Journal of Socioeconomics and Development

https://publishing-widyagama.ac.id/ejournal-v2/index.php/jsed

Analysis of competitiveness of sugarcane farming: A case study in Kampung Beru Village, South Sulawesi

Suardi Bakri*, Hana Afriana, Musdalipa Mahmud, Helda Ibrahim, and Qurniasty

Universitas Islam Makassar, Indonesia

*Correspondence email: suardibakri@uim-makassar.ac.id

ARTICLE INFO

►**Research Article**

Article History
Received 26 June 2022
Accepted 29 March 2023
Published 6 July 2023

Keywords
competitiveness analysis; policy analysis matrix; sugarcane; sugar industry

JEL Classification
A10; B40; B55

ABSTRACT

The sugarcane based sugar industry is a source of income for sugarcane farmers and workers in the industry. However, farmers often complain about the high price and cost of farming, which result in a decrease in the quality of sugarcane. The survival of sugarcane farmers is threatened, including those in Kampung Beru Village as one of the largest suppliers of sugarcane for Takalar Sugar Factory. This study aims to explore the competitiveness of sugarcane farming based on competitive and comparative advantages. Data collection was carried out through interviews and focus group discussion (FGD) involving 76 farmers. Policy analysis matrix (PAM) was utilized for data analysis. The results showed that the private cost ratio (PCR) value, an indicator of competitive advantage, was >1 (1.048), suggesting that sugarcane farming does not have a competitive advantage. Domestic resource cost ratio (DRCR) as an indicator of comparative advantage had a value of >1 (1.795), indicating that sugarcane farming also has no comparative advantage. Sugarcane farming has extremely low competitiveness. Hence, the government is advised to increase sugarcane productivity by conducting campaigns to use superior seeds, increase the efficiency of production facilities, revise purchase price standards, and regulate the marketing system.

To cite this article: Bakri, S., Afriana, H., Mahmud, M., Ibrahim, H., & Qurniasty. (2023). Analysis of competitiveness of sugarcane farming: A case study in Kampung Beru Village, South Sulawesi. Journal of Socioeconomics and Development, 6(1), 21-35. https://doi.org/10.31328/jsed.v6i1.3788

ISSN 2615-6075 online; ISSN 2615-6946 print

INTRODUCTION

Indonesia is a country with the largest sugarcane area among the Association of Southeast Asian Nations (ASEAN) member countries (Hermawan, 2012). Based on the data from the Central Statistics Agency (BPS) in 2017, the sugarcane area in Indonesia amounted to 420.15 thousand hectares. Sugarcane is therefore one of plantation commodities with a strategic role in the Indonesian economy and must consequently be developed with a high level of excellence and competitiveness. In reality, however, sugarcane is currently not the main commodity chosen by most farmers. They prefer other commodities to cultivate, such as rice, corn, and shallots. This will result in a shrinkage of sugarcane production and productivity, with a big impact on competitiveness (Yunitasari, 2019).

The study by Pratiwi, Wibowo, and Wibowo (2021) in Probolinggo Regency stated that the lack of attention and strict protection from the government such as fertilizer distribution, the existence of the highest retail price (HET) of sugar, and farm business credit affect the competitiveness of sugarcane farming. The aforementioned factors certainly affects

the shrinkage of sugarcane production and productivity (Pratiwi et al., 2021).

Hani and Mustapit (2016) and Sulaiman et al. (2019) identified the main problems of sugar production in Indonesia, including stagnant harvest areas, productivity, sugar factory inefficiency, productivity fluctuations, and the institutional framework for trade policymaking. The problems suggest the inefficient management of sugarcane. Despite having one of the largest harvest areas, sugarcane production has not been maximized. They therefore represent the biggest challenge in the sustainability of sugarcane farming activities, which can be eroded by other commodities that have more profitable opportunity costs (Hani & Mustapit, 2016; Sulaiman et al., 2019).

A commodity can compete in the market if it possesses high competitiveness, which is reflected in competitive price and excellent quality (Danelon et al., 2023). Problems will arise if the commodities are not able to compete. To increase competitive advantage, a region must increase the creation of production factors, work motivation, profits, and business scale, domestic competition, demand quality, as well as efforts in creating new business opportunities. Competitiveness includes broader aspects beyond production or efficiency at the micro level (Bahati et al., 2022). This is supported by the study conducted by Oghazi, Aliyari, and Pashkevich (2022), which stated that in the era of globalization, with competitiveness challenges faced by advanced economies, growth opportunities and job creation strategies depend heavily on the ability to innovate and succeed in the global market. It can therefore be concluded that the competitiveness of a region can be seen from its economic level, which will affect the level of welfare of its population (Hajighasemi et al., 2022).

Freitas et al. (2021) stated that the potential for bagasse management to obtain valuable products in the economic aspect presents an opportunity to increase the attractiveness to produce a commodity with good quality and low cost according to international market prices. Moreover, the commodity can be marketed with sufficient profit so that production or cultivation activities can be continued in the next planting season (Freitas et al., 2021).

The general approach in measuring the competitiveness of a commodity is through the level of profit and efficiency in commodity management (Carrington et al., 2023). The level of profit can be observed from two aspects, namely private profit and social profit (Contreras et al., 2023), while efficiency consists of competitive advantages and comparative advantages. A more modern theory of comparative advantage includes Heckshcher Ohlin's trade pattern theory which emphasizes the inherent differences in factors of production between countries as the most important determinant of trade and that abundant factors of production will indirectly be exported, while scarce factors of production will be imported (Hunt & Morgan, 1995).

A measurement tool that can be used to determine comparative advantages and serve as a comparison between the ratio of exports of an industry (or commodity) in a country to the country's total exports and the ratio of the world export value of the industry to total world exports is the revealed comparative advantage (RCA) (Danna-Buitrago & Stellian, 2022). This is supported by the research by Stellian and Danna-Buitrago (2022) which stated that a country should have a comparative advantage for a particular product if the share of that product in the country's exports is greater than the share at the level of the trade area under consideration. The next RCA index is calculated as the ratio of the former to the latter (Stellian & Danna-Buitrago, 2022).

In addition, to identify competitiveness, policy analysis matrix (PAM) analysis is used to analyze comparative advantages (economic analysis). Economic analysis invariably considers the amount of domestic and foreign inputs used and the level of government intervention in subsidizing and taxing imported products (Kassali et al., 2022). All inputs and government policies must be converted into actual prices so that the divergence effect (the difference between farm income, costs, and profits measured by private and social prices) of the government can be identified for subsequent government policies (Paulraj et al., 2015; Tanjung et al., 2023). The three main objectives of the PAM method include (1) calculating the level of private profit, which is a measure of the competitiveness of farming at the market price level, (2) calculating the level of social profit of farming produced by assessing output and costs at the efficiency price level (social opportunity cost), and (3) calculating the transfer effect as an impact of a policy. Comparing revenues and costs before and after the implementation of a policy will determine the impact of the policy. The PAM method calculates the impact

of a policy that affects output and production factors (Darmayanti et al., 2019).

The comparative advantage indicators are used to determine whether a region has an economic advantage to expand production and trade of a commodity, while competitive advantage indicators identify whether a region will successfully compete in the commodity market. The comparative and competitive advantages of a commodity depend on key factors including market performance (Zhu et al., 2022).

Takalar Regency has the second largest sugarcane area and production (after Bone) in the South Sulawesi (Thamrin, 2022). The Central Statistics Agency of South Sulawesi recorded that Takalar had a sugarcane area of 1018 ha and production of 1470 tons in 2016. The data show that Takalar region has less than 200 ha compared to Bone, even though its production is half that of Bone. This confirms that the inefficiency of sugarcane cultivation and processing in Indonesia is at a critical level.

North Polongbangkeng is a district in Takalar that is home to one of the sugarcane factories in South Sulawesi, while the other two factories are located in Bone. According to the data from BPS Takalar in 2017, Polongbangkeng Utara is the center of sugarcane production in the district with 935 tons and an area of 647.50 hectares. Hence, it is natural that sugarcane is a superior commodity in the area, and one area with superior commodity production is Kampung Beru village (BPS, 2018).

Kampung Beru is one of the villages that produce sugarcane in Takalar and is selected as the case study location to assess the level of sugarcane competitiveness in the area due to its larger number of farmers among several villages and adequate land. However, the data of the area and production of sugarcane at the national, provincial and district levels indicates a low level of sugarcane competitiveness. The inefficiency of sugarcane processing is indicated by small productivity values, resulting in competitive and comparative advantages that do not meet the requirements for high competitiveness.

On the other hand, little research has been conducted on whether or not sugarcane is a competitive commodity. Complementing existing research on sugarcane, this study aims to assess the competitiveness of sugarcane, particularly in South Sulawesi, Indonesia. Therefore, research on the competitiveness of sugarcane farming is needed to prove initial conclusions (based on secondary data analysis). If the initial conclusions are incorrect or the competitiveness is not low, the research results can then be used as a standard for policy-makers to develop sugarcane to be more competitive due to its great potential. Conversely, if the initial conclusions are proven correct, the research results can subsequently be used as a benchmark for sugarcane farmers to shift their lands to other more potential commodities.

RESEARCH METHOD

The research was conducted for a month in July 2019 in Kampung Beru Village, North Polobangkeng District, Takalar Regency. The location was deliberately selected since Takalar is the second largest sugarcane production area in South Sulawesi, the highest sugarcane producing area in the district, and the location of the Takalar Sugarcane Factory.

The population in this study included six farmer groups from Kampung Beru Village with a total of 76 respondents. Purposive sampling technique was used for this study with the criteria of sugarcane farming in partnership with the Takalar Sugarcane Factory. To collect study data, two sources of data were required, namely primary data and secondary data, when needed. Interviews and FGDs were the main data sources as well as information in the form of archives as a complementary data source.

Table 1. Policy Analysis Matrix

Item	Revenue	Cost		Profit
		Tradable Input	Domestic Input	
Private Price	A	B	C	D = A-(B+C)
Social Price	E	F	G	H = E-(F+G)
Divergence	I = A-E	J = B-F	K=C-G	L=I-(J+K)

Source: Monke & Pearson (1989)

A = Total sugarcane farming revenue in private price (Rp), B = Total tradable cost of sugarcane farming in private price (Rp), C = Total domestic cost of sugarcane farming in private price (Rp), D = Private profitability, E = Total revenue in social price (Rp), F = Total tradable cost of sugarcane farming in social price (Rp), G = Total domestic cost of sugarcane farming in social price (Rp), H= Social profitability, I = Output transfer (OT), J = Input Transfer (IT), K = Factor Transfer (TF), L = Net Transfer (NT) (Rp)

Table 2. Descriptions of PAM Indicators

Description		Indicator	Result
Competitive Advantage			
a	Private Profitability	D	D > 0 indicates that the commodity system acquires an above-normal profit, indicating that it is capable of expansion. D ≤ 0 indicates that the commodity system has a below-normal profit, indicating that it is not able to expand.
b	Private Cost Ratio	PCR = C/(A-B)	PCR < 1 indicates that the studied commodity system has a competitive advantage. PCR ≥ 1 indicates that the studied commodity system has no competitive advantage.
Comparative Advantage			
a	Social Profitability	H	H > 0 indicates that the commodity system is efficient in a condition with no divergences and efficient policy implementation. H ≤ 0 indicates that the commodity system is unable to compete without government assistance and intervention.
b	Domestic Resource Cost Ratio	DRCR = G/(E-F)	DRCR < 1 indicates that the commodity system has a comparative advantage. DRCR ≥ 1 indicates that the commodity system has no comparative advantage.
Effects of Output Policy:			
a	Output Transfer	OT = A-E	OT > 0 indicates that there is a transfer from communities (consumers) to producers. OT ≤ 0 indicates that there is no transfer from communities (consumers) to producers.
b	Nominal Protection Coefficient on Output	NPCO = A/E	NPCO > 1 indicates that the policy is protective of outputs, and the larger the NPCO value the higher the protection level of the government of the outputs. NPCO ≤ 1 indicates that the policy is a disincentive.
Input Policy:			
a	Input Transfer	IT = B -F	IT > 0 indicates that there is a transfer from farmers to tradable input producers. IT ≤ 0 indicates that there is no transfer from farmers to tradable input producers.
b	Nominal Protection Coefficient on Tradable Input	NPCI = B/F	NPCI < 1 indicates that the policy is protective of inputs, and there is a subsidy policy for the tradable inputs. NPCI ≥ 1 indicates that there is no protective policy of inputs or no subsidy policies for the tradable inputs.
c	Factor Transfer	TF = C -G	TF > 0 indicates that there is a transfer from producer farmers to tradable input producers. TF ≤ 0 indicates that there is no transfer from producer farmers to tradable input producers.
Input-Output Policy:			
a	Effective Protection Coefficient	EPC = (A-B)/(E-F)	EPC > 1 indicates that the policy is protective. The larger the EPC value, the higher the government protection of domestic commodities. EPC ≤ 1 indicates that the policy is not protective, and there is no government protection of domestic commodities.
b	Net Transfer	NT = D -H	NT > 0 indicates additional producer surplus due to the government policy applied to inputs and outputs. NT ≤ 0 indicates that there is no additional producer surplus due to the government policies applied to inputs and outputs.
c	Profitability Coefficient	PC =D/H	PC > 0 indicates that government policies provide incentives to producers. PC ≤ 0 indicates that government policies do not provide incentives to producers.
d	Subsidy Ratio to Producer	SRP = L/E	SRP < 0 indicates that government policies that have been in force have caused producers to incur production costs greater than the offset costs for production. SRP ≥ 0 indicates that government policies that have been in force have not caused producers to incur production costs that are greater than the offset costs for production.

Source: Murtiningrum (2014)

Table 3. Criteria of Competitiveness Assessment

Indicator	Value Criteria				
D	+	-	-	-	-
H	+	+	-	-	-
PRC	+	+	+	-	-
DRCR	+	+	+	+	-
Combined Value	4+	3+ 1-	2+ 2-	1+ 3-	4-
Competitiveness	Very high	High	Medium	Low	Very low

Source: Kohari (2005)

Competitiveness is reflected by a variety of commodities, including very high, high, medium, low, and very low competitiveness. Based on Table 3, the difference in the range of competitiveness of a commodity can be used to determine the priority scale of commodity development, namely (i) commodities with very high competitiveness are prioritized to be developed; (ii) commodities with high competitiveness remain a priority to be developed but commodities with very high competitiveness are prioritized; (iii) commodities with moderate competitiveness have two possibilities, to be developed or not, which depend on field checks, whether due to policy distortions or market failures; and (iv) commodities with low or very low competitiveness should not be developed.

RESULT AND DISCUSSION

Characteristics of Respondents

A total of 76 farmers were sampled in this study. They were sugarcane farmers affiliated with Takalar Sugarcane Factory. The demographic characteristics of respondents, consisting of age and education level, are presented in Table 4.

Table 4 shows that the youngest category of farmers (under 35 years old) was the smallest group (11.84%), indicating that there is less interest among youth in the village to cultivate sugarcane. As a safety measure, they preferred commodities with higher opportunity costs, such as rice and maize compared to respondents aged 35-45 (28.95%) and 46-55 (35.53%). Mature age and experience in growing sugarcane for 10-15 years are their strength in running the rapidly fluctuating sugar industry. Respondents aged 56 or older (23.68%) were experienced, rich farmers who were slowly moving out of their "comfort" zone by starting new businesses or activities or enjoying the fruits of their labor in old age by relaxing at home and delegating the work to their successors.

Table 4. Respondent Characteristics

Characteristic	Frequency	Percentage %
Age		
<35 years old	9	11.84
35 – 45 years old	22	28.95
46 – 55 years old	27	35.53
>56 years old	18	23.68
Level of Education		
SD (elementary school)	34	44.74
SLTP/SMP (junior high school)	22	28.95
SLTA/SMA (senior high school)	14	18.42
D3/S1 (diploma/bachelor deg)	6	7.89
Land Ownership Status		
Owned land	16	21.05
Leased land	40	52.63
Profit-sharing scheme	20	26.32
Land Area		
0.5 – 1 hectare	54	71.05
1.1 – 1.5 hectare	7	9.21
>1.6 hectare	15	19.74

Several studies have suggested that the number of young people in Indonesia who stay in the countryside to work in agriculture is small. This is due to low salaries and limited material sources. In addition, most parents are hesitant to let their children to choose farming as their career choice (Haharap & Siregar, 2018; Yodfiatfinda, 2020). On the other hand, some developed countries provide access to entrepreneurship and job creation, including enabling policies for youth and the agriculture sector that are attractive to the younger generation such as promoting agriculture in schools, making young farmers act as role models for other young farmers, encouraging and supporting young farmers and proactively communicating positive perceptions of agriculture as a career (Hayden et al., 2021; Nguyen-Thi-Lan et al., 2022; Salvago et al., 2019).

The respondents of the study owned lands with a variety of status, such as self-owned lands, leased lands, lands with cultivation right title (HGU), and lands lent by the sugarcane factories to farmers on a profit-sharing basis.

Table 5. PAM Analysis of Sugarcane Farming in Kampung Beru

Item	Revenue	Costs		Profit
		Tradable Input	Domestic Factor	
Private	23,547,979.45	8,611,250.00	15,652,638.89	-715,909.89
Social	19,238,617.608	10,583,223.24	15,544,751.11	-6,889,356.752
Effects of Divergences	4,309,361.842	-1,971,973.24	107,887.77	61,73,447.312

Based on Table 4, owned lands constituted the least proportion (21.5%) and leased lands the largest proportion (52.63%), suggesting that sugarcane farmers are less prosperous. The study was conducted in one of the villages with the highest number of sugarcane farmers (PTR), 56 farmers. Five farmer groups oversaw the PTR, while the remaining one farmer group consisted of 20 HGU landowners. Three categories of land areas were indicated as follows: the largest group is in the 0.5 - 1 hectare category (71.05%), followed by 1.6 hectares (19.74%) and 1.1 - 1.5 hectares (9.21%). When comparing land ownership and land occupation, it is possible that owners of 0.5-1 ha lands were leasing the lands.

Previous studies have suggested that the problem of land ownership through lease, pawn or purchase continues to this day. This potentially increases of the number of landless owners (Bakri et al., 2020). Meanwhile, in other countries such as China, the affirmation of agricultural land rights has a major impact on the welfare of farmers (Guan et al., 2022).

Competitiveness of Sugarcane Farming

1. Personal and social profitability

The domestic component includes labor and land rent. Cost data for these two components were calculated according to private and social costs. It was subsequently summarized in a PAM analysis table to identify its private and social profitability (van Zyl & Pearson, 1990). The results of the two profits determined the level of competitiveness of sugarcane farming in Kampung Beru Village and whether it is worth developing. The results are shown in Table 5.

In Table 5, private and social profitability are both negative and sugarcane farmers experienced losses from their farms in the previous growing season. The social component loss (- Rp6,889,356.752) was due to the shadow fertilizer price (e.g., urea = Rp3,287.53) being higher than its market price (urea = Rp1,916.67), with a difference of 58.30%. However, the farmers also received no gain in their personal profitability (-Rp715,909.89). Other studies showed that one of the reasons for this is the calculation of land rent (Zhang & Song, 2022). Sugarcane farmers in this study made a profit (Rp 1,450,756.78) when land rent was excluded. Another cause was the classic problem of low yield value (6.5%). Several studies stated that the yield value (percentage) determines how much sugar farmers will receive as a final product. The examined planting season had the lowest yield value in recent years, therefore the results were not enough to cover the production costs incurred by farmers resulting in losses (Hanka & Santosa, 2021; Yusvianto & Kuntadi, 2022).

In addition to private and social profitability, the PAM values in Table 4 show the value of output transfer (OT or I) caused by output price divergence or the difference in the value of private and social income. The value is also caused by the presence of input transfers (IT or J) due to the divergence of tradable input costs or the difference in foreign private and social costs. Finally, factor transfers (TF) are caused by divergence of domestic factor costs or differences in private costs of non-tradable factors, and social costs (Nina et al., 2017). The results can be seen in Table 6.

Table 6. Description of the PAM Analysis of Kampung Beru Village

Item	Results	Conclusion
Output Transfer (OT)	4,309,361.842	OT > 0 indicates that there is a transfer from communities (consumers) to producers.
Input Transfer (IT)	-1,971,973.24	IT ≤ 0 indicates that there is no transfer from farmers to tradable input producers.
Factor Transfer (TF)	107,887.77	TF > 0 indicates that there is no transfer from producer farmers to the tradable input producers.

Based on Table 6, positive OT suggests that the community (sugar consumers) contributed Rp4,309,361,842 to the Takalar Sugar Factory as a producer. Negative IT indicates that sugarcane farmers did not contribute to the government as producers of tradable inputs (subsidized fertilizer and

seed providers). Instead, their sugarcane farming activities caused the government to pay Rp11,971,973.24 in exchange for fertilizer and seed subsidies. A positive TF means that sugarcane farmers contributed Rp107,887.77 to the government's minimum labor wage regulation.

Meanwhile, several studies stated that the government has initiated efforts to improve subsidized fertilizer governance through digitalization in the distribution and redemption of subsidized fertilizers, as well as the preparation of data on fertilizer subsidy recipients to be more targeted. Subsidized fertilizers are intended for 9 staple and strategic food commodities, namely rice, corn, soybeans, chili, shallots, garlic, sugarcane, coffee, and cocoa. These nine commodities are expected to support the realization of better food security in the future (Brenneis et al., 2023; Gunawan & Pasaribu, 2020).

2. Competitive advantage analysis

The results of the analysis show that the value of private profitability (D) of sugarcane farming in Kampung Beru Village was (-) Rp715,909.89 or a loss of Rp715,909.89. The details of the results are presented in Table 7.

Table 7. Analysis Results of Competitive Advantage of the PAM Matrix

Item	Results	Conclusion
Private profitability (D)	- 715,909.89	D<0 indicates that the sugarcane farming activities are unable to expand since they have no profit directly accepted by the farmers.
Private cost ratio (PCR)	1,048	PCR>1 indicates that the sugarcane commodity has no competitive advantage.

Based on Table 7, the private profitability is negative (- Rp715,909.89), indicating that sugarcane farmers' farming activities incurred losses and had no competitive advantage in the 2018 growing season. This value indicates that farming activities cannot increase further because it does not provide profits for farmers (Kurniawan et al., 2021). However, this value can still be debated considering that the negative value occurred due to the inclusion of land rent in the calculation, while farmers generally do not calculate land rent in their farming activities (Ariani et al., 2006; Paramitha et al., 2014).

The private cost ratio (PCR) value for sugarcane farming is 1.048 (> 1), suggesting that sugarcane farming in the growing season did not have the potential to be developed further because it did not have a competitive advantage. Several studies also mentioned that sugarcane farming is unable to compete with other commodity farming activities in the domestic market (Pratiwi et al., 2021; Warr, 2014).

3. Comparative Advantage Analysis

The analysis results of the PAM method showed that the value of social profitability (H) of sugarcane farming in Kampung Beru village was (-) Rp6,889,356,752. The results are presented in Table 8.

Table 8. Analysis Results of PAM Matrix Comparative Advantage

Item	Results	Conclusion
Social profitability (H)	- 6,889,356.752	H<0 indicates that there is no efficiency of the commodity system in the condition of no divergences and implementation of efficient policies.
Domestic resource cost ratio (DRCR)	1.795	DRCR>1 indicates that the commodity system has no comparative advantage.

Based on Table 8, social profitability is negative (- Rp6,889,356,752) and sugarcane farming activities at the social price level experienced a loss of Rp6,889,356,752. This implies that sugarcane farming activities in the 2018 growing season were inefficient in the absence of government intervention (in terms of input-output prices or policies). This condition can occur if a perfectly competitive market is created where prices are determined based on an agreement between sellers and buyers without government involvement. The domestic resource cost ratio (DRCR) value of sugarcane farming in Kampung Beru Villageis 1.795 (> 1), indicating that to obtain 1 unit of added value, domestic costs of 1,795 units are required in sugarcane farming.

Based on the results of research conducted by Anggraeni et al. (2018), the value of PCR and DRCR are the main indicator to assess the competitiveness of farming in the research location based on its comparative and competitive advantages. In Table 7, both advantages have a value of >1, which indicates that sugarcane farming activities in the growing season did not have competitiveness. The results are illustrated in a chart in Figure 1.

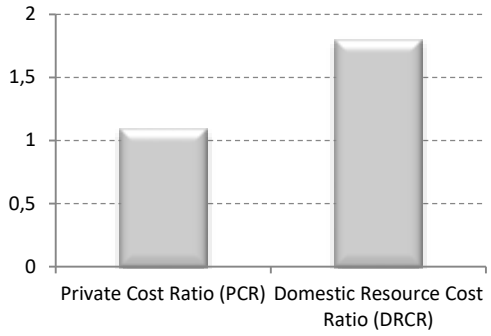

Figure 1. Comparative and competitive advantages of Sugarcane Farming in Kampung Beru Village

Competitiveness of Sugarcane Farming

Based on analysis and interpretation, each competitive and comparative indicator, namely private profitability (D), social profitability (H), private cost ratio (PCR), and domestic resources cost ratio (DRCR), was given a positive or negative value. For example, if D is profitable, then the value is positive, while if it is not profitable, then the value is negative (Amri & Rosiana, 2022; Antriyandarti et al., 2013; Purbaningsih et al., 2019). The combination of positive and negative values of the four indicators becomes the criteria for assessing competitiveness as presented in Table 9.

The assessment results in Table 9 show that D (-Rp715,909.89) and PCR (1,048) are in the negative criteria, therefore farming did not have competitiveness. This is in line with the results of research conducted in Madiun and Kediri districts where sugarcane farming did not have a comparative advantage (Malian & Syam, 2016). Meanwhile, H (-Rp6,889,356,752) and DRCR (1,795) are also in the negative criteria indicating no competitiveness. The combination of these values shows that the sugarcane commodity in Kampung Beru Village, North Polongbangkeng District, Takalar Regency in the 2018 growing season was not competitive at all, both in competitive and comparative aspects.

Similarly, conditions in the field support these results since many sugarcane farmers have gone out of business and switched to cultivating other more potential commodities. The planting season marked the biggest loss in agriculture, with research that supports this include the studies by Mahruf (2022), Riyanto (2018) and Egeskog et al. (2016). Delays in the distribution of subsidized fertilizers disrupted the fertilization schedule, causing the growth of sugarcane stalks to be less than optimal and subsequently a low yield of 5.5%.

Another vital factor that causes losses is the technical factors of the sugarcane mill. (Afsharnia et al., 2021; Misra et al., 2022). The breakdown of the mill's milling machine caused a delay in the milling schedule of up to one week. This triggered long queues of sugarcane trucks in front of the mill. The assessment of the competitiveness of the business is presented in Table 9.

Effects of Government Policy on Input-Output

Government policies were present in the sugar cane farming activities in Kampung Beru Village. Policies in the form of fertilizer and seed subsidies caused disparity in income, costs, and profits in terms of market and social prices. This is in line with previous research which stated that government policy's objectives can be broadly divided into three main objectives, namely efficiency, equity, and resilience. Efficiency is achieved if the allocation of scarce economic resources can generate maximum income. Equity means that the distribution of income between groups of people targeted by the policy market. Food security means food availability at a stable and affordable price (Dianpratiwi, 2005; Perwitasari et al., 2021; Saputri & Respatiadi, 2018).

Identifying the extent to which these impacts affect the input-output of sugarcane farming in the research location requires indicators or parameters to determine the value of their influence. The details can be seen in Table 10.

Table 9. Assessment of Sugar Cane Farming Competitiveness

Indicator	Value	Criteria	Definition	Combination Value	Competitiveness
D	-715,909.89	(-)	Uncompetitive	4-	Uncompetitive
H	-6,889,356.75	(-)	Uncompetitive		
PCR	1.048	(-)	Uncompetitive		
DRCR	1.795	(-)	Uncompetitive		

Table 10. Effects of Policies Based on Sugarcane Farming PAM Analysis

Indicator	Result
NPCO (A/E)	1.2239
NPCI (B/F)	0.8137
EPC (A-B) / (E-F)	1.7942
NPT (D-H)	6,173,446.862
PC (D/H)	0.1039
SRP (L/E)	0.3209

Note: NPCO (Nominal Protection Coefficient on Output) is used to determine the effects of government policies on market mechanisms of the sugarcane output (sugar). NPCI (Nominal Protection Coefficient on Input) is used to determine the effects of government policies on tradable inputs. EPC (Effective Protection Coefficient) is used to determine the effects of overall government policies and input-output market mechanisms. NPT (Net Protection Transfer) is used to illustrate the increase and decrease of producer surplus due to government policies. PC (Profit Coefficient) is used to determine the differences in the private profitability and social profitability levels. SRP (Subsidy Ratio to Producer) is used to measure the overall transfer effects.

1. Effects of government policy on output

The nominal protection coefficient on output (NPCO) value is used to identify the effect of government policy on the market mechanism of sugarcane (sugar) production (Murdy et al., 2021; Poernomo, 2018). The NPCO value for sugarcane farming in Kampung Beru is 1.2239, which indicates that farmers received a price that was 22.39% more expensive than the international price. Meanwhile, with the NPCO value of 1.168 in Kediri, East Java, farmers had to pay higher tradeable inputs than the price they should receive (Isaskar et al., 2010). In other words, there is a government policy that protects the results of sugarcane farming in Kampung Beru.

2. Effects of government policy on inputs

The effects of government policy on tradable inputs can be seen from the nominal protection coefficient on input (NPCI) value (Antriyandarti et al., 2013; Sinaga, 2018; William et al., 2023). The analysis results showed that government policy on tradable inputs had a positive effect on sugarcane farming as indicated by the NPCI value of <1. This means that sugarcane farmers are able to buy inputs at a price that is cheaper than the social price. The NPCI value of sugarcane farming of 0.8137 shows that farmers bought tradable inputs at a price 18.63% cheaper than their social inputs. Widyatami and Wiguna (2019) stated that farmers buy tradable inputs at lower prices, therefore the production costs of sugarcane farming become cheaper.

3. Effective Protection Coefficient (EPC)

Effective protection coefficient (EPC) is used to identify the effects of overall government policy and input-output market mechanisms (Setiawan & Sengadji, 2016; Shang et al., 2019; Farid et al., 2009), whether it provides incentives or disincentives to sugarcane farming in Kampung Beru. Based on the EPC analysis, the net effect of government policies in price formation and commodity market mechanisms has provided incentives (protection) to sugarcane farmers. Raushan, Ahern, and Nor (2022) stated that the EPC value greater than 1 means that the added value enjoyed by farmers is higher than its social value. The EPC value of sugarcane farming in Kampung Beru (1.7942) indicates that the government provided effective incentives to farmers since the added value enjoyed by farmers (79.42%) was higher than its social value.

4. Net Protection Transfer (NPT)

Net protection transfer (NPT) is a value that describes the increase or decrease in producer surplus due to government policy (Firdaus, 2007; Santosa, 2020). Based on the analysis, sugarcane farming in Kampung Beru was positively influenced by government policy, evidenced by the positive NPT analysis. The net transfer value for sugarcane cultivation was Rp6,173,446.862. According to Takeshima and Nkonya (2014), this is due to the tradable input policy in the form of fertilizer subsidies used by sugarcane farmers. In addition, the output price or sugar price at the farm level is higher than the price that farmers should receive or the social price.

5. Profit Coefficient (PC)

The coefficient of profit (PC) is used to determine the difference in the level of private profitability and social profitability (Daryana et al., 2020; Heriyanto, 2020; Irfanda, 2020). Based on the analysis, government policies did not provide incentives to producers. The PC value for sugarcane farming is 0.1039. Harwoto et al. (2022) stated that this is due to government policies overriding taxation on inputs used which can increase production costs and reduce the level of profit.

6. Subsidy Ratio to Producer (SRP)

Subsidy ratio to producer (SRP) is a ratio used to measure the overall transfer effect (Lindawati et al., 2021; Murdy et al., 2021; Nina et al., 2017). Based on the analysis, there was positive protection from the government on sugarcane farming in Kampung Beru Village, evidenced by the positive SRP value. This is supported by the study conducted by Setiawan, Widayanti, and Sudiyarto (2018), which stated that the positive SRP value indicates that government protection can reduce the production costs of sugarcane farming. The SRP value for sugarcane farming is 0.3209, indicating that there was a government policy that reduced production costs by 32.64% for every kilogram of production. The decrease in production costs is a decrease in tradable input costs.

The EPC, NPT, PC, and SRP values in Table 9 show that government policies had a positive effect on both output and tradable inputs for sugarcane farmers in Kampung Beru Village. Government policies in the form of fertilizer subsidies had a positive impact on farm production costs since the costs incurred by sugarcane farmers in Kampung Beru were lower than the added value received by farmers from the social price they should receive. Lestari et al. (2015) stated that apart from private and social profitability, which has a negative value or loss, the statistical figures of the four components that assess government policies provide hope for sugarcane farmers to bounce back in the current planting period (Lestari et al., 2015; Monke & Pearson 1989). This is supported by research from Kos et al. (2023) which stated that as long as the government continues to provide support in the form of subsidized fertilizers and timely delivery, agricultural hope will continue. Moreover, it was anticipated that the Takalar Sugarcane Factory will increase the yield rate by 8%.

Research Implication

The problem identified by this research is the decreasing competitiveness of sugarcane farming in Kampung Beru Village, i.e., inability of the farming to increase further because it does not provide benefits for farmers. Sugarcane farmers are consistently unhappy about the prices they receive from sugar factories, considering that sugarcane farming does not have competitiveness compared to other crops, such as corn and rice.

This is supported by data on competitive and comparative advantages based on personal and social profitability with a value of >1, which shows that sugarcane farming activities do not have competitiveness, including in the aspect of land rent. Several studies explained that lands that were supposed to be used for sugarcane were usually developed for other commodities. In such situation, sugarcane crops have become difficult to compete and the sugarcane farming activity is often defeated by other interests (El Chami et al., 2020) and the potential sugarcane plant lands are used for the benefit of other commodities. Therefore, the government is obliged to set policies to place potential sugarcane lands on top priority so that the lands are not allocated for other land use interests (Bahati et al., 2022; Pratiwi et al., 2021).

Data that support the problem of competitiveness in Kampung Beru Village include policy influence data based on PAM analysis of sugarcane farming in Kampung Beru Village with six indicators to identify the impact of the influence of farm inputs and outputs, which has a positive impact on sugarcane farmers. Based on previous research, efforts that can be made in increasing the competitiveness of sugarcane farming include the utilization of technology, product processing technology, and cultivation technology (Ncoyini et al., 2022; Sulaiman et al., 2019) as well as increasing the institutional capacity of farmers and trade system policies, especially related to sugarcane prices (Robaey et al., 2022). In line with the results of research conducted in Madiun, Kediri, and Malang districts (rice fields), the area will have a comparative advantage if the productivity (yield) of sugarcane increases by about 20% or if the world sugar price becomes 220 US$/ton (Ariani et al., 2006).

Sugarcane farmers also need to gain knowledge on the utilization of sugarcane waste to produce bioenergy, either individually or in groups, and on a large scale. The utilization of bioenergy as a diversification of sugarcane products can increase farmers' income and the competitiveness of sugarcane farming (Borges et al., 2021; Hiloidhari et al., 2021; Negrão et al., 2021). In addition, the current sugarcane farming is still protected by the government both in terms of inputs and outputs, representing a protection for farmers. Consequently, the government must review the existing protection model. Is protection still needed in the current era of globalization and information? The government must

continue to strive to ensure that sugarcane farming becomes the main support for sugar factories which are the basic needs of the community, and continues to be improved so that the welfare of sugarcane farmers is equally guaranteed.

CONCLUSION AND SUGGESTION

Based on the research results, the competitiveness of sugarcane farming in the form of competitive and comparative advantages in Kampung Beru village during the 2018 growing season can be seen from the private cost ratio (PCR) value > 1 (1.048), and the domestic resource cost ratio (DRCR) value> 1 (1.795). These values indicate that sugarcane farming is not competitive.

The effect of government policy on the input-output of sugarcane farming can be seen from the NPCO value >1 (1.229), and the NPCI value <1 (0.8137). These values indicate that government policy protects the input-output of sugarcane farming.

Based on the above conclusions, sugarcane farming has very low competitiveness. Therefore, the government is advised to increase sugarcane productivity by conducting campaigns to use superior sugarcane seeds, improve the efficiency of production facilities, revise purchase price standards, as well as regulating the sugarcane marketing system.

From the results of this study, one of the factors causing the absence of competitive and comparative advantages of sugarcane farming is the very low yield value (5.5%-6.5%) in the growing season caused by technical factors at Takalar Sugarcane Factory. It is suggested that the factory pay more attention and think about sugarcane farmers who rely on the value of yields for their income which is solely determined by the factory.

Maximum efforts are needed to achieve competitive and comparative advantages in the form of input-output policies that assist and benefit sugarcane farmers. The absence of competitive and comparative advantages in sugarcane farming in Kampung Beru only occurred in one growing season. This does not guarantee the low competitiveness of their sugarcane farms in the following planting season since competitive and comparative values are not fixed, very sensitive, and fluctuate from year to year. Therefore, intensifying technological assistance in the form of subsidized machinery and seeds as well as increasing the value of yields and the price of yields potentially increase the competitiveness of sugarcane farming.

REFERENCES

Afsharnia, F., Marzban, A., Asoodar, M., & Abdeshahi, A. (2021). Preventive maintenance optimization of sugarcane harvester machine based on FT-Bayesian network reliability. International Journal of Quality and Reliability Management, 38(3), 722–750. https://doi.org/10.1108/IJQRM-01-2020-0015

Amri, M. R., & Rosiana, N. (2022). Competitiveness analysis of robusta coffee In Pamijahan District, Bogor Regency West Java. Journal of Agri Socio Economics and Business, 04(2), 81–94. https://doi.org/10.31186/jaseb.04.2.

Anggraeni, N. W., Roessali, W., & Setiyawan, H. (2018). Competitiveness of soybean business farming analysis in Grobogan Regency Central Java Province. Agroland: The Agricultural Sciences Journal, 5(2), 112. https://doi.org/10.22487/j24077593.2018.v5.i2.11843

Antriyandarti, E., Ferichani, M., & Ani, S. W. (2013). Sustainability of post-eruption socio economic recovery for the community on mount Merapi slope through horticulture agribusiness region development (Case Study in Boyolali District). Procedia Environmental Sciences, 17, 46–52. https://doi.org/10.1016/j.proenv.2013.02.010

Ariani, M., Askin, A., Hestina, & Juni, H. (2006). Analisis daya saing usahatani tebu di propinsi Jawa Timur. Socio-Economic of Agriculturre and Agribusiness), 9–9. Retrieved from http://ojs.unud.ac.id/index.php/soca/article/view/4113

Bahati, I., Martiniello, G., & Abebe, G. K. (2022). The implications of sugarcane contract farming on land rights, labor, and food security in the Bunyoro sub-region, Uganda. Land Use Policy, 122, 106326. https://doi.org/10.1016/j.landusepol.2022.106326

Bakri, S., Zain, M. M., Baso, A. K. T., Syafar, A. A. R., Novita, D., & Arsyad, M. (2020). Small scale corporate model and rice farming efficiency. IOP Conference Series: Earth and Environmental Science, 575(1). https://doi.org/10.1088/1755-1315/575/1/012100

Borges, A. do V., Fuess, L. T., Alves, I., Takeda, P. Y., & Damianovic, M. H. R. Z. (2021). Co-digesting sugarcane vinasse and distilled glycerol to enhance bioenergy generation in biofuel-producing plants.

Energy Conversion and Management, 250, 114897. https://doi.org/10.1016/j.enconman.2021.114897

BPS (Badan Pusat Statistik) (2018). Kecamatan Polongbangkeng Utara dalam Angka 2018. BPS Kabupaten Takalar. Retrieved from https://takalarkab.bps.go.id

Brenneis, K., Irawan, B., & Wollni, M. (2023). Promoting agricultural technologies with positive environmental effects: Evidence on tree planting in Indonesia. Ecological Economics, 204, 107666. https://doi.org/10.1016/j.ecolecon.2022.107666

Carrington, S. J., Herrero Olarte, S., & Urbina, G. (2023). Commodity cycle management in Latin America: The importance of resilience in face of vulnerability. Resources Policy, 81, 103316. https://doi.org/10.1016/j.resourpol.2023.103316

Contreras, H., Korczak, A., & Korczak, P. (2023). Religion and insider trading profits. Journal of Banking & Finance, 149, 106778. https://doi.org/10.1016/j.jbankfin.2023.106778

Danelon, A. F., Spolador, H. F. S., & Bergtold, J. S. (2023). The role of productivity and efficiency gains in the sugar-ethanol industry to reduce land expansion for sugarcane fields in Brazil. Energy Policy, 172, 113327. https://doi.org/10.1016/j.enpol.2022.113327

Danna-Buitrago, J. P., & Stellian, R. (2022). A new class of revealed comparative advantage indexes. Open Economies Review, 33(3), 477–503. https://doi.org/10.1007/s11079-021-09636-4

Darmayanti, N. W. S., Winandi, R., & Tinaprilla, N. (2019). Analisis dayasaing jagung di wilayah sentra produksi di Indonesia dengan pendekatan Policy Analysis Matrix (PAM). Forum Agribisnis, 8(2), 137–154. https://doi.org/10.29244/fagb.8.2.137-154

Daryana, D., Romano, & Arida, A. (2020). Analisis keunggulan komparatif dan keunggulan kompetitif serta dampak kebijakan pemerintah terhadap industri minyak pala di kabupaten Aceh Selatan. Jurnal Ilmu Pertanian, 5, 131–140.

Dianpratiwi, T. (2005). Relationship Between Cane Farmers With Sugar Factory, Cane Farmers Association and Government Post Farmer Sugarcane Intensification Program. 1981, 1–15.

Egeskog, A., Barretto, A., Berndes, G., Freitas, F., Holmén, M., Sparovek, G., & Torén, J. (2016). Actions and opinions of Brazilian farmers who shift to sugarcane: an interview-based assessment with discussion of implications for land-use change. Land Use Policy, 57, 594–604. https://doi.org/10.1016/j.landusepol.2016.06.022

El Chami, D., Daccache, A., & El Moujabber, M. (2020). What are the impacts of sugarcane production on ecosystem services and human well-being? A review. Annals of Agricultural Sciences, 65(2), 188–199. https://doi.org/10.1016/j.aoas.2020.10.001

Farid, M., Ekawati, I., & Fatmawati, I. (2009). Analisis daya saing kedelai di Kabupaten Sumenep. Jurnal Pertanian Cemara, 6 (1), 24–34. https://doi.org/10.24929/fp.v6i1.546

Firdaus, M. (2007). Analisis daya saing kedelai di Jawa Timur. JSEP (Journal of Social and Agricultural Economics), 1(2). 16-27. Retrieved from https://jurnal.unej.ac.id/index.php/JSEP/article/view/450

Freitas, J. V, Bilatto, S., Squinca, P., Pinto, A. S. S., Brondi, M. G., Bondancia, T. J., Batista, G., Klaic, R., & Farinas, C. S. (2021). Sugarcane biorefineries: potential opportunities towards shifting from wastes to products. Industrial Crops and Products, 172, 114057. https://doi.org/10.1016/j.indcrop.2021.114057

Guan, J., Huang, K., Lan, X., Zhang, J., & Li, H. (2022). Impact of confirmation of farmland rights on farmers' welfare: Based on the micro-empirical investigation of farmers in China. Sustainability (Switzerland), 14(15), 1–13. https://doi.org/10.3390/su14159710

Gunawan, E., & Pasaribu, S. (2020). Persepsi petani dan permasalahan program kartu tani mendukung distribusi pupuk bersubsidi. Jurnal Ekonomi Dan Pembangunan, 28(2), 131–144. https://doi.org/10.14203/jep.28.2.2020.131-144

Haharap, N., & Siregar, A. Z. (2018). Factors affecting youth generation interest on agricultural fields (Case study in Deli Serdang District). International Journal of Environment, Agriculture and Biotechnology, 3(5), 1922–1928. https://doi.org/10.22161/ijeab/3.5.45

Hajighasemi, A., Oghazi, P., Aliyari, S., & Pashkevich, N. (2022). The impact of welfare state systems on innovation performance and competitiveness: European country clusters. Journal of Innovation and Knowledge, 7(4), 100236. https://doi.org/10.1016/j.jik.2022.100236

Hani, E. S., & Mustapit. (2016). Stakeholder response to the development strategy of sugarcane dry land agriculture in East Java. Agriculture and Agricultural Science Procedia, 9, 469–474. https://doi.org/10.1016/j.aaspro.2016.02.165

Hanka, M. K. F. & Santosa, B. (2021). Analisis kualitas bahan baku tebu melalui teknik pengklasteran dan klasifikasi kadar gula sebelum giling (Studi kasus pabrik gula PT. XYZ). Jurnal Teknik ITS, 10(2), 100–108. https://doi.org/10.12962/j23373539.v10i2.64924

Harwoto, W. R., Rondhi, M., Rokhani, R., & Suwandari, A. (2022). Direct payment system in sugarcane industry: beneficial or unfavourable solution? Economics Development Analysis Journal, 11(1), 96-109. Retrieved from https://journal.unnes.ac.id/sju/index.php/edaj/article/view/48507

Hayden, M. T., McNally, B., & Kinsella, A. (2021). Exploring state pension provision policy for the farming community. Journal of Rural Studies, 86, 262–269. https://doi.org/10.1016/j.jrurstud.2021.05.032

Heriyanto, H. (2020). Keunggulan Kompetitif dan keunggulan komperatif usahatani kelapa sawit pada lahan suboptimal di kabupaten Musi Rawas. Jurnal Agribisnis, 21(2), 150–162. https://doi.org/10.31849/agr.v21i2.3252

Hermawan, R. (2012). Terkait dengan pencapaian swasembada gula di Indonesia (Analysis of land use of sugar cane and paddy in the framework of achieving sugar self-sufficiency in Indonesia). Jurnal Ekonomi & Kebijakan Publik, 3(1), 47–63.

Hiloidhari, M., Vijay, V., Banerjee, R., Baruah, D. C., & Rao, A. B. (2021). Energy-carbon-water footprint of sugarcane bioenergy: A district-level life cycle assessment in the state of Maharashtra, India. Renewable and Sustainable Energy Reviews, 151, 111583. https://doi.org/10.1016/j.rser.2021.111583

Hunt, S. D., & Morgan, R. M. (1995). The comparative advantage theory of competition. Journal of Marketing, 59(2), 1. https://doi.org/10.2307/1252069

Irfanda, A. I. (2020). Analisis daya saing di Desa Tleter Kecamatan Kaloran Kabupaten Temanggung. Agrisaintifika: Jurnal Ilmu-Ilmu Pertanian, 3(2), 147. https://doi.org/10.32585/ags.v3i2.550

Isaskar, R., Sutrisno, S., & D, D. P. (2010). Studi keunggulan komparatif usahatani tebu (comparative advantage study of sugar cane farming). Agrise, X(2). 129-138. Retrieved from https://agrise.ub.ac.id/index.php/agrise/article/view/43/70

Kassali, R., Adetomiwa, K., & Lasisi, A. L. (2022). Competitiveness of broiler production in Nigeria: A policy analysis matrix approach. Heliyon, 8(5), e09298. https://doi.org/10.1016/j.heliyon.2022.e09298

Kos, D., Lensink, R., & Meuwissen, M. (2023). The role of social capital in adoption of risky versus less risky subsidized input supplies: An empirical study of cocoa farmers in Ghana. Journal of Rural Studies, 97(October 2022), 140–152. https://doi.org/10.1016/j.jrurstud.2022.10.027

Kurniawan, D., Jaenudin, A., & Wachdijono. (2021). Model peningkatan pendapatan agribisnis tebu rakyat. 331–344. https://doi.org/10.25047/agropross.2021.237

Lestari, E. K., Fauzi, A., Hutagaol, P., & Hidayat, A. (2015). Keuntungan petani tebu rakyat melalui kemitraan di kabupaten Jember. Buletin Tanaman Tembakau, Serat & Minyak Industri, 7(2), 79–89.

Lindawati, L., Zulfida, I., & Azmi, A. F. (2021). Analysis of comparative and competitive advantages of organic rice in Beringin Subdistrict of Deli Serdang Regency. IOP Conference Series: Earth and Environmental Science, 782(2). https://doi.org/10.1088/1755-1315/782/2/022021

Mahruf. (2022). Penerapan kebijakan pemerintah dalam penentuan harga jual gula kristal putih melalui Peraturan Menteri Perdagangan Republik Indonesia Nomor 7 Tahun 2020. Populis : Jurnal Sosial dan Humaniora, 7(2), 205–224. http://dx.doi.org/10.47313/pjsh.v7i2.1855

Malian, A. H., & Syam, A. (2016). Daya saing usahatani tebu di Jawa Timur. In Forum penelitian Agro Ekonomi (Vol. 14, Issue 1, p. 1). https://doi.org/10.21082/fae.v14n1.1996.1-11

Misra, V., Mall, A. K., Solomon, S., & Ansari, M. I. (2022). Post-harvest biology and recent advances of storage technologies in sugarcane. Biotechnology Reports, 33(December 2021), e00705. https://doi.org/10.1016/j.btre.2022.e00705

Murdy, S., Nainggolan, S., & Rezeki. R Sihombing, S. (2021). Analysis of the competitiveness of rice farming and its implications on Input-Output price policy scenario of rice in Jambi Province - Indonesia. Jurnal Paradigma Ekonomika, 16(2), 359–368. https://doi.org/10.22437/jpe.v16i2.12658

Ncoyini, Z., Savage, M. J., & Strydom, S. (2022). Limited access and use of climate information by small-scale sugarcane farmers in South Africa: A case study. Climate Services, 26, 100285. https://doi.org/10.1016/j.cliser.2022.100285

Negrão, D. R., Grandis, A., Buckeridge, M. S., Rocha, G. J. M., Leal, M. R. L. V, & Driemeier, C. (2021).

Inorganics in sugarcane bagasse and straw and their impacts for bioenergy and biorefining: A review. Renewable and Sustainable Energy Reviews, 148, 111268. https://doi.org/10.1016/j.rser.2021.111268

Nguyen-Thi-Lan, H., Fahad, S., Ho-Ngoc, N., Nguyen-Anh, T., Pham-Van, D., Nguyen-Thi-Viet, H., Do-Hoang, P., Do-Kim, C., & To-The, N. (2022). Crop farming and technical efficiency of tea production nexus: An analysis of environmental impacts. Journal of the Saudi Society of Agricultural Sciences, xxxx. https://doi.org/10.1016/j.jssas.2022.09.001

Nina, Tarumun, S., & Rifai, A. (2017). Analisis kebijakan pengembangan daya saing industri kelapa sawit Riau. Indonesian Journal of Agricultural Economics (IJAE). 8(2), 231–245. http://dx.doi.org/10.31258/ijae.8.2.231-245

Paramitha, P., Wibowo, R., & Fajar, A. (2014). Studi efisiensi teknis dan ekonomis usahatani tebu sendiri dan tebu rakyat di Pabrik Gula Padjarakan. Berkala Ilmiah Pertanian, 1(1), 1–13.

Paulraj, A., Chandrasekaran, M., & Easwaran, N. (2015). Policy analysis matrix approach: Applications, strengths and weaknesses. Agricultural Research Journal, 52, 11. https://doi.org/10.5958/2395-146X.2015.00029.0

Perwitasari, H., Mulyo, J., Sugiyarto, S., Widada, A. W., Siregar, A., & Fadhliani, Z. (2021). Economic impact of sugarcane in Indonesia: An input-output approach. Agro Ekonomi, 32. https://doi.org/10.22146/ae.61051

Poernomo, A. (2018). Analysis of the protection of input subsidies policy (fertilizer and seed) and production output in rice plant agriculture in Indonesia. Eko-Regional Jurnal Pengembangan Ekonomi Wilayah, 12(1), 49–55. https://doi.org/10.20884/1.erjpe.2017.12.1.1069

Pratiwi, T. D., Wibowo, E. P., & Wibowo, H. (2021). Daya saing usahatani tebu terhadap komoditas eksisting di wilayah kerja pabrik gula Wonolangan Kabupaten Probolinggo Tahun 2018. Caraka Tani: Journal of Sustainable Agriculture, 33(1), 57. https://doi.org/10.20961/carakatani.v33i1.19562

Purbaningsih, Y., Bafadal, A., & Sutariati, G. A. K. (2019). An analysis of the comparative and competitive advantage of sago processing business. IOP Conference Series: Earth and Environmental Science, 382(1). https://doi.org/10.1088/1755-1315/382/1/012036

Raushan, K., Ahern, C., & Norton, B. (2022). Determining realistic U-values to substitute default U-values in EPC database to make more representative; a case-study in Ireland. Energy and Buildings, 274, 112358. https://doi.org/10.1016/j.enbuild.2022.112358

Riyanto, M. R. P. (2018). Perubahan budidaya tanaman tebu ke tanaman bawang merah Desa Kedung Dalem Kecamatan Dringu Kabupaten Probolinggo. Avatara, 6(1). Retrieved from https://jurnalmahasiswa.unesa.ac.id/index.php/avatara/article/view/22178

Robaey, Z., Asveld, L., Sinha, K. M., Wubben, E., & Osseweijer, P. (2022). Identifying practices of inclusive biobased value chains: Lessons from corn stover in Iowa, sugar cane in Jamaica, and sugar beet in the Netherlands. Cleaner and Circular Bioeconomy, 3(January), 100032. https://doi.org/10.1016/j.clcb.2022.100032

Salvago, M. R., Phiboon, K., Faysse, N., & Nguyen, T. P. L. (2019). Young people's willingness to farm under present and improved conditions in Thailand. Outlook on Agriculture, 48(4), 282–291. https://doi.org/10.1177/0030727019880189

Santosa, R. (2020). Analisis daya saing kacang hijau di Kecamatan Saronggi Kabupaten Sumenep. Jurnal Pertanian Cemara, 17(2), 35-49. https://doi.org/10.24929/fp.v17i2.1146

Saputri, N. K., & Respatiadi, H. (2018). Policy Reform to Lower Sugar Prices in Indonesia. 16. https://repository.cips-indonesia.org/pt/publications/270481/policy-reform-to-lower-sugar-prices-in-indonesia

Setiawan, K., & Sengadji, H. M. (2016). Analisis Dampak Kebijakan Pemerintah Terhadap Daya Saing. Agrica (Jurnal Agribisnis Sumatera Utara) 9(2), 80–89. https://doi.org/10.31289/agrica.v9i2.485

Setiawan, R. F., Widayanti, S., & Sudiyarto. (2018). Analisis daya saing usahatani tembakau kasturi di kabupaten Jember. Jurnal Ilmiah Sosio Agribis, 18(1), 12–26. http://dx.doi.org/10.30742/jisa1812018449

Shang, T., Liu, P., & Guo, J. (2019). How to allocate energy-saving bene fi t for guaranteed savings EPC projects ? A case of China. Energy, xxxx, 116499. https://doi.org/10.1016/j.energy.2019.116499

Sinaga, A. H. (2018). Analisis komoditi jagung (Zea mays L). Jurnal Darma Agung. 26(1), 318-325. http://dx.doi.org/10.46930/ojsuda.v26i1.6

Stellian, R., & Danna-Buitrago, J. P. (2022). Revealed comparative advantage and contribution-to-the-trade-balance indexes. International Economics,

170(October 2020), 129–155. https://doi.org/10.1016/j.inteco.2022.02.007

Sulaiman, A. A., Sulaeman, Y., Mustikasari, N., Nursyamsi, D., & Syakir, A. M. (2019). Increasing sugar production in Indonesia through land suitability analysis and sugar mill restructuring. Land, 8(4), 1–17. https://doi.org/10.3390/land8040061

Takeshima, H., & Nkonya, E. (2014). Government fertilizer subsidy and commercial sector fertilizer demand: Evidence from the Federal Market Stabilization Program (FMSP) in Nigeria. Food Policy, 47, 1–12. https://doi.org/10.1016/j.foodpol.2014.04.009

Tanjung, F., Azhari, R., & Erwin, E. (2023). Competitiveness and impact of government policies on the development of people's arabica coffee plantations partnership pattern in Solok Regency. Journal of Social Research, 2(2), 376–387. https://doi.org/10.55324/josr.v2i2.589

Thamrin, S. (2022). Kinerja pabrik gula di Provinsi Sulawesi Selatan. Agrokompleks, 22(2), 25–31. https://doi.org/10.51978/japp.v22i2.438

van Zyl, J., & Pearson, S. R. (1990). Review: The policy analysis matrix for agricultural development. Development Southern Africa, 7(1), 133–140. https://doi.org/10.1080/03768359008439507

Warr, P. (2014). Agricultural liberalization, poverty and inequality: Indonesia and Thailand. Journal of Asian Economics, 35, 92–106. https://doi.org/10.1016/j.asieco.2014.10.003

Widyatami, L. E., & Wiguna, A. A. (2019). Competitiveness and impact of government policies on rice farming with SRI Method in Rogojampi District, Banyuwangi Regency. Agraris, 5(2), 99–110. https://doi.org/DOI: http://dx.doi.org/10.18196/agr.5279

William, B., Kpenavoun, S., & Hervé, C. (2023). Analysis of the competitiveness of soybean production in Benin. Scientific African, 19, e01491. https://doi.org/10.1016/j.sciaf.2022.e01491

Yodfiatfinda. (2020). Effort to improve the interests of young generations in the agricultural sector to attain food security in Indonesia. 194(FANRes 2019), 291–296. https://doi.org/10.2991/aer.k.200325.058

Yunitasari, D. (2019). Achieving self-sufficiency through sugar supply and demand policies (Dynamics system approach). International Journal of Scientific and Technology Research, 8(3), 34–40.

Yusvianto, A. G., & Kuntadi, E. B. (2022). Persepsi petani tebu terhadap penerapan sistem pembelian tebu (SPT): Studi kasus di Kabupaten Situbondo. JSEP (Journal of Social and Agricultural Economics), 15(2), 229. https://doi.org/10.19184/jsep.v15i2.30397

Zhang, C., & Song, Y. (2022). Road to the city: Impact of land expropriation on farmers' urban settlement intention in China. Land Use Policy, 123, 106432. https://doi.org/10.1016/j.landusepol.2022.106432

Zhu, Z., Wu, D., & Jiang, Q. (2022). Chinese Freshwater aquaculture: A comparative analysis of the competitiveness on regional aquaculture industries. Aquaculture and Fisheries. https://doi.org/10.1016/j.aaf.2022.11.001