4,693.75	150,200.00	77,446.88

Source: (BPS Kabupaten Tasikmalaya, 2015)

Table 2. Operationalization of variables

Consept	Dimension	Variable	Indicator	Unit
Competitiveness	Tradabel inputs	Type of fertilizer		
		Amount of fertilizer		Kg/ha
		Actual price of fertilizer		Rp/kg
		Social price of fertilizer		Rp/kg
		Type of pesticides		-
		Amount of pesticide		Kg/ha
		Actual price of pesticide		Rp/kg
		Social price of pesticide		Rp/kg
		Number of seed		Kg/ha
		Actual price of seed		Rp/kg
		Social price of seed		Rp/kg
	Nontradable inputs	Number of workers		Person/ha
		Labor wages		Rp/working day
		Land lease		Rp/ha
		Number of lands		Unit
		Land costs		Rp/ha
		Source of capital	Private Assistance	
	Output	Total black rice production		Kg/ha
		Actual price of black rice		Rp/ha

Black rice in Tasikmalaya Regency has the potential to be developed both domestically and abroad. In this era of free trade, opportunities to export or penetrate international markets are getting bigger. In order to be exported, Tasikmalaya black rice must be competitive. Meanwhile, in developing black rice farming, the government has implemented various policies in the form of subsidies and taxes.

Based on the description above, problems can be identified: how is the competitiveness of black rice?, and what is the impact of government policies on black rice farming?. The research objectives were 1. to analyze the competitiveness of black rice and 2. to analyze the impact of government policies on black rice farming.

RESEARCH METHODS

This research was conducted in 2017 in Mekarwangi Village, Cisayong District, Tasikmalaya Regency, West Java, because Mekarwangi Village was the only village that produces black rice in Tasikmalaya Regency. The research design was quantitative with survey techniques on 15 farmers who were selected purposively.

The fifteen farmers are members of the Sangkan Hurip Farmer Group, the Sympathetic Farmer Group Association (Gapoktan).

The concepts and variables in this study can be explained as follows:

1. Competitiveness is the ability of a commodity to be able to compete with other products, both in foreign and domestic markets.
2. Competitive advantage is the advantage of an agricultural commodity that is financially efficient in exploiting its domestic agricultural resources, so that its products can compete and get bigger profits.
3. Comparative advantage is the advantage of an agricultural commodity that is efficient in the utilization of its domestic agricultural resources.
4. Input costs are all costs incurred by farmers for production inputs. Input costs are labor costs, input costs, land rent and other costs. Input costs are measured in rupiah per unit of each production input which will later be converted into Rp/kg output.
5. Tradable inputs are inputs that are traded in foreign markets.
6. Nontradable inputs are inputs that are not traded in foreign markets because their import prices are greater than domestic costs or their export prices are less than domestic production costs.
7. Shadow price (social) is a price that describes the real social or economic value of the elements of costs and results.
8. The actual (private) price is the price prevailing in the region or the price received by farmers.
9. The interest rate is the interest rate applied by banks for agricultural credit. The interest rate is determined based on the bank which is usually used by farmers.
10. Profits are the difference between total revenue and total costs (fixed costs and variable costs).
11. Financial profit is the difference between total financial income and total financial input costs.
12. Economic profit is the difference between total economic income and total economic input costs.

Competitiveness was identified by analyzing competitive advantage and comparative advantage. The impact of government policies is known based on the analysis of input policies, output policies, and input - output policies. The measured variables can be seen in Table 2.

Data consists of primary and secondary data. Primary data were collected through questionnaires and interviews. Meanwhile, secondary data were obtained from the Central Bureau of Statistics, related literatures, and previous studies in the form of journals that were accessed online and offline.

Data analysis. Data were analyzed using the PAM method. To identify competitiveness, the PAM matrix is filled in as shown in Table 3.The steps are as follows: 1. determine the input of black rice farming, 2. allocate input into tradable and nontradable inputs, 3. determine the shadow price of the input and output, and 4. analyze PAM.

Tabel 3. Policy Analysis Matrix

Component	Revenues	Costs		Profit
		Tradable inputs	Nontradable inputs (Domestic factors)	
Private prices	A	B	C	D
Social prices	E	F	G	H
Divergences	I	J	K	L

Source: (Pearson, Gotsch and Bahri, 2005)

Notes: Privat profit (D) = A – B – C, Social profit (H) = E – F – G, Output transfer (I) = A – E, Input transfer (J) = B – F, Factor transfer (K) = C – G, Net transfer (L) = D – H = I – J – K

Private profit (D) = A - B - C. If D ≥ 0, farming activities are financially feasible to continue. If D < 0 then the farming loses so it is not feasible to continue. Social profit (H) = E - (F + G). If H > 1 or D = 0, the farm is feasible to continue. However, if H < 0 the farm is not feasible to continue.

Determine the competitive and comparative advantage.

Competitive advantage is measured by private cost ratio (PCR) = C / (A-B). For 15 respondents, C is the total domestic factor cost (nontradable input) at the private price = sum of product of the domestic factor quantity and the private price = $\sum_1^{15} X_{di} P_{pdi}$. A is the total gross revenue at private price = sum of product of the quantity of black rice output and its private price = $\sum_1^{15} Q_i P_{pi}$. B is the total cost of tradable input at private price = sum of product of the quantity of tradable input and its private price = $\sum_1^{15} X_{ti} P_{pti}$. Thus, the PCR formula becomes.

$$PCR = \frac{\sum_1^{15} X_{di} P_{pdi}}{\sum_1^{15} Q_i P_{pi} - \sum_1^{15} X_{ti} P_{pti}}$$

If PCR < 1, black rice has a competitive advantage. This means that to increase the added value by one unit additional domestic factor costs less than one unit are required.

Meanwhile, comparative advantage is measured by domestic resource cost ratio (DRC) = G / (E-F). For 15 respondents, G is the total domestic factor cost at the social price = sum of the product of the domestic factor quantity and the social price = $\sum_1^{15} X_{di} P_{sdi}$. E is the total gross revenue at the social price = $\sum_1^{15} Q_i P_{si}$. F is the total cost of tradable inputs at social prices = $\sum_1^{15} X_{ti} P_{sti}$. So the DRC formula becomes:

$$DRC = \frac{\sum_1^{15} X_{di} P_{sdi}}{\sum_1^{15} Q_i P_{si} - \sum_1^{15} X_{ti} P_{sti}}$$

If the DRC < 1 then black rice has a comparative advantage, which means that farming is economically efficient.

Competitiveness is categorized as very high if the PCR and DRC values are ≤ 0.259, high if the PCR and DRC values are 0.260 - 0.509, quite high if the PCR and DRC values are 0.510-0.759 and low if the PCR and DRC values are 0.760 - 0.999 (Prayuginingsih *et al.*, 2012).

Determine the impact of government policies.

The output policy is obtained based on:

1. Transfer of output = I = A - E. If I > 1, then society must buy output at a price higher than the price that should be paid. As a result, producers receive a price that is higher than the price that should be received.
2. The Nominal Output Protection Coefficient (NPCO) is used to measure the impact of government policies that cause differences in output values as measured by private and social prices. If NPCO < 1, the government policy in the form of taxes will hinder the export of output.

The input policy is obtained based on:

1. Input transfer J = B - F. If J is positive then the benefits received are greater than without the policy. If J is negative, the benefits received are smaller than without the policy.
2. NPCI nominal input protection coefficient = B / F. If NPCI > 1 then there is protection for input producers, while the sectors that use these inputs will suffer from high production costs. If the NPCI value < 1, there is a constraint on input exports, so that production uses local inputs.
3. Transfer factor K = C - G. If the value of K is positive, there is a negative subsidy or tax on nontradable inputs, whereas if K is negative, there is a positive subsidy for nontradable inputs.

Input - output policy is obtained based on:

1. EPC effective protection coefficient = (A-B) / (E-F). The EPC value shows the direction of government policy whether it is to protect or inhibit domestic production effectively. If the

EPC value is > 1, the government protection in the black rice production system is high, whereas if the EPC value is < 1, the government protection for the production system is very low.

2. Net transfers L = D - H which indicates inefficiencies in the production system. If L > 0, the surplus will increase due to government policies towards input and output. L values that are less than zero indicate the opposite.
3. The profit coefficient PC = D / H shows the impact of government policies on the profits received by farmers. If the PC value is <1, the farmer's profit due to government policy is smaller than that without the policy. Conversely, if the value of PC > 1 means that government policy causes greater profits to farmers.
4. Subsidy ratio for producers, SRP = L / H. The SRP value < 0 indicates that government policy causes producers to spend less than their offset costs to produce. However, if the SRP value is more than > 0, then government policy causes producers to pay more than the offset cost to produce.

RESULTS AND DISCUSSION

The results of farm analysis will be the data input for the policy analysis matrix decribed below. Based on Tabel 4, all respondents were of productive age because their age range is between 43 - 60 years, and the average is 52 years. The majority of respondents graduated from junior high school (47%). They have more than 15 years of rice cultivation experience.

Table 4. Characteristics of Respondent

	Class	Frequency	%
Age (year)	43 – 48	4	27
	49 – 54	5	33
	56 – 57	3	20
	58 – 60	3	20
Education	Primary school	6	40
	Junior high school	7	47
	Senior high school	2	13

Source: Primary data processed, 2017.

However, experience in producing black rice is only 5 to 8 years. They have conducted training in rice cultivation, especially black rice, which was held by the local government of Tasikmalaya Regency and Gapoktan Simpatik. All respondents cultivate on their own land. The average land area was 0.65 ha. The majority of respondents (47%) owned land in the medium category (0.5 - 1 ha). Only 2 farmers (17%) own large land (> 1 ha), while the other 6 farmers (40%) have narrow land (<0.5 ha).

Private price

All respondents did not purchase black rice seeds because they had been provided by the Simpatik farmer group association and from the remaining seeds from the previous planting season. The average price of manure was Rp. 500/kg and the requirement was 4.5 tons/ha. The price of vegetable pesticides was Rp. 2,500/kg with an average requirement of 20 kg per 100 bricks (1 brick = 14 m^2). The price of Local Micro Organisms (LMO) liquid was Rp. 7,900/kg. The average LMO liquid requirement was around 10 kg per one time spray. Spraying was carried out an average of 3 times per one planting season. Seeds, manure, vegetable pesticides, and LMO liquid are tradable inputs. Nontradable input costs consist of land, equipment and labor costs. The land used by all respondents was their own land. The cost of land use consists of land and building taxes, village fees, and

irrigation fees. The average cost of land was Rp. 91,977 per planting season with an average land area of 0.65 ha. Furthermore, the respondent's expenditure for equipment was Rp. 742,357 which is calculated on the basis of depreciation. The use of labor is dominated by the workforce in the family, but it is still calculated as a farmer's expense. The average expenditure for labor was Rp. 4,935,333 per planting season and the price of black rice was Rp. 8,700/kg.

Social price

The social or efficiency prices for tradable inputs and tradable outputs are international prices for similar goods. Imported commodities use import prices, and export commodities use export prices. Each respondent gets tradable input by making it individually or in groups. The shadow price for tradable goods was estimated through the Highest Retail Price plus distribution costs to farmers. The social prices for the Bundong variety seeds, manure, vegetable pesticides and LOM liquid was Rp. 748.48/kg, Rp. 930.12/kg, Rp. 2,730.12/kg and Rp. 8,630.12/kg respectively.

The social prices for equipment and labor are the same as the private prices. The tools used in black rice farming are hoes, *kored* (a tool for cleaning grass, shaped like a small hoe), machetes, sickles, handsprayers, scratches, sacks, tarpaulins, buckets and *lalandak* (tools for weed weeds, in the form of ragged wheels, made of wood and metal, iron or steel). The labor was dominated by the workforce in the family. There was no intervention from the government, which is usually the minimum wage for labor. The equipments used were traditional tools, most of which are the work of the farmers themselves. There was no international price comparable to the equipment used, so the social land price was estimated based on the rental price of land around Mekarwangi Village which was Rp. 110,000/100 bricks = Rp 78.57/m^2. The social price of black rice was Rp. 10,96/kg. Revenue at private and social price can be seen in Table 5.

Table 5. Revenue of black rice farming at private price = Rp 8,700 and social price = Rp 10,961/ kg

No.	Land area (ha)	Quantity (kg)	(a) Private revenue (Rp)	(b) Social revenue (Rp)
1	0.14	300	2,610,000	3,288,300
2	0.35	750	6,525,000	8,220,750
3	0.42	900	7,830,000	9,864,900
4	0.56	1,200	10,440,000	13,153,200
5	0.98	2,000	17,400,000	21,922,000
6	0.21	435	3,784,500	4,768,035
7	0.28	590	5,133,000	6,466,990
8	0.49	963.75	8,386,800	10,566,404
9	0.63	1,363.5	11,866,800	14,950,804
10	0.70	1,550	13,485,000	16,989,550
11	0.98	1,995	17,356,500	21,867,195
12	0.63	1,364.85	11,875,500	14,961,765
13	1.12	2,444	21,262,800	26,788,684
14	1.42	2,994	26,047,800	32,817,234
15	0.85	1,810.5	15,755,700	19,850,371
$\sum X$	9,76	20,662	179,759,400	226,476,182
$\bar{X}$	0,65	1,377.47	11,983,960	15,098,412

Source: Primary data prcessed, 2017

Table 6. Private budget of black rice farm in Mekarwangi Village per ha per planting season

	(c) Tradable cost				(d) Nontradable cost			
No.	Seed	Manure	Vegetable pesticide	LMO liquid	Equipment	Labor	Land	Private Profit
	Rp	Rp	Rp	Rp	Rp	Rp	Rp	Rp
1	0	321,425	30,000	237,000	160,221	1,300,000	19,851	541,503
2	0	803,563	75,000	237,000	400,553	2,750,000	49,628	2,209,256
3	0	964,275	90,000	316,000	480,663	4,130,000	59,554	1,789,508
4	0	1,285,700	120,000	158,000	640,884	4,800,000	79,405	3,356,011
5	0	2,249,975	210,000	237,000	1,121,547	6,200,000	138,958	7,242,520
6	0	482,138	45,000	158,000	240,332	1,600,000	29,777	1,229,254
7	0	642,850	60,000	158,000	320,442	2,450,000	39,703	1,462,005
8	0	1,124,988	105,000	158,000	560,774	4,700,000	69,480	1,666,384
9	0	1,446,413	135,000	237,000	720,995	5,650,000	89,331	3,583,712
10	0	1,607,125	150,000	237,000	801,105	6,250,000	99,256	4,340,514
11	0	2,249,975	210,000	237,000	1,121,547	6,100,000	138,958	7,299,020
12	0	1,446,413	135,000	158,000	720,995	5,300,000	89,331	4,024,457
13	0	2,571,400	240,000	237,000	1,281,768	7,200,000	158,809	9,573,823
14	0	3,214,250	300,000	158,000	1,602,210	9,950,000	198,512	10,624,828
15	0	1,928,550	180,000	237,000	961,326	5,650,000	119,107	6,675,367
ΣX	0	22,339,040	2,085,000	3,160,000	11,135,360	74,030,000	1,379,659	65,618,161
$\bar{X}$	0	1,489,269	139,000	210,667	742,357	4,935,333	91,977	4,374,544

Source: Primary data processed, 2017.

Table 7. Social budget of black rice farm in Mekarwangi Village (in Rp)

	(e) Tradable cost				(f) Nontradable cost			Social profit
No.	Seed	Manure	Vegetable pesticide	LMO liquid	Equipment	Labor	Land	
	Rp	Rp	Rp	Rp	Rp	Rp	Rp	
1	802	597,928	54,602	250,804	160,221	1,300,000	107,810	816,133
2	3,207	1,494,819	136,506	250,804	400,553	2,750,000	269,525	2,915,337
3	3,400	1,793,783	163,807	334,405	480,663	4,130,000	323,430	2,635,412
4	4,018	2,391,711	218,410	167,202	640,884	4,800,000	431,240	4,499,736
5	6,465	4,185,493	382,217	250,804	1,121,547	6,200,000	754,670	9,020,804
6	2,099	896,891	81,904	167,202	240,332	1,600,000	161,715	1,617,892
7	2,665	1,195,855	109,205	167,202	320,442	2,450,000	215,620	2,006,001
8	3,510	2,092,747	191,108	167,202	560,774	4,700,000	377,335	2,470,987
9	5,120	2,690,674	245,711	250,804	720,995	5,650,000	485,145	4,896,876
10	4,453	2,989,638	273,012	250,804	801,105	6,250,000	539,050	5,881,488
11	5,613	4,185,493	382,217	250,804	1,121,547	6,100,000	754,670	9,066,851
12	5,864	2,690,674	245,711	167,202	720,995	5,300,000	485,145	5,344,530
13	6,557	4,783,421	436,819	250,804	1,281,768	7,200,000	862,480	11,966,835
14	13,256	5,979,276	546,024	167,202	1,602,210	9,950,000	1,078,100	13,481,166
15	8,537	3,587,566	327,614	250,804	961,326	5,650,000	646,860	8,412,183
ΣX	75,566	41,555,971	3,794,867	3,344,048	11,135,360	74,030,000	7,492,795	85,032,230
$\bar{X}$	5,038	2,770,398	252,991	222,937	742,357	4,935,333	499,520	5,668,815

Source: Primary data processed, 2017.

The private budget is the quantity of factors of production used times the private price. Meanwhile, social cost is the quantity of production factors used times the social price. These two types of budgets for each respondent are presented in Tables 6 and 7, and the averages are in Table 8. Private profit (Table 6) was obtained from private revenue (a) in Table 5 minus (c) minus (d) in Table 6. Meanwhile, social profit (Table 7) was obtained from social revenue (b) in Table 5 minus (e) minus (f).

Government Policy Analysis

To make PAM of black rice farm (Table 9), the data entered are: i) average ($\bar{X}$) private revenue (a) and average social revenue (b) in Table 5, ii) tradable input cost at private price (Table 6) that is Rp 0 + Rp 1,489,269 + Rp 139,000 + Rp 210,667 = Rp 1,838,936, iii) nontradable input cost at private price = Rp 742,357 + Rp 4,935,333 + Rp 91,977 + Rp 4,374,544 = Rp 5,769,668, v) tradable input cost at social price (Tabel 7) = Rp 5,038 + Rp 2,770,398 + Rp 252,991 + Rp 222,937 = Rp 3,251,363, and vi) nontradable input cost at social price = Rp 742,357 + Rp 4,935,333 + Rp 499,520 + Rp 5,668,815 = Rp 6,177,210.

It can be seen in Table 9 that the divergence was negative. The negative revenue divergence indicates that there was no government policy on black rice produced by Mekarwangi Village. As a result, private prices were lower than social prices (international prices). In the case of tradable inputs, there was a negative divergence (input transfer). This shows the size of export and import subsidies, so that black rice farmers can buy manure, vegetable pesticides and LMO fluids at a lower price than their social price. The seeds are not compared here because they are subsidized by the government. The divergence of non-tradeable inputs is negative, indicating that private prices were cheaper than social prices. This is because land rent was cheaper than the social price. Land rent was cheap because all respondent farmers have inherited land from their parents.

Black rice farming in Mekarwangi Village was financially profitable because the private profit was positive, namely Rp. 4,374,544. Thus, black rice farming was able to compete at the actual price level. In other words, input subsidies are able to cover the transfer of output from private prices to the social prices (Prayuginingsih *et al.*, 2012).

Table 8. The average of personal and social budget of black rice farming

Category	Items	Private budget (Rp)	Social budget (Rp)
Tradable inputs	Seed	0	5,038
	Manure	1,489,269	2,770,398
	Vegetable pesticide	139,000	252,991
	LMO liquid	210,667	222,937
Nontradable inputs	Land	91,977	499,520
	Labor	4,935,333	4,935,333
	Equipment	742,357	742,357
Total		7,608,603	9,428,574

Source: Primary data processed, 2017

Table 9. Policy analysis matrix (PAM) for black rice farming.

Components	Revenue (Rp.)	Cost (Rp.)		Profit (Rp.)
		Tradable input	Nontradable input	
Private price	11,983,148	1,838,936	5,769,668	4,374,544
Social price	15,097,389	3,251,363	6,177,210	5,668,815
Divergence	-3,114,241	-1,412,427	-407,542	-1,294,271

Source: Primary data processed, 2017

The social benefits of black rice farming were also positive, namely Rp. 5,668,815. This shows that black rice farming is economically profitable. Thus, black rice was able to compete at international price levels without the aid of government policy in any form.

Competitive and comparative advantage.

The competitive advantage of black rice farming = Private Cost Ratio = PCR = 5,769,668 / (11,983,148 -1,838,936) = 0.568. Because 0.568 < 1, black rice has a competitive advantage. This means that black rice farming is financially efficient. The PCR value = 0.568 shows that to get the additional value of one unit of output, an additional domestic production factor cost is required by 56.8% of the private price. The competitive advantage of black rice is influenced by several factors, namely market demand, use of technology, and marketing

Meanwhile, the comparative advantage of black rice = Domestic Resource Cost Ratio = DCR = 6,177,210 / (15,097,389 - 3,251,363) = 0.521 < 1. This means that to produce black rice requires domestic resource costs of 52 percent of the required export costs. The DCR value which is smaller than 1 indicates that black rice has a comparative advantage at social price where there is no government policy. So, economically, black rice farming is efficient. Comparative advantage is influenced by natural resources, human resources, facilities and infrastructure, and government policies.

The PCR and DRC values ranged from 0.510 to 0.759 were categorized as quite high (Prayuginingsih *et al.*, 2012). Hence the competitiveness of black rice is quite high.

The black rice farming in Mekarwangi Village had the opportunity to export its production. But this opportunity was small due to the very small production (Table 5). This very small production of black rice is consistent with the findings of (Lisarini and Abdurahman, 2018)'s research which stated that black rice was less available than red rice and pandanwangi rice.

Government policy impact.

Government policies in the form of subsidies or taxes on an agricultural commodity can have a positive or negative effect on farming actors. In order to increase foreign exchange, government policies in the agricultural sector can affect the success of a farm. Indicators of the impact of government policies on black rice farming are presented in Table 10.

1. Output policy.

It can be seen on Table 10 that the output transfer was negative Rp -3,114,241. This indicates that the private price is lower than the social price, so government policies reduce the benefits received by farmers. In addition, the taxation policy for black rice causes implicit taxes or resource transfers that reduce system profits.

The nominal protection coefficient on tradable output (NPCO) of black rice = 0.793 < 1. This means that farmers receive 79.3 percent less than the price they should receive. In addition, there was no protection provided by the government for black rice output. Even the government policy in the form of taxes hinder the export of output (Pearson, Gotsch and Bahri, 2005). Thus, the government policy on black rice farming in Mekarwangi Village has an impact on the benefits received by farmers, where the profits were not as big as the profits that should be received. In other words, government policies make farmers' profits lower than they should be.

2. Input policy.

Government policies on inputs such as subsidies and trade barriers are enforced with the hope that producers can utilize resources optimally and protect domestic producers. Government intervention indicators for input protection are the value of input transfer (J), Factor Transfers (K), and nominal protection coefficient on tradable input (NPCI).

Table 10. Indicators of the Impact of Government Policies on Black Rice Farming.

	Items	Values
Output policy	Output transfer (I)	Rp. -3,114,241
	Nominal protection coefficient on tradable outputs (NPCO)	0.793
Input policy	Input transfer (J)	Rp. -1,412,247
	Nominal protection coefficient on tradable inputs (NPCI)	0.565
Input-output policy	Factor transfers (K)	Rp. - 407,542
	Effective protection coefficient (EPC)	0.856
	Net transfer (L)	Rp. 1,294,271
	Profitability coefficient (PC)	0.771
	Subsidy ratio to producers (SRP)	- 0.228

Source: Primary data processed, 2017

The J value for black rice was Rp -1,412,247. This negative input transfer shows that government policies cause smaller financial benefits than those without policies. This indicates an implicit subsidy or transfer of resources from the government into the system. The existence of subsidies is indicated by the difference between private and social prices. As a result, the costs incurred by farmers at the actual price (private prices) were 36 percent lower than the costs that should be incurred by farmers (social prices).

The NPCI value shows how much incentive the government provides for tradable production inputs. The NPCI value of black rice = 0.565 < 1. This means that there are input export barriers that cause production to use local inputs. So, there is a subsidy from the government for tradable inputs so that farmers spend lower costs than their socially tradable input costs.

The factor transfer (K) describes government intervention on nontradable inputs. The K value for black rice is Rp -407,542. This negative value indicates a positive subsidy on nontradable inputs. Farmers' expenditure on land used in farming in the form of taxes and fees causes a difference between nontradable factor costs at the private price and at the social price. This is what makes the K value negative.

Subsidies tend to support black rice farming activities, that is the expenditure at the actual price level was lower than the costs that should be incurred by farmers (social prices).

3. Input-output policy

EPC value of black rice = 0.856 < 1 indicate that the net effect of policies that alter prices in product markets is to reduce private profits (Pearson, Gotsch and Bahri, 2005). This means that government policies were not effective and prevented black rice farmers from producing. Thus, the government's protection against the black rice production system is still low.

The net transfer (L) value of black rice was Rp. -1,294,271. It means that government policy caused black rice farming to lose Rp 1,294,271.

The subsidy ratio for producers (SRP) indicates the proportion of revenue at the social price that can cover subsidies and taxes. The SRP value of black rice = -0.228 < 0, then government policy causes producers to spend more than the offset costs to produce (Pearson, Gotsch and Bahri, 2005). In other words, government policies cause farmers to spend less than the costs they should have spent (social costs) for one time production. This aspect of competitiveness is so complex that it would be better if other approaches were also used to analyze it. Sirikrai and Tang (2006) stated that there is a new way of studying competitiveness, namely by using the Analytical Hierarchy Process (AHP) method which can handle complex aspects of competitiveness.

CONCLUSION

The black rice farming in Mekarwangi Village, Tasikmalaya Regency was competitive because it has competitive advantages and comparative advantages. Therefore, 1) black rice farming was efficient financially and economically, 2) black rice has the potential to be exported.

Based on the positive value of the private profit, black rice was able to compete at its private price. In addition, because the social profit were positive, black rice farming was able to compete at the international level without any form of government policy assistance.

The impact of government policies on black rice farming has overall reduced farmers' revenues. Based on the NPCO value < 1, government policy was inhibiting farmers to export black rice, and based on the NPCI < 1, government policy was preventing producers from exporting inputs. Hence, the government should review policies that prevent farmers from exporting black rice. In line with that, the Sangkan Hurip Farmer Group must develop the black rice market to an international scale.

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