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IMPACT OF GOVERNMENT POLICIES ON THE COMPETITIVENESS OF SOYBEAN FARMING SYSTEM IN INDONESIA: STUDY IN BANGSALSARI DISTRICT, EAST JAVA PROVINCE

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ABSTRACT

Soybean farming in Indonesia, as well as in other countries in the world, has an important role in providing food for the population, food ingredients for the food and beverage industry, and feed ingredients. Some policies have been implemented by the government to increase the profitability, efficiency and competitiveness of soybean farming. This study used the Policy Analysis Matrix (PAM) method to assess the competitiveness of soybean farming and evaluate the effectiveness of government policies in soybean farming. The results showed that soybean farming had a competitive advantage and comparative advantage. The results of the sensitivity analysis indicate that output price policy is an effective instrument to increase the profitability and competitiveness of soybean farming in Indonesia.

Keywords: *Government policy, Competitiveness, Sensitivity analysis, Policy Analysis Matrix*

JEL Classification: *Q1, Q18*

INTRODUCTION

Soybean (Glycine max. Merr) contains high vegetable protein. In Indonesia, soybeans are an important foodstuff after rice and corn. Soybeans are generally consumed by the public in the form of processed products such as soy sauce, tofu, tempeh (fermented soybean cake), fermented soybean paste, soy milk, fermented soya cake and various other processed food ingredients. In addition, soybeans are also used as feed ingredients. The level of soybean consumption in Indonesia is predicted to increase with increasing public awareness about healthy food, income and population growth (Marwoto and Hilman 2005; Tastra et al. 2012; Sari & Prajanti 2016; Bahari et al. 2017).

In the past decade, soybean consumption in Indonesia has grown by 7.5% per year. Meanwhile, the growth of soybean production is only 3.0% per year. On average, only about 34% of total soybean consumption can be met by domestic production, and the rest is imported from other countries. During the same period, soybean imports have increased by 13% per year (FAO, 2017). Therefore, increasing domestic soybean production is necessary to close the gap, increase stock, and reduce dependence on imported soybeans.

However, this is not an easy way because the competitiveness of soybean farming based on revenue to cost ratio (R / C) indicators is still lower than other food commodities such as rice, corn, cassava, peanuts, mung beans (Tastra et al. 2012; Krisdiana 2012; Nainggolan and Rachmat 2014). The low selling price of soybeans at the farm level, the decline in import tariffs, the high prices of fertilizers, seeds and pesticides caused soybean farming to be unprofitable (Tastra et al. 2012).

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As a tradable commodity, the price of domestic soybeans is relatively more expensive than imported soybeans, indicating that domestic soybeans are also less competitive to imported soybeans. The volatility of soybean prices in the world market caused by shocks on the demand and supply side and the volatility of exchange rates can ultimately lead to volatility in farmer income. This condition, if it continues, can reduce interest and encourage soybean farmers to switch to other more profitable crops with a low risk of crop failure.

The Indonesian government has stated that soybean is one of the strategic commodities that need to be protected. Some protective policies have been implemented by the government to increase domestic soybean production and farmers' income, including subsidizing certified seed prices; government assistance in the form of production facilities including certified seeds, organic fertilizers, inorganic fertilizers, rhizobium, herbicides or pesticides; soybean pricing (procurement price) at the farm level; imposing tariff on imported soybean. However, studies on the effectiveness and impact of these policies are still limited. This study aims to calculate the competitiveness of soybean farming and evaluate the impact of government policies on the competitiveness of soybean farming.

In the literature, the concepts and indicators of measuring commodity competitiveness vary widely. Review of the literature on this matter and its application can be read for example in Latrufe (2010), OECD (2011), Arslan and Tathdil (2012), Siudek and Zawojska (2014), Rouf et al. (2014). Of the many indicators of competiveness, domestic resource cost analysis is most often used in the literature on agricultural competitiveness, especially for farm level data. This analysis can estimate that the resources used to produce certain commodities have competitive advantages and comparative advantages. The comparative advantage of farming can be analyzed by using domestic resource cost analysis on its social prices, while its competitive advantage can be analyzed using domestic resource cost analysis at its actual price (Andriani and Hanani, 2010).

However, this analysis does not take into account the effects of divergence and government policy on farming. The impact of divergence can arise due to one of two reasons, namely market failure or policy distortion, while the impact of government policy is important to see the possibility of whether domestic commodity production can compete in global markets, and therefore need further analysis. This study applies the Policy Analysis Matrix (PAM) method developed by Monke and Pearson (1989).

This method has been widely used to analyze the impact of government policies that affect agriculture such as pricing policies, macroeconomic policies, investment policies on specific commodities (see for examples, Zakaria et al. 2010; Haryono et al. 2011; Hasibuan et al. (2012); Ali & Khan (2012); Mutiara et al. (2013); Khai & Yabe (2013); Bandrang et al. (2015); Bowo et al. 2016; Suhardedi et al. 2017; Fatah & Von Cramon-Taubadel 2017; Che Soh et al. 2017). The next section will discuss the research methodology, results and discussion, conclusions and policy implications.

RESEARCH METHODOLOGY

Research Method

Policy Analysis Matrix (PAM) is an analysis system to measure the impact of government policies on the profitability of farming systems and the efficient use of resources. The structure of PAM as shown in Table 1. The first row in Table 1 sequentially shows income (A), costs (B and C), and profits (D) based on private prices (or actual market prices) received and paid by farmers. This price implicitly contains the impact of all policies and market failures. The second

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row in sequences is income (E), cost (F and G), and profit (H) based on social prices or efficiency prices. The third row, divergences, the difference between private prices and social prices explains the impact of policies or policy transfers in the absence of market failures.

Table 1. The Structure of Policy Analysis Matrix

	Revenues	Costs		Profits
		Input Tradable	Domestic factors	
Privat Price	A	B	C	D=A-(B+C)
Social Price	E	F	G	H=E-(F+G)
Divergences	I=A-E	J=B-F	K=C-G	L=D-H or L=I-(J+K)

Source: Monke and Pearson (1989)

Policy analysis uses ratio indicators that can be calculated based on PAM tables. The ratio indicators consist of:

(i) The private cost ratio (PCR) = C / (A - B) shows the ability of the commodity system to finance domestic resources at private prices. This ratio measures the competitiveness of a commodity system based on private prices. PCR <1 indicates that commodity systems have competitive advantage.

(ii) Domestic resource cost ratio (DRCR) = G / (E - F). This ratio measures the competitiveness of a commodity system based on social prices. DRC <1 shows that commodity systems are able to use domestic resources efficiently and have comparative advantages.

(iii) Nominal protection coefficient (NPC) on tradable outputs (NPCO) = A / E. This ratio shows the rate at which the private price or the actual price of output is different from the social price. NPCO > 1 and the greater indicates that the level of protection of government policies to output is also greater. Conversely, NPCO < 1 and the smaller indicates that the level of protection of government policy to output is getting smaller.

(iv) Nominal protection coefficient (NPC) on tradable inputs (NPCI) = B / F. This ratio shows the level of difference between private prices of tradable inputs to their social prices. NPCI> 1 indicates that private prices are greater than social prices, and thus the system is taxed by policy. Conversely, NPCI <1 indicates that this system is subsidized by policy.

(v) Effective protection coefficient (EPC) = (A - B) / (E - F). This ratio compares the added value in the private price (A - B) with the added value in the social price (E - F). This indicator shows the combined effect of policy transfers that affect both tradable output and tradable input. EPC > 1 indicates that existing policies are able to provide positive incentives for producers. Conversely, EPC < 1 indicates a disincentive.

(vi) Profitability coefficient (PC) = (A - B - C) / (E - F - G) = D / H. This indicator measures the incentive effects of all policies, and thus serves as a proxy for net policy transfers.

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PC > 1 shows that all government policies provide incentives to commodity systems. In contrast, PC < 1 shows that all government policies cause the benefits received by the commodity system to be smaller than without policy.

(vii) Subsidy ratio to producers (SRP) = L / E = (D - H) / E. This ratio shows the rate at which revenue of the commodity system increase or decrease due to policy transfers. If market failure is not significant, the SRP shows the net impact of policy distortions on the revenue of commodity system. SRP > 0 indicates that the effect of policy transfer increases revenue of the commodity system, vice versa.

However, private and social price valuations may change due to changes in certain conditions. In this context, sensitivity analysis can be used to explain the impact on the efficiency and competitiveness of farming systems. The sensitivity analysis in this study is based on two scenarios, namely (i) an increase in the procurement price of soybeans at farm gate by Rp 8,500 per kilogram based on the Regulation of the Minister of Trade, the Republic of Indonesia Number 27 / M-DAG / PER / 5/2017, and (ii) imposition of import tariffs by 0.5% for imported soybeans based on Regulation of the Minister of Finance, the Republic of Indonesia Number 34 / Pmk. 010/2017.

Data

The compilation of PAM tables requires a comprehensive set of data consisting of output and various types of inputs used in the production of a commodity system, as well as actual market prices and social prices of output and inputs. In summary, to compile a PAM table, data on the structure of farming costs is needed. The output of soybean farming in this study was dried soybean seeds (kg/ha). The inputs used in soybean farming consist of land (ha), seeds (kg/ha), fertilizer (kg/ha), liquid pesticides (l/ha), labor services (HOK/ha), working capital (Rp/ha), water pump (unit/ha), thresher (unit/ha). All inputs are disaggregated into tradable inputs and domestic factors.

Private prices or actual market prices of output and inputs are prices received and paid by farmers at the research location (price per unit at the farm level). The social price of tradable output and input refers to international prices. Social prices at farm level are estimated by using import parity. This requires some supporting data, including c.i.f import prices, domestic currency exchange rates; import tariffs; storage, handling, and transportation costs. Social prices for domestic factors are estimated using the principle of opportunity cost, based on the value of the best alternative use. The structure of soybean farming costs in detail and the calculation of import parity prices are presented in APPENDIX.

All the output, inputs and actual market prices date, as well as social prices of domestic factors were collected through surveys to 30 soybean farmers based on the size of land used for soybeans cultivation in 2016. The survey was located in Sukorejo Village Bangsalsari District, Jember Regency, East Java province with the consideration that the productivity of soybean farming in this village is the highest compared to other regions. In-depth interviews were also conducted with several stakeholders such as farmer groups, farm stall owners, agricultural input distributors, traders, and food crop agriculture office, soybean importers, business associations of goods and logistics transportation services to ensure the accuracy / validity of the data. Meanwhile, some supporting data for the calculation of import parity of tradable output and inputs were collected from World Bank (2016), and Bank Indonesia (2016).

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RESULTS AND DISCUSSION

Table 2 presents the results of the PAM for the 2016 soybean farming system. Profits are based on private prices of Rp 1,573,649.89 per hectare or almost double compared to profits based on social prices of Rp 789,760.67 per hectare. The divergence in the revenue column of Rp 681,893.05 per hectare implicitly indicates the effect of soybean pricing policies at the farm level, so that the private price of output is higher than the social price

In the tradable input column, the divergence of Rp -138,869.50 implicitly indicates that the farming system is subsidized, and therefore the private price of tradable inputs is lower than the social price. Fertilizer is one of the tradable inputs whose prices are subsidized by the government. The type of fertilizer used by farmers in the study locations is SP36 and NPK with prices at the farm level of Rp 2,000 per kilogram and Rp 2,300 per kilogram respectively. Other types of inputs that are also subsidized are high yielding seeds. The seed subsidies are regulated by the government at Rp 1,000 per kilogram. Furthermore, divergence in domestic factors is Rp. 36,873.33 due to the interest rate of working capital at private prices (3.8% per season) higher than the interest rate of working capital at social prices (3.2% per season).

Indicators that show the competitiveness of soybean farming in Table 2 are PCR and DRCR. The PCR value is 0.80 (less than 1) which means that to increase the value added of soybean farming by one unit only requires domestic factor costs of 0.8 units. This indicates that soybean farming has a competitive advantage. The similar results were also found in previous studies such as Firdaus (2007), Zakaria et al. (2010), and Sari and Prajanti (2016).

The DRCR value of 0.89 means that to produce an added value of one unit only requires a domestic factor cost of 0.89 units. This shows that soybean farming is efficient in using domestic resources and has a comparative advantage. Similar results were also found in Zakaria et al. (2010) and Mutiara et al. (2013). However, this result is contrary to Sari and Prajanti (2016) who found that soybean farming is inefficient and does not have a comparative advantage with more than one DRCR value.

Table 2. Results of Policy Analysis Matrix (PAM) for Soybean Farming, 2016

	Revenues (Rp/ha)	Costs (Rp/ha)		Profits (Rp/ha)
		Tradable Inputs	Domestic Factors	
Privat Price	9,102,282.00	1,050,001.00	6,478,631.11	1,573,649.89
Social Price	8,420,338.95	1,188,870.50	6,441,757.78	789,760.67
Divergences	681,893.05	-138,869.50	36,873.33	783,889.22
PCR	0.80			
DRCR	0.89			
NPCO	1.08			
NPCI	0.88			
EPC	1.11			
PC	1.99			
SRP	0.09			

Source: Author calculation.

The impact of government policies on soybean farming can be explained by using the ratio indicators of NPCO, NPCI, EPC, PC and SRP. The NPCO value of 1.08 indicates that government policy causes private price of output to be 8% higher than the social price. NPCO> 1 indicates considerable protection by the government against the output of soybean farming. The NPCI value of 0.88 indicates that government policy causes the private price of tradable inputs to be 12% lower than the social price.

The EPC value of 1.11 indicates that the net impact of government policies that affect the market causes the added value at private price to be 11% higher than the added value at social price. PC value of 1.99 indicates that government policy causes profit at private prices to be 1.99 times greater than profit at social prices. Finally, the SRP 0.09 indicates that the existence of government policy causes soybean farmers' income to be 9% higher than without policy.

The increase in domestic soybean price to Rp 8,500 per kilogram due to changes in soybean pricing policies at the farm level have caused changes in revenue and profit at private price. Revenue at private price which was originally Rp 9,102,282 per hectare increased to Rp 12,478,935 per hectare. Meanwhile, profit at private price increased from the original value of Rp 1,573,649.89 per hectare to Rp 4950,302.89 per hectare. Conversely, the increase in soybean import tariffs to 0.5% due to changes in the import tariff policy led to changes in import parity price at the farm level, which in turn would affect the revenue and profit at social price. Revenue at social price which were originally Rp 8,420,338.95 per hectare increased to Rp 8,462,480 per hectare. The social profit gained also increased from the original value of Rp 789,760.67 per hectare to Rp 830,478.72 per hectare, or an increase of approximately 5%.

As a protective instrument, import tariffs should be increased to the optimum level allowed. For example, a simulation conducted by Kustiari and Dermoredjo (2013) shows that the import tariff for soybeans by 15% to 27% will increase the profitability of soybean farming by 25% to 35%. The impact of changes in pricing policy of soybean and import tariffs on revenues and profits is presented in Table 3.

Table 3. Results of the Sensitivity Analysis

	Initial condition[1)]		Increase in soybean price by 34.92%[2)]		Increase in soybean import tariff by 0.05%[3)]	
	Revenues (Rp/ha)	Profits (Rp/ha)	Revenues (Rp/ha)	Profits (Rp/ha)	Revenues (Rp/ha)	Profits (Rp/ha)
Private Price	9,102,282.00	1,573,649.89	12,478,935.00	4,950,302.89	9,102,282.00	1,573,649.89
Social Price	8,420,338.95	789,760.67	8,420,388.95	789,760.67	8,462,480.00	830,478.72
Divergences	681,893.05	783,889.22	4,058,546.05	4,160,542.22	639,802.00	743,171.17

Source: Author calculation

Notes: [1)] the actual price of soybean at farm gate level Rp 6,300/kg, import tariff 0%; [2)] Based on the trade minister regulation No. 27/M-DAG/PER/5/2017, the procurement price of soybean at farm gate is Rp 8500/kg; [3)] Based on the minister of finance regulation No. 34/Pmk. 010/2017, the import tariff of soybean is 0.05%.

The impact of changes in soybean output prices and soybean import tariffs on the competitiveness of soybean farming is shown in table 4. PCR values decreased from the initial value of 0.80 to 0.56 due to an increase in soybean output prices by 34.92%, while the DRCR

value remained unchanged. In other words, this policy only increases competitive advantage and not the comparative advantage of soybean farming. The increase in import tariffs by 0.5% does not cause changes in PCR and DRCR values. This indicates that the policy does not have an impact on the competitiveness of soybean farming.

Table 3. Impact of Changes in Output Price Policy and Import Tariffs

Ratio Indicators	Initial Value	Price of Output Increased by 34.92%	Changes	Imposing Import tariff by 0.5%	Changes
(1)	(2)	(3)	(4)=(3)-(2)	(5)	(6)=(5)-(2)
PCR	0.80	0.56	-0.23	0.80	0.00
DRCR	0.89	0.89	0.00	0.88	-0.01
NPCO	1.08	1.48	0.40	1.07	-0.01
NPCI	0.88	0.88	0.00	0.88	0.00
EPC	1.11	1.58	0.46	1.10	-0.01
PC	1.99	6.26	4.27	1.89	-0.11
SRP	0.09	0.49	0.40	0.08	-0.01

Source: Author calculation

The policy of increasing soybean prices at the farm level and soybean import tariffs indicate that the government policies are increasingly protective of output. However, the increase in import tariffs is very small compared to the increase in soybean prices at the farm level. Therefore, the economic impact of increasing soybean prices is greater than the increase in import tariffs.

The increase in soybean prices at the farm level of 34.92% has increased the NPCO value by 0.40 from its initial value. This policy also increases the EPC value to 1.58, and therefore increases the added value at private price by 58% higher than the added value at social price. PC value also increased 4.27 indicating that an increase in soybean prices at the farm level caused profit at private price to increase by 4.27 times more than in the initial conditions. Finally, the SRP value increased by 0.40 from the initial value indicating that the net effect of the policy transfer increased the income of soybean farmers 40% higher than the initial value.

CONCLUSIONS AND POLICY IMPLICATIONS

Soybean farming has proven to have a competitive advantage and comparative advantage. Pricing policy of soybean, input price subsidies, and subsidizing production inputs directly to farmers have caused soybean farming to have greater benefits than without policy. Based on the sensitivity analysis, an increase in the price of soybean at farmer level increases the profitability and competitive advantage of soybean farming. Meanwhile, the relatively small

increase in soybean import tariffs does not have an impact on the competitiveness of soybean farming

However, output and input price policies are also applied to competing soybean commodities such as rice and maize. In this context, a gradual increase in the price of soybean relative to the price of rice and corn is necessary not only to increase the competitiveness of domestic soybean farming against imported soybeans, but also their competitiveness to the rice and maize farming. Furthermore, import tariffs should be increased to the highest limits that can be tolerated. In this case, further research is needed to determine the feasible price of soybean for farmers and the optimal import tariffs of soybean, so that it can be positive incentive to encourage increased domestic soybean production and farmer income.

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APPENDIX

Table 4. Costs, Revenues, and Profit of Soybean Farming, 2016

Input-Output	Quantities	Private Price (Rp)	Value at Private Price (Rp)	Social Price (Rp)	Value at Social Price (Rp)
Tradable Inputs					
-Fertilizer (kg/ha)					
NPK phonska	67.87	2,300	156,101.00	2,300	156,101.00
SP-36	67.87	2,000	135,740.00	4,046[1)]	274,609.50
-Chemical					
Liquid Pesticides (liters/ha)	1.01	200,000	202,000.00	200,000	202,000.00
-Seed (kg/ha)	50.56	11,000	556,160.00	11,000	556,160.00
Tradable Input Costs			1,050,001.00		1,188,870.50
Domestic Factors					
-Labor (HOK/ha)					
Land Prep	4.04	70,000	282,800.00	70,000	282,800.00
Planting	14.17	70,000	991,900.00	70,000	991,900.00
Fertilization	2.67	70,000	186,900.00	70,000	186,900.00
Harvesting	14.05	70,000	983,500.00	70,000	983,500.00
-Capital					
Working capital (Rp/ha)	6,145,556	3.8%	233,531.11	3.2%	196,657.78
Water pump (unit/ha)	1	100,000	100,000.00	100,000	100,000.00
Theser (unit/ha)	1	200,000	200,000.00	200,000	200,000.00
-Land (ha)	1	3,500,000	3,500,000.00	3,500,000	3,500,000.00
Domestic Factor Costs			6,478,631.11		6,441,757.78
Output					
-Dry soybeans seeds (kg/ha)	1,468.11	6,200	9,102,282.00	5,735.53[2)]	8,420,388.95
Total Profits			1,573,649.89		789,760.67

Source: Author calculation
Notes: [1)] and [2)] are import parity value at farm gate

Table 5. Import Parity Price for SP-36 Fertilizer

Descriptions	SP-36
F.O.B. Tunisia ($/ton)	281.7
Freight & Insurance ($/ton)	10
C.i.f. Jakarta ($/ton)	291.7
Exchange rate (Rp/$)	13,145
Exchange rate premium (%)	0%
Equillbrium exchange rate (Rp/$)	13,145
C.i.f. Jakarta in domestic currency (Rp/ton)	3,834,396.5
Weight conversion factor (kg/ton)	1,000
C.i.f. Jakarta in domestic currency (Rp/kg)	3,834.39
Transportation and handling cost to wholesale market (Rp/kg)	191.61
Value before processing (Rp/kg)	4,026
Processing conversion factor (%)	100%
Import parity value (Rp/kg)	4,026
Distribution costs to farm (Rp/kg)	20
Import parity value at farm gate (Rp/kg)	4,046

Source: Author calculation

Table 6. Import Parity Price for Soybeans

Descriptions	Soybeans
Harga C.I.F Rotterdam (US $/ton)	417
Exchange rate (Rp/$)	13,145
Exchange rate premium (%)	0%
Equillbrium exchange rate (Rp/$)	13,145
C.i.f. Jakarta in domestic currency (Rp/ton)	5,481,465
Weight conversion factor (kg/ton)	1,000
C.i.f. Jakarta in domestic currency (Rp/kg)	5,481.47
Transportation and handling cost to wholesale market (Rp/kg)	274.07
Value before processing (Rp/kg)	5,755.53
Processing conversion factor (%)	100%
Import parity value (Rp/kg)	5,755.53
Distribution costs to farm (Rp/kg)	20
Import parity value at farm gate (Rp/kg)	5,735.53

Source: Author calculation

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