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COMPETITIVENESS AND AGRICULTURAL POLICIES OF CORN FARMING IN KARO REGENCY

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Abstract

Corn, the second most important source of carbohydrates after rice, is vital for food security, animal feed supply, and as a raw material for biofuel. Enhancing the competitiveness of corn farming is essential for succeeding in global trade due to these benefits. This study aims to analyze the income and measure the competitiveness of corn farming, encompassing both competitive and comparative advantages. Data collection involved observations and interviews using questionnaires. A simple random sampling method was used to select 45 farmer respondents. Data analysis employed income analysis and the Policy Analysis Matrix (PAM). The findings reveal that corn farming in Karo Regency is profitable, with total revenue exceeding total costs, resulting in an average income of Rp. 15,261,695 per planting season. Corn farming in Karo Regency demonstrates both competitive and comparative advantages, reflecting high competitiveness and indicating that government policies have effectively protected corn farming.

Keywords: corn farming, income, competitiveness, PAM**s**

Introduction

Corn is a versatile carbohydrate-producing crop with significant potential for development beyond rice. It serves multiple purposes, including as seed, raw material for the feed industry, household consumption, and the food industry. The demand for corn, particularly from the feed industry, is projected to rise, while household consumption remains low and is expected to decline. This increasing demand highlights the potential for further development in corn farming (Ministry of Agriculture, 2017, Nawaz et al., 2022).

To boost corn production, the government has implemented policies providing incentives such as fertilizer subsidies and seed assistance. These subsidies aim to enhance productivity and improve the welfare of farmers, especially those growing food crops. Additionally, the government has reduced corn imports and imposed a 5 percent import tariff on corn products to protect domestic farmers.

Despite these efforts, low corn productivity and high farming costs lead to elevated domestic corn prices. The import tariff on corn aims to mitigate the impact of imported corn, ensuring that domestic corn remains competitive in terms of price.

Beyond input efficiency and favorable output prices, the competitiveness of the corn commodity is crucial. Competitiveness relates to both comparative and competitive advantages. Comparative advantage measures potential competitiveness in a distortion-free economy, indicating economic efficiency. Competitive advantage, on the other hand, assesses competitiveness under actual economic conditions, reflecting financial efficiency (Daryanto, 2009, Maksum et al., 2021).

Enhancing the competitiveness of corn farming is vital for agricultural development to face global trade challenges and meet national food quality demands (Hermawan et al., 2023). Competitiveness can be assessed through comparative and competitive advantages. Comparative advantage explains the benefits for farmers under market distortions or government policies (Haryanto et al., 2019). Corn, a crucial crop for the feed industry, household consumption, and food industry, is expected to see rising demand with population growth (Lestari et al., 2020). Karo Regency, the largest corn producer in North Sumatra Province with a production of 677,083.7 tons, has significant potential for improving corn farming competitiveness (North Sumatra Province Statistics Agency, 2023).

Indonesia has the capability to meet its domestic corn needs and the potential to become a global corn exporter by enhancing the competitiveness of its corn. According to Aldillah (2017), policies supporting economically and environmentally friendly agriculture are essential for strengthening corn's competitiveness nationally and internationally. Effective coordination between central and local governments is necessary to meet agribusiness needs from upstream to downstream.

Corn is a strategic commodity whose availability is closely monitored by the government. To ensure sustainable corn farming and availability, the government has enacted several policies, including fertilizer subsidies and international trade regulations. Policies such as the Minister of Finance Regulation No. 1322/PMK.010/2015 and No. 244/PMK.011/2014, which set import tariffs and value-added tax on fertilizers, and Regent Regulation No. 44 of 2015, which regulates subsidized fertilizer prices, significantly influence the competitiveness of corn.

This research uses the Policy Analysis Matrix (PAM) to measure the competitiveness of corn farming in Karo Regency, focusing on comparative and competitive advantages and assessing the impact of government policies. The aim is to provide the Karo Regency government with insights into the current state of corn farming in the corn production centers of Tigabinanga, Mardingding, and Laubaleng districts, and to help formulate protective policies for corn farming.

Research Methods

Research Location

This research was conducted in Karo Regency, specifically in Tigabinanga District, Mardingding District, and Laubaleng District. These districts were chosen because they are the primary corn production centers in Karo Regency, North Sumatra Province. In 2022, the corn harvest areas were as follows: Tigabinanga District covered 24,099.49 hectares (23.14% of the total), Mardingding District covered 15,305.00 hectares (14.69%), and Laubaleng District covered 15,918.98 hectares (15.28%) (Badan Pusat Statistik Kabupaten Karo, 2023).

Research Sample

The sample for this study consists of 45 corn farmers, with 15 respondents selected from each of the three districts. Secondary data was obtained from sources including Central Statistics Agency of North Sumatra, Central Statistics Agency of Karo Regency, and other relevant agencies.

Data Collection Methods

Data collection was conducted using the following techniques: (a) Observation: Direct observation and measurement in the field to obtain valid data and a clear understanding of the research context, (b) Interviews: Gathering data directly from respondents through a questionnaire-

based interview process, (c) Documentation: Collecting data from various literature sources such as letters, photo archives, books, and other relevant documents.

Data Analysis Method

Income analysis is expressed using the following formula (Pardani et al. 2017):

Pd = TR – TC

Where:

Pd : Income

TR : Total Revenue

TC : Total Cost

Meanwhile, to analyze competitiveness using the Policy Analysis Matrix (PAM) method.

Table 1. Policy Analysis Matrix (PAM)

Description	Reveneu	Cost		Profit
		tradable	non tradable	
Harga Privat Pricing	A	B	C	D=A-B-C
Harga Social Pricing	E	F	G	H=E-F-G
Policy Impact	I	J	K	L=D-H=I-J-K

Source: Pearson, et.al., 2005

Description:

Revenue from corn farming at private prices = A

Total tradable costs of corn farming at private prices = B

Total nontradable costs of corn farming at private prices = C

Profit rate at private prices = D

Corn farming revenues at social prices = E

Total tradable costs of corn farming at social prices = F

Total non-tradable costs of corn farming at social prices = G

Social profit = H

Output transfer (OT)= I

Input transfer (IT) = J

Transfer Factor (TF) = K

Net transfer (NT)= L

The first line of the PAM Matrix is a calculation using market (private) prices, namely the prices actually paid by farmers. The second line is a calculation based on the social price (shadow price), namely the price that reflects the true social value for elements of costs and results. And the third row is the difference in calculations between private prices and social prices as a result of the impact of government policy.

Data analysis in this research uses the Policy Analysis Matrix (PAM) to analyze the competitiveness of corn farming and the impact of government policy on corn farming activities (Pearson, et al., 2005). In using PAM as an analytical tool, economic activity can be viewed from two points of view, namely the perspective of private prices and social prices.

Utilizing PAM as an analytical tool provides insights into economic activities from two perspectives: the private price perspective, which considers transactions at actual market prices, and the social price perspective, which envisions conditions under perfect competition and social equilibrium, albeit challenging to achieve in real markets. Assumptions under perfect competition allow for the estimation of shadow prices for tradable inputs and outputs in international trade contexts.

Results and Discussion

Maize Farming Income

Income analysis was conducted based on the sales realized by maize farmers, subtracting total production expenses.

Table 2. Total Revenue, Production Costs and Income in Corn Farming (Rp/MT)

No	Description	Total	Average
1	Reveneu	Rp. 2157049575	Rp. 47934435
2	Production cost	Rp. 1470273300	Rp. 32672740
3	Profit	Rp. 686776275	Rp. 15261695

Source: Primary Data, Processed, 2023

Table 2 reveals that the average income from maize farming is Rp. 47,934,435 per planting season (MT), with average production costs amounting to Rp. 32,672,740/MT and farmers' average income totalling Rp. 15,261,695/MT. Maize farming thus generates positive income or profit, supporting the livelihoods of maize farmers. This profitability is crucial for attracting continued investment in maize farming, highlighting the economic viability of maize cultivation at the research location.

These findings are consistent with Eri and Saragih (2023), who reported significant profitability in sweet maize farming within a single planting season, with an average production of 7,250 cobs/MT. Sweet maize farming generates income ranging from Rp. 36,250,000 to Rp. 19,908,493 per 0.036 Ha – 1 Ha per farmer. The efficiency analysis in Kiritana Village indicated a favorable R/C ratio of 2.6, underscoring the economic viability and potential for sweet maize cultivation.

Similarly, these outcomes align with Pamusu and Paelo's (2023) findings, demonstrating that maize farmers in Zone 29, Pamona Puselemba District, Poso Regency, earn an average income of Rp. 16,554,666 per planting season, with an R/C ratio of 3.33, affirming the economic feasibility and benefits of maize farming for enhancing farmer welfare.

Competitiveness of Maize Farming

This research aims to assess the comparative and competitive advantages of maize farming in the study area using the Policy Analysis Matrix (PAM) method. The PAM method requires data on revenues, profits, and production costs categorized into private prices and social prices. Production costs encompass tradeable inputs like fertilizers and non-tradeable inputs such as labor, pesticides, seeds, and equipment depreciation. The analysis results based on PAM calculations are presented in Table 3 below:

Table 3. Analysis of Corn Farming Policy in Karo Regency (per Ha per Planting Season)

Description	Reveneu	Input Costs		Profit
		Tradable	Non Tradable	
Private price	47934435	27554761	5117979	15261695
Social price	43140990	33065713	5117979	2201821
Policy impact	4793445	-5510952	0	13059874

Source: Primary Data, Processed, 2023

Table 3 reveals that maize farming activities yield positive profits. This indicates that private profits from maize farming, supported by government interventions, result in positive outcomes for maize farming activities in Karo Regency, amounting to Rp. 15,261,695 per planting season. Social profits from maize farming total Rp. 2,201,821 per planting season. The positive social profit indicates that maize farming activities can sustain themselves without government intervention.

Furthermore, Table 3 presents the Policy Analysis Matrix (PAM) results for maize farming in Karo Regency, showing overall positive or profitable revenues from both private and social perspectives.

Competitive Advantage Analysis

This analysis assesses the financial feasibility of maize farming in the research area, focusing on private profits calculated based on actual market prices, which may be influenced by government interventions. Positive private profit values indicate efficient commodity production using available resources. Therefore, maize farming in the research area can generate profits above zero even when government policies intervene in the market.

The competitive advantage of a commodity is reflected in how resources are allocated to achieve financial efficiency in its production (Indriyanti, 2007). Financial efficiency indicators from output production are illustrated by the Private Cost Ratio (PCR). The PCR is the ratio between non-tradable input costs or domestic factors and the difference between revenue and tradable input costs at actual market prices. A PCR value less than one (PCR < 1) indicates efficient financial management in farming. A smaller PCR value suggests a higher competitive advantage.

In this study, the PCR value is calculated by dividing the private non-tradeable input costs of Rp. 5,117,979 by private revenue of Rp. 47,934,435 minus private tradeable input costs of Rp. 27,554,761, resulting in a PCR value of 0.251. This implies that to achieve an additional output value of Rp. 1,000,000, maize farming would need to increase non-tradeable input costs by Rp. 251,000. With a PCR value less than one, maize farming in the research area demonstrates sufficient financial efficiency, indicating that maize farming in Karo Regency maintains a competitive advantage.

Comparative Advantage Analysis

This analysis examines social benefits and the Domestic Resources Cost Ratio (DRC), which serves as an indicator of competitiveness without government assistance. Social benefits are assessed using shadow prices, representing the efficient prices that farmers would face in the absence of government policies or market failures.

According to Rahmaniyah & Rum (2020), comparative advantage in farming refers to the ability or strength of a region to produce with lower costs than the social opportunity costs. The Domestic Resources Cost Ratio (DRC) is utilized to measure comparative advantage in farming, with a value less than one (DRC < 1) indicating favorable conditions.

In this study, the DRC value is calculated by dividing the non-tradeable input costs of Rp. 5,117,979 by the social revenue of Rp. 43,140,990 minus the social tradeable input costs of Rp. 33,065,713, resulting in a DRC value of 0.507. This suggests that to achieve an additional output value of Rp. 1,000,000, farming would need to increase non-tradeable input costs by Rp. 507,000. The obtained DRC value indicates efficient resource utilization, demonstrating comparative advantage in farming. This finding is consistent with research by Irawati et al. (2015), which similarly concluded that farming operations exhibit comparative advantage with a DRC value of less than one.

Government Policy Impact

This section evaluates the impact of government policies on maize farming in Karo Regency, aiming to assess the influence of these policies and their effectiveness in supporting maize farming activities. The Policy Analysis Matrix (PAM) results detailing the impact of government policies on maize farming in the research area are summarized in Table 4.

Table 4. PAM Analysis of the Impact of Government Policy

Policy	Indicator	Value
Input Tradeable	NPCI	0,83
Input Non Tradeable	TF	13059874
Output	NPCO	1,11
Input-Output	EPC	2,02

Source: Primary Data, Processed, 2023

Table 4 presents the Nominal Protection Coefficient Input (NPCI), which indicates the difference in tradeable input prices between private and social prices. An NPCI value < 1 signifies that government policies on tradeable inputs have successfully shielded farmers from higher costs. In the case of maize farming in Karo Regency, the NPCI value is 0.83, indicating that farmers only pay 83% of the costs they would have borne without government intervention.

These findings align with research by Radiansyah et al. (2016) on maize farming in Bengkayang District, where an NPCI value < 1 indicates effective local government involvement in protecting tradeable input prices, particularly fertilizers.

The Transfer Factor (TF) measures the difference between non-tradeable input costs at private and social prices. For maize farming in Karo Regency, the positive TF value of Rp. 13,059,874 suggests implicit taxes, indicating that farmers pay higher non-tradeable input costs than their social prices. This situation arises when the government does not implement protective policies for non-tradeable inputs.

This outcome corresponds with Hidayah's (2018) findings on coffee and cocoa competitiveness in South Sulawesi Province, where a positive TF signifies implicit taxes, burdening farmers with higher costs than their social prices.

The Nominal Protection Coefficient Output (NPCO) measures the ratio of price differences between private and social prices by dividing income at private prices (Rp. 47,934,435) by income at social prices (Rp. 43,140,990). A NPCO value > 1 indicates that domestic maize prices exceed import prices, highlighting the effectiveness of government policies in safeguarding maize farming. In Karo Regency, the NPCO value of 1.11 signifies that government policies have indeed shielded domestic maize prices, resulting in higher output values compared to global prices.

The Effectivity Policy Coefficient (EPC) assesses the impact of government policies on input-output dynamics. Calculated by subtracting income at private prices (Rp. 47,934,435) from tradeable input costs at private prices (Rp. 27,554,761), and dividing the result by the difference between income at social prices (Rp. 43,140,990) and tradeable input costs at social prices (Rp. 33,065,713), the EPC value for maize farming in Karo Regency is 2.02. An EPC value > 1 indicates that government policies effectively support all maize farming activities. Therefore, the EPC value of 2.02 affirms that government policies have significantly bolstered maize farming in Karo Regency, contributing to its overall protection and sustainability.

Conclusion

Maize farmers in Karo Regency achieve an average income of Rp. 15,261,695 per planting season, highlighting the economic viability of maize farming in the region. The presence of both competitive and comparative advantages underscores the district's strong position in maize farming, reflecting its high competitiveness in the agricultural sector.

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