AGRISOCIONOMICS
Jurnal Sosial Ekonomi dan Kebijakan Pertanian
ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 807-826, November 2024

EXAMINING THE SOYBEAN COMPETITIVENESS IN CENTRAL JAVA: A POLICY ANALYSIS MATRIX APPROACH

Avi Budi Setiawan[1*], Ernoiz Antriyandarti[2], Mochammad Yusuf[1], Prasetyo Ari Bowo[1], and Dian Tri Wiyanti[3]
[1]Universitas Negeri Semarang, Semarang, Central Java, Indonesia
[2]Universitas Sebelas Maret, Surakarta, Central Java, Indonesia
[3]Taipei Medical University, Taipei, Taiwan

*Correspondence Email: avibs@mail.unnes.ac.id

Submitted 10 January 2024; Approved 05 July 2024

ABSTRACT

Soybean is one of the leading food crops in Indonesia, but its dependence on imports is very high. The productivity of soybean yields in Indonesia is also far below that of other soybean-producing countries. This study aims to analyze the competitiveness of soybean farming in Central Java Province. Policy Analysis Matrix (PAM) is used to analyze the soybean competitiveness. The results showed that the from PAM model shows that the PCR value is 0.37, which means that soybean farming is competitive in the current market. Furthermore, the DRC value is 0.30, indicating that soybean commodities have a comparative advantage or are competitive in the market if they are perfectly competitive and there are no distortions. Soybeans have an NPCO value of 0.960, farmers are paid 96% of what they should be paid. It appears that soybean farmers are relatively disadvantaged based on the NPCO value. Furthermore, the NPCI value is 0.98. The research results indicate that the NPCI has a value less than one. This implies the existence of consumer input protection policies in the form of subsidies. Thus, to meet domestic demand for soybeans, producing for domestic is better than importing from other countries. The and competitiveness analysis results show that soybean farming is profitable and competitive. The existence of competitive and comparative advantages indicates that soybean farming is still feasible to be cultivated domestically, so efforts are needed to increase efficiency to reduce dependence on imports.

Keywords: *competitiveness, policy analysis matrix, soybean*

BACKGROUND

Soybean is a common food crop in Indonesia and one of the leading agricultural products. Soybean is one of the essential food crop commodities to be produced, along with rice and corn. Tofu, tempeh, and other processed meals are made from soybeans that are widely grown for their seeds (Setiawan & Bowo, 2017). Indonesia's soybean production has averaged a negative growth of 15.54% per year in the last five years, from 2015 to 2019. The decline in production impacts competition for land use with other commodities. Land use change is also unavoidable due to economic demands and high population growth rates. This condition is a factor causing the decrease in the soybean harvested area by an average of 11.97% per year. A significant reduction in the harvested area nationally occurred in 2017 and 2019 by 38.34% and 42.20% from 2015, covering an area of 614.10 thousand hectares in 2019 and the remaining 285.27 thousand hectares (Kementerian Pertanian, 2020).

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
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The high level of dependence on imported soybeans is an empirical reality. According to Edison (2019), domestic production has not been able to meet market demand amid efforts to be self-sufficient. In the last few years, soybean production has been dominated by only a few provinces, meaning there has been no shift in producer centers, indicating no new planting areas. High imports also indicate that local soybeans compete with imported soybeans in the domestic market (Balanay & Laureta, 2021). Even though the prices of the two types of soybeans are not far adrift and are substitutes, according to Salimova et al. (2017), if imported soybeans enter the domestic market at competitive prices, local soybeans will lose competitiveness, and the tendency to import becomes greater than planting it yourself.

Based on data from the Ministry of Agriculture (2020), seven provinces in Indonesia in the last five-year period from 2015 to 2019 became soybean production centers with a total contribution of 79.98%, or an average production of 403.18 thousand tons, to Indonesian production. In the 2015-2019 period, it was 687.15 thousand tons. The main production center is East Java Province which contributes 31.29% or an average annual production of 215.04 thousand tonnes. The second center is Central Java Province, with a contribution of 15.44% or annual production of 106.09 thousand tonnes, West Java contributing 11.94% or 82.06 thousand tonnes per year, and West Nusa Tenggara contributing 11.18% or production of 76.84 thousand tons per year. The other two provinces are Lampung and Aceh, contributing 2.62% of the annual production of 18 thousand tons and 2.54% or 17.47 thousand tons.

The production of native soybeans has historically been concentrated on the Central Java Province. Central Java Province is directly beneath East Java in terms of soybean production. The improvement of regional varieties and regular planting rates have elevated Central Java to the position of top soybean producer. While Central Java also saw a fall in soybean output growth, it was not as severe as in other production hubs, only declining by -12.71%. Grobogan Regency is vital in the national production map and Central Java. The large production, coupled with the development of local soybean varieties, has made Grobogan Regency one of the buffers for soybean production at the national level. However, soybean productivity in Grobogan only reached 18.63 Quintals/Ha (BPS Kabupaten Grobogan, 2020). Blora Regency in Central Java has the highest soybean productivity at 23.26 quarters per hectare, while Cilacap Regency has the lowest output at 13.21 quintals per hectare (BPS Jawa Tengah, 2020).

High imports signify consumption that cannot be satisfied domestically. This event demonstrates that Indonesia is not yet independent in terms of the domestic soybean market. Concerns should be raised about declining production and below-average productivity. However, free trade allows imported goods to freely enter the Indonesian market (Zainuri et al., 2015). Soybean cannot be separated from imported commodities, which make up the majority of supplies in the domestic market. Soybean imports in 2015 reached 2,256,932 tons, then imports in 2019 amounted to 2,670,086 tons. There was an increase in imports of around 18.03% over five years. There was an average deficit of around 2,100,000 tonnes in 2015-2019. The value of dependence on imports (Rp) in 2015 was 70.11, then increased to 86.29 in 2019. It was noted that the average value of the Import Dependence Ratio (Rp) was 78.44% per year. The Self-Sufficiency Ratio (SSR) value in 2015 was 29.91, then decreased to 13.71 in 2019. This condition indicates a higher level of dependence on imports. At the same time, the ratio of self-sufficiency ability is decreasing (Ministry of Agriculture, 2020).

ISSN 2580-0566; E-ISSN 2621-9778
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Indonesia's soybean productivity was recorded at 14.88 quintals/hectare. Productivity is relatively lower compared to productivity from other soybean centers worldwide (>29 Quintals/Hectare). Low and fluctuating productivity makes it difficult to meet domestic demand for soybeans from domestic production. It was recorded that in 2020, Indonesia had the lowest productivity level compared to other countries, namely 14.88 Quintals/Hectare. Turkey's highest productivity was recorded, with 43.55 Quintals/Hectare. This low productivity is the reason for low production. Several soybean exporting countries to Indonesia, such as the United States and Brazil, recorded higher productivity. Turkey recorded a productivity of 43.55 Quintals/Hectare, the United States 33.44 Quintals/Hectare, and Brazil 31.14 Quintals/Hectare. If there is no real breakthrough to increase the harvested area while increasing domestic soybean production in the short term, then imports will increase (Zainuri et al., 2015). It is estimated that domestic production will not be able to keep up with demand as the population increases and the demand for soybeans increases, one of the factors causing the low production of soybeans is that the land for planting soybeans has experienced a conversion of functions (Setiawan & Fafurida, 2019). This causes the business scale to get smaller, and they still have to compete with other strategic crops such as rice and corn.

The problem of the low productivity of soybean farming certainly raises questions about how the factors of production are used. There has been efficiency in use factors of production or not, given that efficiency is the relationship between the use of inputs and the resulting output. Research on farming efficiency has been carried out on rice, corn, and soybeans. Nugraha et al. (2020), Setiawan et al. (2019), Setiawan et al. (2019), Setiawan & Bowo (2017), and (2015) on soybeans. Zabihi et al. (2015) and (Ndlovu et al., 2014) on corn plants, Orewa & Izekor (2012) on yam plants. Various demographic conditions and internal and external factors owned by each region make the farming problems that arise will vary. The results of these studies also show mixed conclusions. Research conducted by Ndlovu et al. (2014), Orewa & Izekor (2012), Ainsworth et al. (2012), and Chiang et al. (2004) showed that certain combinations of inputs such as land, fertilizers, seeds, labor, and education level had a significant effect on the efficiency of the use of factors of production. Furthermore, the results of Nugraha et al. (2020) show that fertilizer use, farming experience, education, and house size, The ladder is a source of inefficiency in farming.

This study analyzes the competitiveness of soybean. Information about the performance efficiency effort farmer as part of activity on-farm will describe the use of inputs and their effects on the output of soy cultivation. In the following analysis, power competitive is done to deliver information about superiority competitive, comparative on effort farmer soy. The hope is that information about the analysis of power competition will describe performance on-farm and off-farm. Theoretically, competitiveness will occur if domestic production can meet demand, so efficiency is undoubtedly related to competitiveness. The part of the study that examines the competitiveness of farming with different locations has been carried out by Lindawati et al. (2021), Salimova et al. (2017), Suharyati et al. (2016), Zainuri et al. (2015), Schallera et al. (2014), Finkelshtain et al. (2011) (2012), Kariyasa & Dewi (2011), and Arisudi & Gapor (2008). There is also research about power competitiveness done in Malaysia, i.e., by Salimova et al. (2017) in Russia. Based on the results of research on competitiveness as described in Indonesia, Malaysia, Brazil, India, China, and Israel. There are different results between these studies, where several agricultural commodities such as soybeans, sweet potatoes, rice, corn, and other seasonal crops have competitiveness, both competitive and comparative. However, there are also research results indicating that these commodities do not yet have competitiveness

ISSN 2580-0566; E-ISSN 2621-9778
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Previous studies regarding farm competitiveness analysis have yielded various findings. Likewise, comparative and competitive advantages represent the strength of the competitiveness of agricultural commodities, which have been studied through several previous studies. This study tries to prove that technical efficiency is related to the competitiveness of agricultural commodities, as well as filling gaps in the literature and inconsistencies in previous research results. This study combines technical efficiency analysis using the stochastic frontier production model and Policy Analysis Matrix (PAM) to provide more empirical findings. Several previous studies have demonstrated that soybean commodities in Indonesia have high competitiveness in both comparative and competitive advantages. However, the observed phenomenon is that local soybean production cannot meet domestic demand, leading the country to continually import soybeans to fulfill domestic needs. Considering the continuously increasing soybean imports, there is concern that this could lead to import dependence. On the other hand, it is also observed that local soybean prices are higher than imported soybeans, further diminishing the competitiveness of domestic soybeans. This creates an irony where Indonesia, as one of the world's highest soybean producers, has a remarkably high and continually increasing soybean import rate. This research aims to analyze the competitiveness of soybeans in Central Java, Indonesia, examining the impact of government policies on the domestic soybean market position, and analyzing strategies to minimize soybean imports through government policy adjustments.

The issue of low productivity has to be researched. Techniques used in crop cultivation, the usage of inputs, and market performance could all play a role. Low productivity may also signify subpar input quality and production efficiency. Imports increased due to the country's heavy reliance on soybeans and the inability of local production to satisfy consumer demand (Finkelshtain et al., 2011). In proportion to population growth and rising incomes, there is a noticeable increase in the demand for soybeans. The country's capacity to produce soybeans has been unable to keep up with the rise in demand (Arisudi & Gapor, 2008). Domestic demand depends on imports because domestic soybean production cannot keep up with demand. The soybean processing industry suffers from the increased reliance on imports, mainly if rising global food prices result from low supply levels. This situation exists due to the current price of imported soybeans following the price on global exchanges.

Setiawan & Bowo (2017), in their research, stated that farming food crops in the Grobogan Regency consisting of rice, corn, and soybeans is still inefficient. The calculation of technical efficiency, allocation, and economic efficiency of the three commodities shows no efficiency yet. In line with this, research by Anggraeni et al. (2018) di Kabupaten Grobogan in the District Grobogan shows that although land area and labor significantly affect production efficiency, costs and output have a significant effect on cost efficiency. The decrease in the planting area, low productivity, and production, which tend to decrease, need to be of particular note. Soybean imports have increased in the last five years, from 2008 to 2013. The decrease in planted area in line with this indicates that soybean cultivation is no longer attractive, profitable, and low efficiency. This study analyzes the efficiency of farming and the competitiveness of sobean. In the following analysis, power competitive is done to deliver information about competitive competitive, comparative on effort farmer soy. This methods assigned to give a brief analysis about the analysis of power competition will describe performance on-farm and off-farm. Theoretically, competitiveness will occur if domestic production can meet demand, so efficiency is undoubtedly related to competitiveness.

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RESEARCH METHODS

This research aims to analyze and explore the comparative and competitive advantages of soybeans also how the market and government policies affects. The first step in this research is to estimate the power competitive including coparative and competitive advantages. The next step this research will analyzing how the effort of farmer soybeans and the impact of Policy government on input and output transfers from the existing position of soybean competitiveness. The subject of this research is farmer soybeans in the central production of soybean. This research was conducted in Center of soybean producer location in Indonesia. The location in Grobogan Regency was chosen because the production was the highest in Central Java Province. The location in Grobogan Regency was selected because its soybean production in 2012 was the highest in Central Java, with a total output reaching 13,961 tons (see Table 1). Blora Regency was chosen as a research site due to its highest soybean productivity in Central Java, with a productivity rate of 23.26 quintals per hectare in 2019 (see Table 1). These conditions justify the selection of these research locations to analyze the efficiency and factors influencing the inefficiency of farming operations that hinder productivity.

Table 1. Soybean Land area, Production and Productivity in Central Java Province in 2022

City/Regency		Land area (Ha)	Production (Ton)	Produktivitas (Quintal/Ha)
		Regency		
1.	Cilacap	4,941	6,526	13.21
2.	Banyumas	817	1,037	12.69
3.	Purbalingga	1,656	3,102	18.73
4.	Banjarnegara	491	852	17.35
5.	Kebumen	1,712	2,210	12.91
6.	Purworejo	640	1,277	19.95
7.	Wonosobo	25	40	16.21
8.	Magelang	4	7	17.81
9.	Boyolali	695	1,131	16.28
10.	Klaten	1,563	3,410	21.82
11.	Sukoharjo	1,101	1,690	15.36
12.	Wonogiri	1,933	2,874	14.87
13.	Karanganyar	277	488	17.61
14.	Sragen	1,665	2,772	16.65
15.	**Grobogan**	**7,495**	**13,961**	**18.63**
16.	**Blora**	**1,264**	**2,940**	**23.26**
17.	Rembang	2,135	2,948	13.81
18.	Pati	1,900	2,781	14.64
19.	Kudus	264	464	17.54
20.	Jepara	52	91	17.33
21.	Demak	3,318	6,235	18.79
22.	Semarang	93	124	13.38
23.	Temanggung	-	-	-
24.	Kendal	723	1,466	20.29
25.	Batang	1,106	1,559	14.10

ISSN 2580-0566; E-ISSN 2621-9778
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City/Regency		Land area (Ha)	Production (Ton)	Produktivitas (Quintal/Ha)
26.	Pekalongan	200	337	16.86
27.	Pemalang	195	344	17.63
28.	Tegal	73	130	17.77
29.	Brebes	1,607	3,537	22.00
	City			
1.	Magelang	-	-	-
2.	Surakarta	-	-	-
3.	Salatiga	-	-	-
4.	Semarang	-	-	-
5.	Pekalongan	-	-	-
6.	Tegal	-	-	-
Central Java		37,944	64,334	16.95

Source: Central Bureau of Statistics (2023)

This research conducted Policy Analysis Matrix (PAM) method. This technique is used to calculate competitiveness. According to (Monke & Pearson, 1989), PAM is intended to determine the economic efficiency and incentives obtained from the intervention government and its impact on farming activities. The revenue PAM model differentiates costs and benefits according to private (market) and social prices. The difference between the two prices is the impact of the government's policies and the occurrence of distortions in the input and output markets. The private price for soybeans is the price level soybean farmers will receive based on the auction price. In contrast, the social price is obtained from the price of imported soybeans (fob) at the nearest port, plus freight and insurance costs, loading and unloading at the port, and transportation costs to the soybean warehouse. The use of Policy Analysis Matrix (PAM) in this study is aimed at analyzing the competitiveness aspects of soybean farming, namely comparative advantage and competitive advantage, as well as the impact of policy analysis. The following presents the PAM analysis table (see Table 3).

Table 2. Policy Analysis Matrix Formulation

Component	Receipt	Cost of Production Factors		Profit
		Tradable	Non tradable	
Private Price	A	B	C	D
Social Price	E	F	G	H
Divergence	I=A-E	J=B-F	K=C-G	L=D-H

Source: Monke dan Pearson (1995)

Information:

A : Private Revenue
B : Private Tradable Input Costs
C : Private Non Tradable Input Costs
D : Private Profit
E : Social Revenue
F : Social Tradable Input Costs
G : Social Non-Tradable Input Costs
H : Social Profit
I : Output Transfer
J : Tradable Input Transfer
K : Transfer Factor
L : Net Transfer

ISSN 2580-0566; E-ISSN 2621-9778
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Tabel 3. Operational Variable of Policy Analysis Matrix

No	Variables	Operational Definition	Unit
1	Private Revenue	The total income from agricultural activities obtained by farmers in the current market, calculated by multiplying the production quantity by the actual selling price in the market.	Rp
2	Private Tradable Input Costs	All types of expenses incurred by farmers for the purchase of non-tradable inputs in the global market, calculated by summing the costs of acquiring each non-tradable input, multiplied by the allocation percentage for each input, and further multiplied by the actual market price.	Rp
3	Private Non Tradable Input Costs	All types of expenses incurred by farmers for purchasing non-tradable inputs in the global market, calculated by summing the costs for acquiring each non-tradable input, multiplied by the allocated percentage for each input, and further multiplied by the actual market price.	Rp
4	Private Profit (Pp)	Farmer's profit that calculated by subtracting the private tradable input costs and private non-tradable input costs from the private revenue.	Rp
5	Social Revenue	Social revenue is the total income from agricultural activities obtained by farmers in a market assumed to be perfectly competitive or without distortions. It is calculated by multiplying the production quantity by the selling price using the shadow price.	Rp
6	Social Tradable Input Costs	Social tradable input costs are all types of expenses incurred by farmers for purchasing tradable inputs in the global market. These costs are calculated by summing the expenses for acquiring each tradable input, multiplied by the allocated percentage for each input, and further multiplied by the purchase price using the shadow price.	Rp
7	Social Non-Tradable Input Costs	Social non-tradable input costs are all types of expenses incurred by farmers for purchasing non-tradable inputs that are not traded in the global market. These costs are calculated by summing the expenses for acquiring each non-tradable input, multiplied by the allocated percentage for each input, and further multiplied by the purchase price using the shadow price.	Rp
8	Social Profit (SP)	Social profit is the profit received by all economic market participants. It is calculated by subtracting the social tradable input costs and social non-tradable input costs from the social revenue.	Rp
9	Output Transfer (Ot)	Output Tranfer is an indicator that demonstrates the presence of government policies affecting the output, resulting in a discrepancy between private and social output prices. A positive output transfer value indicates that there is an incentive for producers, calculated as the difference between private revenue and social revenue..	Rp
10	Tradable Input Transfer (IT)	Transfer input is an indicator that indicates the presence of government policies on input, resulting in a difference	Rp

ISSN 2580-0566; E-ISSN 2621-9778
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No	Variables	Operational Definition	Unit
		between private and social input prices. A positive transfer input value indicates that there is a subsidy from society to consumers, calculated by subtracting private tradable input costs from social tradable input costs.	
11	Factor Transfers(FT)	The transfer factor indicates the extent of subsidies for non-tradable inputs. It is calculated by subtracting private non-tradable input costs from social non-tradable input costs.	Rp
12	Net Policy Transfers (NPT)	Net policy transfer represents the magnitude of inefficiency in the agricultural system arising from policy distortions (or efficiencies) or market failures. It is calculated by subtracting private profit from social profit.	Rp
13	Privat Costs Ratio (PCR)	It is a comparison between the financial cost of domestic factors and the value added in financial prices, serving as a measure of efficiency or competitiveness in financial terms (competitive advantage).	Ratio
14	Domestic Resource Costs Ratio (DRC)	It is a comparison between the economic cost of domestic factors and the value added in economic prices. DRC is similar to PCR, where DRC focuses on economic profit, while PCR focuses on financial profit (comparative advantage).	Ratio
15	Nominal Protection Coefficient (NPC)	It is the ratio between the prevailing commodity price (financial) and the world price (economic). NPC on tradable output (NPCO) indicates the degree of output transfer, while on tradable input (NPCI) indicates the degree of input transfer.	Ratio
16	Effective Protection Coefficient (EPC)	It is the ratio of value added in financial prices to value added in world prices. An indicator that reflects the impact of combined nominal protection policies on tradable output and input (NPCO and NPCI).	Ratio
17	Profitability Coefficient Atau PC)	Ratio of financial profit to economic profit, serving as a measure of the degree of net transfer that makes financial profit either larger or smaller than economic profit.	Ratio
18	Subsidy Ratio To Producers (SRP)	It is a ratio that indicates the magnitude of net transfer from the difference with economic revenue in the system.	Ratio

Source: Monke & Pearson (1989)

This study employs the concept of shadow price to assess the competitiveness of soybeans in the absence of market distortions. Shadow price refers to the assumed input price level that would prevail in a market free of distortions, such as government policies like subsidies, taxes, and similar interventions. Shadow prices are used to calculate the input and output costs in soybean farming production. The operational definitions of shadow prices for both outputs and inputs in soybean farming are presented in Table 4.

Tabel 4. Shadow Price Operational Component Policy Analysis Matrix

No	Variables	Operational Definition	Unit
1	Soybean Production Shadow Price	The price of soybeans on the global market, assuming that the global market is a perfect competition market, so the price is formed purely through interaction.	Rp/Kilograms
2	Land area Shadow Price	The prevailing land rental price in the research area, assuming that land is a non-tradable input, so its social price is not distorted by government policies and its social price reflects the financial price of the agricultural land.	Rp/Hectare
3	Seeds Shadow Price	The price of soybean seeds that is not distorted by government policies such as subsidies, taxes, etc.	Rp/Kilograms
4	Fertilizer Shadow Price	The free on board price of synthetic fertilizers, with data obtained from previous research publications, multiplied by the shadow exchange rate.	Rp/Kilograms
5	Pesticide Shadow Price	The price of pesticides that is not distorted by government intervention, as there are no subsidies for pesticides.	Rp/Mililiter
6	Stimulant Shadow Price	The price of Stimulant that is not distorted by government intervention, as there are no subsidies for stimulants.	Rp/Mililiter
7	Labor Shadow Price	The shadow price of labor using the assumption of 80% of the prevailing wage rate from the private price (Novianti, 2013).	Rp/Person

Sumber: Data Processed (2023)

The sample in this study was soybean farmers spread across Grobogan and Blora Regencies. The sampling method was carried out using a proportional random sampling technique. The selection of respondents was based on consideration of the degree of homogeneity. The determination of the research location was based on the selection of a regency with the highest soybean farming productivity in Central Java. Grobogan dan Kabupaten Blora. Based on data from the Agricultural Office of Central Java Province, the number of farmers in Blora Regency in 2021 was 20,968; the number of farmers in Grobogan Regency was 269,731. In total, the population for this study amounted to 290,699 soybean farmers. Given the cumulative population of farmers in Grobogan and Blora Regencies, the sampling process was conducted using the Slovin Formula. According to Slovin (1960), the calculation for research sampling is denoted as follows:

The amount of Sampel (n) $= N / (1+Ne^2)$
$= 290.699 / (1+290.699\ (0,005))$
$= 290.699 / 1.454,495$
= 200 Farmers.

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ISSN 2580-0566; E-ISSN 2621-9778
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Furthermore, the allocation of sample proportions for Grobogan and Blora regencies was established by considering the percentage of the total population of farmers in each respective location. Grobogan Regency, with a population of 269,731 farmers, accounts for 92.8% (rounded to 93%), while Blora Regency, with a population of 20,968 farmers, constitutes 7.2% (rounded to 7%) of the total research population. The basis for the determination is the similarity of location characteristics, types of soybean varieties, and planting techniques. Based on the percentage the amount sample used is 200 farmers based on slovin sampling methods. In this research, the number sample in the district Grobogan was 184 respondents, and in the district, Blora were 14 respondents.

The number of samples taken from Grobogan and Blora districts was determined by considering the percentage of the farmer population from each location. Grobogan Regency with a population of 269,731 farmers has a percentage of 92.8% (rounded to 93%), while Blora Regency with a population of 20,968 farmers has a percentage of 7.2% (rounded to 7%) of the total population studied. By knowing the number of research samples of 200 respondents, the number of respondents based on the percentage of population for Grobogan Regency is 186 farmers and Blora Regency is 14 farmers.

Sampling of farmers for Grobogan Regency, taken from the districts with the highest level of productivity, namely Pulokulon District with soybean productivity of 21.07 quintals / ha, Kradenan District with productivity of 20.08 quintals / ha, and Gabus District with productivity of 20.08 quintals / ha. The sampling of farmers for Blora District was taken from Kunduran District with consideration of distance and readiness of respondents. From the sample number of research respondents that have been calculated through the Slovin Formula, namely 200 farmers, it is divided proportionally according to the percentage of the population coming from the sub-districts with the highest soybean farming productivity from Grobogan Regency and Blora Regency. Ninety three percent of respondents from this study came from Grobogan Regency from Pulokulon District, Kradenan District, and Cork District which were divided equally with a percentage of 31% each. The remaining 7% respondents were obtained from Blora Regency in Kunduran District. The sample criteria in this study are farmers who plant soybeans on their own land or rent in the dry season of 2022 (June-October).

RESULT AND DISCUSSION

This research was conducted in the Central Java Province, which is one of the main soybean centers in Indonesia. The economy of Central Java is dominated by the agricultural and industrial sectors. The agricultural sector is characterized by food crops and plantations, with major commodities such as rice, corn, soybeans, coffee, and tea. There are production centers for food crops in Grobogan Regency, Cilacap Regency, Blora Regency, Demak Regency, and several other regencies. As for the industrial sector, contributions come from Semarang City, Kudus Regency, and Cilacap Regency. Soybeans are predominantly cultivated in Grobogan Regency, making it the largest soybean producer in Central Java. The highest soybean harvest productivity per hectare is achieved in Blora Regency. Therefore, these two regencies serve as the research focus. In this research, the competitiveness of a commodity is measured through comparative and competitive advantage analysis using the Policy Analysis Matrix (PAM) analysis tool. The preparation of the PAM table is based on data reception, cost production, and trade cost calculated based on financial prices (financial analysis) and shadow prices (social analysis).

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
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Table 5. Policy Analysis Matrix of Soybean Commodity

Component	Reception (Rp)	Cost of Production Factors		Profit (Rp)
		Tradeable	Non-Tradeable	
Private Price	21,000,000	728,572	7,598,228	12,673,200
Social Price	22,785,000	1,006,912	6,650,080	15,128,008
Divergence	-1,785,000	-278,340	948,148	-2,454,808

Source: Processed Data (2023)

The competitive advantage of a commodity is determined by the value of private profit (PP) and the value of the Private Cost Ratio (PCR). The price used in this analysis is the actual price that occurs in the market, which has been influenced by government intervention. In Table 5, the private profit value of soybeans is Rp 12,673,200 per hectare per year. Soybean Private Profit Value is positive, showing that soybean farming is still profitable in conditions where government policies influence it. The private tradable costs exhibit figures smaller than the social tradable costs. This condition indicates that farmers pay for tradable inputs at a lower rate compared to the hypothetical prices in a perfectly competitive market, although the disparity is not substantial (Chanifah et al., 2020). One contributing factor is the subsidies provided to farmers for fertilizers, resulting in a lower private cost compared to the social cost. Meanwhile, for other inputs, the actual prices are lower than the shadow prices (Oumer et al., 2022). On the other hand, social non-tradable costs are lower than private non-tradable costs. This suggests that farmers incur higher expenses for private non-tradable inputs compared to the prices at the social level (Kadakoğlu et al., 2022). One of the reasons for this is the higher costs associated with labor and seeds at the financial prices as opposed to the shadow prices. Table 6 below, providing details on financial and shadow prices for inputs and outputs in soybean farming.

Table 6. Financial Prices and Shadow Prices of Soybean Farming Business

Category	Price	Financial Price (Rp)	Shadow Price (Rp)
Output	Soybean	11,000	11,500
Input	Fertilizer (Urea)	2,250	4,453
	Seeds	15,000	4,453
	Stimulant	550	696
	Pesticide	250	226

Source: Processed Data (2023)

The shadow price for soybean output is derived from the import price of soybeans at the importer's warehouse in March 2023, whereas the financial price of soybeans represents the local soybean price in the research area during the same period. The objective is to enable a comparison of prices during the same timeframe. The competitiveness of a commodity is measured through the analysis of competitive and comparative advantages using the Policy Analysis Matrix (PAM) as an analytical tool. The construction of the PAM table is based on data regarding revenue, production costs, and transaction costs calculated based on financial prices (financial analysis) and shadow prices (social analysis) (Chakuri et al., 2022). The results of financial and social analyses consist of revenue and costs (tradable and non-tradable). The competitive advantage of a commodity is determined by the private profit (PP) and the private cost ratio (PCR). The prices used in this analysis are the actual

ISSN 2580-0566; E-ISSN 2621-9778
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market prices, influenced by government interventions. The following presents the results of estimating private profits and calculating the comparative advantages of soybean farming in Blora and Grobogan regencies, Central Java.

Table 7. Competitiveness Analysis of Policy Analysis Matrix

Competitiveness Matrix	Score
Private Profits (PP)	Rp 12,673,200
Private Cost Ratio (PCR)	0.374824507
Social Benefit (SB)	Rp 15,128,008
Domestic Resource Cost Ratio	0.305356477

Source: Processed Data (2023)

The allocation of resources to achieve financial efficiency in exploiting a commodity might reveal a commodity's competitive edge (Indriyanti, 2007). The PCR value illustrates the financial efficiency indicator of the analyzed soybean farming. As noted in Table 7, the soybean PCR value is 0.37. Due to the financial stability of the soybean growing industry, the PCR value suggests that soybean has a competitive advantage. The lower the PCR value of a commodity, the greater its competitive advantage. A PCR value of 0.37 indicates that an additional domestic factor cost of 0.37 units is required to obtain the added value of one unit of output at private pricing—the selling price of the output influences the amount of income soybean farmers to receive. In contrast, the total cost depends on how much output capacity is generated in a given year.

The value of Social Benefits (SB) and the value of the Domestic Resource Ratio show that soybeans have a comparative advantage (DRC). The two numbers (KS and DRC) serve as indices of the competitiveness and viability of soybean production under non-interventionist settings. The results of this estimation are in line with research conducted by Chanifah et al. (2020), which found that soybean farming has competitiveness, both competitively and comparatively.The Social Benefit Value (SB) describes the benefits obtained if there is a perfectly competitive market where the effects of divergence (government policies or market failures) do not occur. Based on Table 7, the soybean KS value is Rp 15,128,008/Hectare in a year. The soybean commodity analyzed has positive social benefits. It means that the soybean commodity can provide benefits even without government policy and no distortion effects. More specifically, Table 8 below elucidates the distribution of private profits and social gains obtained by the 200 farmers who are the subjects of this research.

Tabel 8. Private Profit (PP) and Social Profit (SB) of Soybean Farming

No	Profit (Rp)	Farmers (Private Profit)	Percent (%)	Farmers (Social Profit)	Percent (%)
1	0 – 4,000,000	76	38	73	36.5
2	4,100,000 – 6,000,000	62	31	65	32.5
3	6,100,000 – 8,000,000	41	20.5	28	14
4	8,100,000 – 10,000,000	10	5	19	9.5
5	>10,000,000	11	5.5	15	7.5
	Average	5,610,367		6,169,322	
	Minimum	1,369,750		1,655,096	
	Maximum	16,972,180		18,280,586	
	Standard Deviation	2,808,179		3,029,923	

Source: Processed Data (2023)

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The private profit value (PP) for soybeans is lower than the social profit value (SB), with the maximum value of social profit exceeding that of private profit. This condition arises because the social prices for both outputs are higher than their private prices. Economically, the non-tradable input costs are also lower than their financial counterparts. This could be attributed to the fact that the economic value of labor costs is 80% of its financial wage, and taxes and capital interest are not considered as costs in economic analysis. In economic analysis, tax components are not computed as costs, assuming that farmers do not pay income tax on agricultural income (Oumer et al., 2022). Additionally, capital interest is not taken into account as the capital used for soybean farming is not sourced from foreign loans.

If we look closely, the value of Private Profit (PP) is lower than that of Social Profit (SB). It is because the social price of the two outputs is higher than the private price. In addition, the costs of non-tradable inputs are economically lower than those of financially non-tradable inputs. It might be because the financial salaries are 20% higher than the high labor expenses in the economy. The economic analysis does not include the cost of capital gains tax and interest. In the economic analysis, the tax component is not counted as a cost because, in the economic analysis, the exploitation of a commodity is carried out with the assumption that there is no government intervention (Meliany et al., 2023). Meanwhile, the capital interest component is not considered because the capital used for soybean farming does not come from foreign loans.

In addition to the SP value, the comparative advantage of a commodity can be seen from the Domestic Resource Ratio (DRC) value. The DRC value describes the economic efficiency of a commodity. The DRC value explains that producing soybeans requires domestic resource costs of 30.5% of the required import costs. The DRC value analyzed has a value of less than one. This condition explains that soybean cultivation has a comparative advantage. Therefore, domestic production is preferable to importing from foreign nations to meet domestic demand. The DRC value in this study is low, so it can be explained that existing government policies have not been able to increase efficiency in producing soybeans in Grobogan and Blora Regencies. Furthermore, government policies (in the form of subsidies or taxes) on an agricultural commodity can have both positive and negative effects on its stakeholders. Indicators of the government's impact on output can be observed using the Transfer Output (TO) value and the Nominal Protection Coefficient on Output (NPCO).

Table 9. Transfer Output (TO) Nominal Protection Coefficient on Output (NPCO)

Indicators	Score
Transfer Output/ TO	Rp -307,635
Nominal Protection Coefficient on Output (NPCO)	0.96

Source: Processed Data (2023)

Based on Table 9, it can be observed that the NPCO value for soybeans in Grobogan and Blora regencies is 0.96. This condition implies that soybean farmers receive 96% of the price they should receive. According to this NPCO value, it is known that soybean farmers are relatively less benefited. A NPCO value less than one indicates that the government's protection for soybean farmers is not optimal, leading to a reduction in producer revenue. This aligns with the concept of producer surplus, where in this case, soybean farmers do not receive a surplus and experience a deficit.

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Government policy on an agricultural commodity (in the form of subsidies or taxes) might affect the actors positively or negatively. The TO (Transfer Output) and NPCO (Nominal Protection Coefficient on Output) numbers can be used to identify indicators of how government policies affect output. Soybeans have a negative output transfer value of 307,635 rupiahs per hectare per year. Soybeans have a negative TO value, which indicates that the private price is less than the social price. This situation demonstrates that it is more advantageous for consumers when government policies or interventions affect the production of these farming firms due to consumers purchasing these soybeans at a discount from their actual cost. In other words, the surplus is transferred from producers to consumers.

Since soybeans have an NPCO value of 0.960, farmers are paid 96% of what they should be paid. It appears that soybean farmers are relatively disadvantaged based on the NPCO value. The NPCO value of soybean growing in Central Java is under one. This indicates that the government's protection of soybean farmers has not been successful, which has led to a decline in producer income. Input prices are subject to government policy, just like output prices are. In order to help producers use resources efficiently and safeguard domestic producers, the government may enact input-related policies such as trade restrictions or subsidies (Zainuri et al., 2015). Government policies not only apply to output prices but also extend to input prices. Government policies on inputs, such as subsidies or trade barriers, are implemented with the hope that producers can utilize resources optimally, aiming to protect domestic producers (Indriyati, 2007). Indicators used to assess government interventions on input production include the Transfer Input (TI) value, Transfer Factor (TF), and Nominal Protection Coefficient on Input (NPCI), as presented in Table 10.

Table 10. Transfer Input (TI) Values, Transfer Factor (TF), and Nominal Protection Coefficient on Input (NPCI)

Indicators	Score
Transfer Input (TI)	Rp -5,517
Nominal Protection Coefficient on Input (NPCI)	0.98
Transfer Factor	Rp 256,837

Source: Processed Data (2023)

The Transfer Input (TI) value illustrates policies (subsidies or taxes) affecting tradable production inputs. The TI value for soybean farming in Grobogan and Blora regencies is -Rp 5,517. A negative TI value indicates the presence of subsidy policies for tradable production inputs (inorganic fertilizer) in soybean farming. The nominal input protection coefficient (NPCI) is the ratio between tradable input costs based on social prices and financial prices. The NPCI value indicates the extent of the government's incentive for tradable production inputs. According to Table 10 above, the NPCI value is 0.98. The research results indicate that the NPCI has a value less than one. This implies the existence of consumer input protection policies in the form of subsidies. However, despite the presence of subsidies, some farmers incur higher expenses for tradable inputs in the private market compared to the expenses for tradable inputs in the domestic market with shadow prices. This is attributed to the higher prices of certain inputs in the local market.

Policies (subsidies or taxes) applied to tradable manufacturing inputs are called Transfer Inputs value (TI) Rp 256,837 per hectare per year TI value of soybeans. A positive TI value indicates the subsidy policy for tradable production inputs (inorganic fertilizer) for soybeans in Central Java.

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This differentiates soybean producers because government regulations result in subsidized tradable inputs (inorganic fertilizers), causing farmers to price these inputs below market prices. Furthermore, the positive value of the Transfer Factor indicates that the cost of non-tradable inputs incurred at financial prices is higher than that of non-tradable inputs at social prices. In order to identify the government policy's impact on inputs and outputs, the Effective Protection Coefficient (EPC), Net Transfer (NT), Profit Coefficient (PC), and Subsidy Ratio for Producers (SRP) are utilized. All these values serve as indicators of the input-output policy impact. The calculated values of these indicators for the analyzed soybean farming can be found in Table 11.

Table 11. Effective Protection Coefficient (EPC), Net Transfer (NT), Profit Coefficient (PC), and Subsidy Ratio for Producers (SRP)

Indicators	Score
Effective Protection Coefficient (EPC)	0.95
Net Transfer (NT)	Rp -307,635
Profit Coefficient (PC)	0.96
Subsidy Ratio for Producer (SRP)	-0.04

Source: Processed Data (2023)

Based on table 11, the EPC value based on the calculation results is 0.95. Implementation of policies on government input-output has provided incentives. The EPC value describes how government policies effectively protect domestic production. If the EPC value is less than one, then the policy is not working effectively or hinders producers from producing. This is what happened to the social welfare analyzed. The Net Transfer (NT) value is an indicator in the PAM analysis tool that can describe how a policy would affect producer surplus. The net transfer value is the gap between private and societal profit value. The Net Transfer Value per hectare per year is negative 307,635 rupiahs. The negative TB value denotes a declining producer surplus in the two outputs under analysis. The surplus of soy farmers decreased to 307,635 rupiahs per hectare in a year.

The PC value is employed to elucidate the incentive impact of overall output policies, encompassing foreign (tradable) and domestic input policies (net policy transfer). Based on the PC values in Table 8, it is discerned that soybean farming has a PC value of less than one. This signifies that government policies in the form of subsidies and distortions indeed have an impact on producer profits, resulting in lower earnings compared to a scenario without policies, or in a domestic market. The PC value for soybeans is 0.96, implying that soybean farming obtains 96% of the profits it should receive if the market operates without distortions. The PC value is derived from dividing private profits by domestic profits. With a value less than 1, it indicates that revenue in a perfectly competitive market or assuming shadow prices is higher than at private prices. Another reason is that the implementation of input subsidies lowers the selling price of soybeans, thus depressing farmer revenues at financial prices.

Another indicator of policy impact on input-output is the SRP or the subsidy ratio for producers. The SRP value for soybean farming is -0.04 (see Table 9). A negative SRP value indicates that government policies have a negative impact on the cost structure of production. This is because the costs invested by producers are greater than the added value of profits they can receive. Based on the SRP value, the negative impact of government policies is more pronounced on soybean output in Grobogan and Blora regencies. This condition is caused by a considerable difference in profits

ISSN 2580-0566; E-ISSN 2621-9778
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between private and social gains received by soybean farmers. One contributing factor to this difference is the disparity in the selling prices of output, where the social selling price is higher than the private selling price.

Although the study results reveal that soybean commodities still maintain strong competitiveness, as demonstrated by their competitive and comparative advantages, the findings indicate that, despite not achieving technical efficiency, soybean commodities remain competitive and can compete with imported soybeans in the market. Previous research (Nuraini et al., 2020) has found that soybean farming can still generate high social benefits across the seven PAM systems studied. In essence, domestic soybean production can compete with imported soybeans, providing additional support for the study's conclusions. Prabowo & Pudjianto (2023) also noted that despite not being technically efficient, soybean farming possesses comparative and competitive advantages. According to Hayat & Islam (2010), comparative and competitive advantages are emphasized as an effort that plays an essential role in increasing the competitiveness of agricultural commodities. According to Cheng & Beghin (1999), reducing production costs and generating low selling prices can boost competitiveness. This will make a commodity more competitive in both home and international markets. In addition to technical efficiency and resource allocation, several internal and external factors must be taken into account in order to produce production costs and selling prices that are low and competitive (Tossou et al., 2023). The role of government and agricultural policies also play a significant role in influencing the competitiveness of agricultural commodities (Nuraini et al., 2020).

According to Haryanto (2019), the output price policy is a valuable tool for boosting the profitability and competitiveness of Indonesian soybean production. Yao (1999), in his research on rice farming, added that government policies should focus on encouraging structural changes that able to enable local agriculture to grow enough to earn sufficient income and generate social benefits that can be done by limiting the price of imported and local rice and the volume of rice imports. In addition to input costs, labor wages are essential in determining production costs. According to Tarigan et al. (2020), in several developing countries, one of which is Indonesia, the cost of labor wages is still relatively low. This is due to the subsidy policy provided by the government on labor wages and several factors of production inputs, such as the prices of fertilizers, seeds, and pesticides (Wang & Shi, 2020).

Competitiveness is closely intertwined with government policies; thus, several previous studies have employed the Policy Analysis Matrix as an analytical tool to assess the impact of government policies on the agricultural competitiveness. Examples of such studies include those conducted by Lindawati et al. (2021), Chanifah et al. (2020), Mardiyati & Natsir (2019) and Arisudi et al. (2008). The findings of this research explicate that government policies regarding tradable inputs are incentive-driven or subsidy-oriented, especially for fertilizer inputs, albeit with relatively low incentive values. These policies are advantageous to farmers as they pay lower prices for tradable inputs than they should (Chanifah et al., 2020). This aligns with Krugman's (1987) trade theory, suggesting that government intervention strengthens the competitiveness of the relevant industries, transferring economic rents to the domestic economy, and enhancing national welfare.

The findings of this study corroborate with the results of Dewi & Yulianti (2021), which also identify substantial impacts of government policies on the competitiveness of soybean farming. Specifically, this research elucidates that domestic production is still capable of covering both private and social costs. Soybeans demonstrate a competitive advantage, as indicated by the Net Private Cost of Input (NPCI) revealing that farmers pay lower input costs due to government policies. The Net Private Cost of Output (NPCO) value suggests that farmers receive lower output prices, possibly as a result of subsidies reducing production costs or the absence of policies concerning selling prices.

Emphasizing competitive advantage and comparative advantage is integral to efforts aimed at enhancing agricultural competitiveness. De Souza et al. (2017) assert that the competitiveness of rice farming in Brazil stems from a production system subject to high taxes. Consequently, this research recommends that rice farming in Brazil leverage existing tax policies as an effort to enhance competitiveness. In line with this, Chanifa et al. (2020) state that the government should be adept at harnessing the competitive and comparative advantages held by agricultural businesses, especially soybean farming in Indonesia. Specific efforts are needed with a focus on stimulating the industrial base through regulations and better support than current policies, aiming to maintain a relatively unregulated domestic free market and relying on the importation of foreign technology(Haryanto, 2020). Research conducted by Fang (2000) emphasizes the pivotal role of government policies in optimizing the competitiveness of commodities with comparative and competitive advantages. Government policies can be directed towards regulating import intensity, improving productivity, and import tariffs.

Government policies are essential for controlling the flow of economic activity, particularly in the agriculture sector (Finkelshtain et al., 2011). Given that Indonesia is an agricultural nation, farming is also one of the key economic drivers that the government closely monitors. The research by Kariyasa & Dewi (2011) examines how much of a role the government plays in boosting the capacity, capability, and efficiency of business production farming in agricultural commodities, opening up a more comprehensive landscape for the sensitivity analysis of government policies that are not just focused on efforts to make farming businesses more competitive.

CONCLUSION AND SUGGESTION

The results of Policy Analysis Matrix (PAM) estimation show that the PCR value of soybeans is 0.37. It shows that soybean farming in Indonesia has a competitive advantage because it is financially efficient soybean farming. The comparative advantage of a commodity can be seen from the Domestic Resource Ratio (DRC) value. Based on the estimation results, the Social Benefits Value (SB) was 15,128,008, and the DRC value of soybean commodity farming was 0.305 < 1, which shows that soybean farming also has a competitive advantage. Soybeans have an NPCO value of 0.960, farmers are paid 96% of what they should be paid. It appears that soybean farmers are relatively disadvantaged based on the NPCO value. This indicates that the government's protection of soybean farmers has not been successful, which has led to a decline in producer income. Input prices are subject to government policy, just like output prices are. Furthermore, the NPCI value is 0.98. The research results indicate that the NPCI has a value less than one. This implies the existence of consumer input protection policies in the form of subsidies.

In general, soybean farming has a lot of potential because it has been shown that this product has comparative and competitive advantages. In order to boost production, the government must pay strict attention to regulations that empower and support farmers, particularly in seed distribution, fertilizer use, pesticide use, and planting areas. It is envisaged that farming can become more technically adequate and contribute more to the regional and national economies with the cooperation of many relevant parties and the alternative policy priorities that have been prepared above.

ISSN 2580-0566; E-ISSN 2621-9778
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