



Increasing Maize Production in Palolo District, Sigi Regency: Challenges and Opportunities toward Food Independence

Muhammad Yasin^{1*}, Hasmari Noer¹, Henny Indrawati²

¹Department of Agricultural Sciences, Postgraduate Program, Universitas Alkhairaat, Central Sulawesi, Indonesia.

²Department of Economics Education, Faculty of Teachers Training and Education, Universitas Riau, Pekanbaru, Indonesia.

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Corresponding Author:

Muhammad Yasin

yasinmel18@gmail.com

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Abstract: Palolo district in Sigi regency has great potential in developing maize production as part of efforts to realize regional food self-sufficiency. However, increasing maize production in this area faces various challenges, including land limitations, climate change, and access to technology and markets. The study aims to determine the potential for increasing maize production based on the support of internal and external factors in Palolo district, Sigi regency. Sampling was done with a purposive sampling technique where members were selected intentionally, namely on the potential for increasing corn production in Palolo District, by tracing the population sampled by as many as 26 sample corn farmers. The data analysis used is SWOT analysis. The results of the research show that the potential for increasing maize production in Palolo district is supported by internal factors, among others: the existence of human resources in maize farming, the existence of superior seeds from the government, the increase in maize production, the existence of fertilizer subsidies, spray assistance from the government, and the direction of extension workers to farmers. External factors, such as the development of agricultural technology, the local government's support for maize farming, the increasing market demand for food, the availability of affordable facilities and infrastructure, and farmers' understanding of maize farming, also support this potential.

Keywords: Food; Maize; Production; Self-sufficiency

Introduction

Maize *Zea mays* L is one of the world's most important food crops, alongside wheat and rice. As the main source of carbohydrates in Central and South America, corn is also an alternative food source in the United States. Residents of some regions in Indonesia (e.g., Gorontalo and Madura) also use maize as a staple food. In addition to providing carbohydrates, researchers are now cultivating genetically engineered maize to produce pharmaceutical ingredients (Ramaprabha et al., 2024; Sidahmed et al., 2025). Indonesia is called an agricultural country where 80% of the population works in the agricultural sector. The agricultural sector plays a crucial role in Indonesia's

economic rotation and in meeting the country's food needs. To be able to continue to meet these needs, good agricultural processing is necessary. There are two ways of processing agricultural land, namely agricultural extensification and agricultural intensification. What is meant by extensification and intensification. Agricultural extensification is the expansion of agricultural areas into areas that have not previously been utilized by humans (Lanz et al., 2018; Ma et al., 2023). The target is forest land, steppe grasslands, peatlands, or other forms of marginalized land (Meyfroidt, 2021). The Indonesian language does not directly associate this term with extensive agriculture (Jellason et al., 2021). Agricultural intensification is one of the efforts to increase agricultural yields by

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optimizing existing attention land (Robinson, 2024; Nasikh et al., 2021). When conducting agricultural intensification, it's important to understand the key methods involved. This method is called Post-Farming Business (Nascimento et al., 2019).

The national priorities in the food sector for the 2020-2024 period aim to enhance and fortify food sovereignty by prioritizing increased food availability from domestic production: rice production is prioritized to be increased in the context of self-sufficiency so that independence can be maintained (Yuan et al., 2024; Connor et al., 2023), corn production is targeted to meet the needs of local food and feed diversity; soybean production is prioritized to secure the supply of craftsmen and the consumption needs of tofu and tempeh (Wijaya et al., 2024) domestic sugar production is targeted to meet household sugar consumption; beef production to secure consumption at the household level; fish production to support the provision of protein sources of animal origin which is targeted at 18.70 million tons in 2023; and salt production is targeted to meet household salt consumption (Sinuraya et al., 2023). In 2022-2023, food production targets are as follows: rice 82 million tonnes; corn 24.10 million tonnes; soybean 1.92 million tonnes; sugar 3.80 million tonnes; beef 755.10 thousand tonnes; fish 18.70 million tonnes; and salt 3.30 million tonnes (BPS Indonesia 2024).

To achieve the domestic production target mentioned above, it is necessary (Pawlak & Kołodziejczak, 2020): Construction and improvement of 600 thousand ha of irrigation network services to replace land that has changed functions; Rehabilitation of 1.75 million ha of irrigation networks as a form of rehabilitation of irrigation infrastructure in accordance with the rate of deterioration; Operation and maintenance of irrigation networks covering 2.95 million ha; Construction of 132 thousand ha of swamp irrigation network services for the development of adaptive swamp land by balancing economic considerations and environmental sustainability (Dharmawan et al., 2024; Yeny et al., 2022) and The realization of an improved Fisheries Management Area (WPP) management system to maintain the sustainability of the abundance of fish resource stocks, which is maintained by realizing sustainable management of fisheries resources and areas. Corn, which is a source of carbohydrates, has considerable potential to be developed, especially in the area of Central Sulawesi Province, which is currently being socialized about non-rice food diversification, so that both the private government and BUMN from districts to rural areas have begun to be implemented.

Only now the problem is that marketing is still not relatively stable and raw materials need to be improved (Sinuraya et al., 2023; Prasanna et al., 2019). The Central

Sulawesi Provincial Government has designated maize as a flagship program for regional development. This is a commendable move, as maize not only possesses significant regional potential in terms of land, but also boasts ease of cultivation, minimal water requirements, and resistance to pests and diseases. Equally important, maize has a significant role in the national economy with the development of the food industry supported by cultivation technology and superior varieties. Based on statistical data, maize production in Central Sulawesi over the past few years has increased by an average of 35% per year. In 2022, maize production in Central Sulawesi province only reached 196.23 tons. However, the results of the BPS survey in 2023 showed a significant increase in corn yield of 642.67 tons. In addition to the increase in harvested area, the increase in corn yield was also obtained from the contribution of increased plant productivity, which reached 5.40 t/ha (Ojeniyi et al., 2024; Tofa et al., 2022).

Sigi Regency is one of the corn productions canters in Central Sulawesi. From 2020 to 2023, Sigi Regency's maize planting area tended to increase. In 2020, the corn harvest area in Sigi Regency was 3481 ha with a production of 9021 tonnes and a productivity of 25.91 kw/ha (Badan Pusat Statistik Provinsi Sulawesi Tengah, 2023). In 2022, the corn harvest area increased to 11707 ha with a production of 45263 tonnes and a productivity of 38.66 kw/ha. Sigi Regency occupies an area of 5,196.02 km², with 32393.77 ha of rice fields and 406546.2 ha of non-fields. Sigi Regency boasts dry land potential, making it a highly promising area for corn development. Therefore, it is necessary to conduct this research with the title "Potential for Increasing Maize Production in Supporting Food Independence in Palolo District, Sigi Regency, Central Sulawesi Province." Here are the research questions of this research, namely: What is the potential for increasing maize production in Palolo district, Sigi regency, Central Sulawesi province, and What are the strategies to increase maize production in Palolo district, Sigi regency, Central Sulawesi province?

Method

The research location is Palolo district, where the majority of the population are corn farmers in Sigi District, Central Sulawesi Province. The research was conducted from December 2023 to January 2024. The population in this study were corn farmers, where the average community there earns a living as a farmer, especially corn farmers. The subdistrict has a population of 127 corn farmers. Of these, the sampling technique was carried out using the purposive sampling method. So that 26 respondents were obtained as sample farmers. To support the writing, the researcher collected two types of data: qualitative data, which is information

obtained through direct interviews with personnel staff, and quantitative data, which is information in the form of numbers, reports, and statistics, such as the development of the number of employees and workers.

This study employs two data collection techniques: observation, which involves direct observation of field phenomena related to the research focus, and interview, which involves direct questioning of the parties involved and direct interaction with informants through a questionnaire. In this study, documentation aids in data collection from the research area by retrieving previously documented data (Wallwey & Kajfez, 2023; Bingham, 2023). Data processing is done by identifying internal and external factors, then using SWOT analysis through the IFAS and EFAS matrices, then using the IE matrix to see the strength of farmers. Next, utilize the SWOT matrix to identify several alternative strategies. The following analytical tools are used to analyze the data: Before formulating alternative strategies through the SWOT matrix, internal and external factors are identified to the company's position using strengths and weaknesses (internal factors) and opportunities and threats (external factors).

The company uses the Internal Strategy Factor Analysis Summary (IFAS) and External Strategy Factor Analysis Summary (EFAS) to examine its internal environment, identifying strengths and weaknesses. The Internal External (IE) Matrix stage generates alternative strategies by merging internal and external factors generated during the input stage. At this stage, the IE matrix analysis tool is used. The purpose of using this model is to obtain a business strategy by looking at the score of internal factors (strengths, weaknesses) and external factors (opportunities, threats) (Hudoyo & Nurmayasari, 2020).

Results and Discussion

Identity Respondent

Farmer identity is necessary to know some of the background of farmers and informants. The main capital of a farmer in doing his farm is determined by the identity of the farmer owned. The identity in question relates to the age of the farmer, the farmer's education level, the number of family dependents, land area, farming experience (Li et al., 2023). The identity of respondents related to maize farmers is explained as follows:

Age of Respondent

In general, age is a determining factor for success in farming, both in thinking and acting, the older the age of the farmer, the ability to work relatively decreased, although on the other hand, older farmers have more experience than young farmers (Ngadi et al., 2023;

Novisma & Iskandar, 2023). Younger farmers are more dynamic, i.e. dare to take risks to gain experience in farming relatively old, have a more mature processing planning capacity in farming (Agussabti et al., 2020; Senapati, 2020), because more to his experience. The age distribution of farmers can be seen in Table 1.

Table 1. Age of Respondents in Palolo district, Sigi Regency, 2018

Description	Age (Year)	Total (Person)	Percentage (%)
Farmer	32-40	6	23.08
	41-49	10	30.77
	50-70	7	23.08
Middlemen	39	1	7.69
Extension	32	1	7.69
Agriculture Office Staff	34	1	7.69
Total		26	100

Table 1, shows that the classification of respondents' age group 32-40 years was 23.08% (6 people), 41-49 years was 30.77% (10 people), 50-70 years was 23.08% (7 people). This shows that respondents in this study are included in the productive age level class, so they are productive in efforts to increase maize production. The productive age in the agricultural business is 41-49 years old, while the age of the middlemen is 39 years old by 7.69% (1 person), 32 years old extension workers by 7.69% (1 person) and agriculture department employees 34 years old at 7.69% (1 person).

Education Level of Respondents

The level of education is an important factor in human life, both for oneself, others, and the environment around them. The level of education affects the mindset of work. In the agricultural sector education does not have a significant impact, this relates both to the direct nature and indirect nature of the type of production (Ninh, 2021; De Guzman et al., 2025). Farmers' education levels can be seen in Table 2.

Table 2. Education Level of Respondents in Palolo District, Sigi regency, 2024

Description	Number of Dependents family	Number of respondents (person)	Percentage (%)
Farmer	1-2	6	23.39
	3-4	10	38.08
	5-6	7	26.46
Middlemen	2	1	7.69
Extension	4	1	7.69
Agriculture Office Staff	3	1	7.69
Total		26	100

Table 3, shows that the highest number of dependents of farmer family respondents is 3-4 people, the highest number of 10 respondents with a total percentage of 38.08% of the 26 total respondents. In addition, the lowest number of family dependents is 1-2 as many as 6 people or 23.39% of the total percentage. While 5-6 with a total of 7 people or 26.46%. This situation greatly affects the level of family welfare and to increase corn production in meeting their needs. While the number of dependents of middlemen as many as 2 people or 7.69%, extension workers as many as 4 people or 7.69% and agricultural service employees as many as 3 people 7.69%.

Land Area of Respondent Farmers

Land area is the area used to conduct farming on a plot of land, which is measured in units of hectares (ha). The size of agricultural land will affect whether or not a production is efficient, because it is closely related to the results obtained and production costs also affect (Desiere & Jolliffe, 2018; Maini et al., 2021). The more land area and production costs are not balanced with the costs obtained, on a relatively narrow farm, even though it uses appropriate technology, and produces extensive production. The land area of maize farmers in Palolo district, Sigi Regency can be seen in Table 4.

Table 4. Land Area of Maize Respondent Farmers in Palolo District, Sigi Regency in 2024

Land Area (ha)	Number (people)	Percentage (%)
<2.00	12	50
2.00-3.00	8	40
>3.00	3	10
Total	23	100

Table 4, Shows that the land area of respondent farmers in Palolo District, Sigi Regency, most of the corn farmers have a land area of <2.00 ha as many as 12 people or 50.00% while 2.00-3.00 ha as many as 8 people or 40.00% and > 4.00 ha as many as 3 people or 30.00%. Thus, ownership of this land is very likely to increase corn production and the land owned by respondent farmers is large enough for the average per farmer.

Table 6. Identification of Internal and External Factors

	Internal Factors
Strengths	Weaknesses
The existence of human resources in maize farming	Market price uncertainty
Availability seedlings superior seeds assistance from the government	Some farmers have not followed the direction of the extension workers
Increased maize production	Some farmers have not followed the direction of the extension workers
The existence of fertilizer subsidies	There is no patented corn peeling machine

Farmer Work Experience of Respondents

Work experience is the length of time respondents have been doing work and will tend to learn from their experiences to start or continue the work they have done because they already have an idea of what to do to improve the quality of work. The state of respondents based on work experience can be seen in Table 5.

Table 5. Work Experience of Farmer Respondents in Palolo district, Sigi Regency in 2024

Description	Work Experience Respondent (Year)	Total (person)	Percentage (%)
Farmer	10-19	7	23.69
	20-29	9	30.39
	30-39	3	7.08
	40-49	4	15.77
Middlemen	6	1	7.69
Extension	3	1	7.69
Agriculture Office Staff			
Agriculture Office Staff	8	1	7.69
Total		26	100

Based on Table 7, it is known that the experience of corn farmers in Palolo district is 10-19 years 7 people (23.69%), 20-29 years 9 people (30.39%), 30-39 years 3 people (7.08%), 40-49 years 4 people (15.77%). Thus, the average maize farmer in Palolo district is experienced in maize farming. While the work experience of middlemen is 6 years or 7.69%, extension workers are 3 years or 7.69% and agricultural service employees are 8 years or 7.69%.

SWOT Analysis

SWOT analysis is used in order to maximize strengths (*Strength*) and opportunities (*Opportunities*), but at the same time can minimize weaknesses (*Weakness*) and threats (*Threat*) (Wang & Wang, 2020). SWOT analysis is carried out after identifying internal factors and external factors, analyzing internal strategic factors (strengths and weaknesses) and external factors (opportunities and threats) (Puyt et al., 2023). The following are details regarding the identification of internal factors and external factors can be seen in Table 6.

		Internal Factors
Spray assistance from the government	There is no cooperative that accommodates the production of corn farming.	
There are many directions from extension workers to farmers	Fertilizer that is difficult to obtain	External Factors
Opportunities	Weather conditions are sometimes unfavorable which makes production decline	Threat
The development of agricultural technology	The large number of corn producers means that corn prices are easily manipulated by middlemen	
Local government support for maize farming	Transportation that does not yet support	
Increased market demand related to food ingredients	The presence of pests that attack corn plants	
Affordable facilities and infrastructure		
Farmers' understanding of the maize crop		

Table 6 shows that internal factors consist of 6 strengths and 5 weaknesses, so it can be said that maize farmers in Palolo district have greater strengths so that they can minimize existing weaknesses. Meanwhile, external factors consist of 5 opportunities and 4 threats. Opportunities owned by maize farmers can be utilized

to increase maize production in Palolo district compared to threats. After identifying internal and external factors, we can then detail them in the analysis of internal and external factors (Bao et al., 2023). The following is a breakdown of the internal factors for increasing maize production in Table 7.

Table 7. IFAS (Internal Factor Analysis Summary)

Power	Internal Factor Matrix	
	Weight	Rating Value
Existence of resources humans in maize farming	0.14	4 0.56
The existence of superior seeds assistance from the government	0.11	3 0.33
Increased production corn	0.11	3 0.33
The existence of fertilizer subsidies	0.11	3 0.33
Spray machine assistance from the government local	0.11	3 0.33
There is a lot of direction from the extension workers towards farmers	0.07	2 0.14
Subtotal	0.65	18 2.02
Weaknesses		
Market price uncertainty	0.11	3 0.33
Fertilizer that is difficult to obtain	0.07	2 0.14
There are some farmers who have not follow the direction of the extension worker	0.07	2 0.14
Lack of machine corn	0.07	2 0.14
There is no cooperative that accommodates the production of farming products corn	0.03	1 0.03
Subtotal	0.35	10 0.78
Total	1.00	28 2.80

Table 7 shows that there are six strengths and five weaknesses of maize farmers in Palolo district in increasing maize production. The weighting is organized based on important to unimportant impacts. The data contained in Table 9 shows that the weights of the strengths of maize farmers are greater than the weights of the weaknesses. Therefore, it can be concluded that maize farmers in Palolo district have greater strengths in increasing maize production. Ratings on strengths and weaknesses were given values ranging from 1 to 4 based on the results of interviews that had been conducted with farmers, middlemen, extension workers and also agriculture office employees in Palolo district. The multiplication between the weight column and the rating column results in a score for the internal factors (strengths and weaknesses) of Palolo

district farmers. The total value of strengths and weaknesses is 2.80.

Strengths

The existence of human resources in maize farming. Based on population data that the population who have a type of work as a farmer is 21782 people and the average of it is corn and rice farmers so it can be said that in Palolo District is one of the central areas of corn producers; The existence of superior seeds from the government. By using seeds directed by extension workers, namely Hybrid, Composite, BISI-2 and Premium 191 varieties, it is said that these seeds are superior seeds so that when planted and harvested they will also produce quality corn; Increased corn production. Judging from the farmers' previous income, the production decreased due to unfavorable weather,

but now farmers can produce 11-12 tons/acre of maize because the weather is now starting to support and also farmers apply what is the direction of the extension workers so that the production increases; The existence of fertilizer subsidies.

Fertilizer assistance from the government under the pretext of increasing maize production includes UREA and POSKA TANI fertilizers; Spray machine assistance from the government to farmers by farmer groups. By seeing the complaints of farmers, the farmer group moved to ask the government for assistance in the form of tools to facilitate farmers in farming such as spray machines. This tool was given to farmers through farmer groups so that farmers are now able to facilitate farmers in providing medicines to their plants (Rose et al., 2016; Reviandy et al., 2021); There are many directions from extension workers to farmers. Based on the results of interviews with respondents, in Palolo Subdistrict there are extension officers who play a role in controlling farmers, facilitating facilities for farming activities, always being ready to go down to the field, listening to what farmers complain about and often giving directions to farmers related to good and correct corn crops including the use of organic fertilizers that have been directed and applied by extension officers to farmers.

Weaknesses

Unclear market prices, as one of the most important things in farming is the market issue where many farmers complain that the marketing price of maize is not in line with expectations due to price games from middlemen, this happens because of the lack of government supervision when the maize harvest period comes so that middlemen can play prices; There are some farmers who have not followed the direction of the

extension workers (Dewi et al., 2024; Prasetya et al., 2022). Judging from the age of farmers who are on average elderly and on average also did not graduate from elementary school so the knowledge applied by extension workers according to them is better than their experience because it is too complicated in the end the results are still the same as the system they encountered; There is no patent corn milling machine. The obstacle for maize farmers in Palolo district is the difficulty of getting a maize piping machine due to the lack of people offering maize piping services and the lack of people who have maize piping machines, plus the high cost; There is no cooperative that accommodates the production of corn farming. Palolo district does not yet have a cooperative to accommodate maize production that can make it easier for farmers to increase their profits. The following details about external factors (opportunities and threats) in increasing maize production obtained from the interviews can be seen in Table 8.

Table 8 shows that there are 5 opportunities and 4 threats faced by maize farmers in Palolo district to increase maize production. The 5 opportunities and 4 threats are ranked from very important to not important. Table 10 shows that the opportunities column has a large value compared to the threats, indicating that maize farmers have more opportunities than the threats faced by maize farmers in increasing maize production. Ratings for opportunities and threats were given values ranging from 1 to 4 based on interviews conducted with maize farmers, middlemen, extension workers and the agriculture office in Palolo district. The multiplication between the weight column and the rating column results in a score for the external factors (opportunities and threats) of the farmers. The total value of opportunities and threats is 2.71.

Table 8. EFAS (External Factor Analysis Summary)

Opportunities	Internal Factor Matrix	
	Weight	Rating Value
The development of agricultural technology	0.16	4 0.64
Local government support related to maize farming	0.13	3 0.39
Increasing market demand related to with food ingredients	0.09	2 0.18
Affordable facilities and infrastructure	0.13	3 0.39
Farmers' understanding of with corn plants	0.09	2 0.18
Subtotal	0.60	16 1.78
The weather conditions are sometimes unfavorable which makes production decline	0.13	3 0.39
There are so many corn producers that corn prices are easily manipulated by middlemen	0.09	2 0.18
Transportation that does not yet support	0.09	2 0.18
The presence of pests that attack corn plants	0.09	2 0.18
Subtotal	0.40	8 0.93
Total	1.00	24 2.71

Opportunities

The development of agricultural technology. In Palolo district, in the past, only traditional tools were used both in cultivating land and in harvesting and post-harvesting, but with the development of the times, there are land processing machines and corn pipil machines that can make it easier for farmers and minimize labor and work time; Corn is a staple food for the community and is one of the basic needs for humans so it is possible that the local government is very supportive of corn farming which can support economic growth in Palolo district; Increased market demand is related to food. Corn is also a food ingredient to continue the life of the food industry so that increased demand by the market itself by looking at the existing reality that in Sigi Regency itself has a very large agricultural land that can encourage increased corn production so that it can meet market demand and needs; Facilities and infrastructure in the form of sprays, seeds, medicines and so on are affordable. To facilitate farming in Palolo district, farmers do not have to look far for facilities and infrastructure because some of them have been provided by the agriculture office and outside of that farmer can buy them at the nearest kiosks in Palolo district itself; Farmers' understanding of the maize crop. Farmers in Palolo district actually understand from seed procurement to marketing, it is just a matter of how to utilize their understanding.

Threat

The weather conditions are sometimes unfavorable which makes production decline. The main obstacle for maize farmers is the unfavorable weather conditions that make it difficult for farmers to handle when the

weather worsens because it will definitely cause the production of maize farmers to decrease drastically if it cannot be handled; The large number of corn producers means that corn prices are easily manipulated by middlemen. Palolo district is one of the central corn-producing areas due to the large number of corn farmers. During the planting season, corn is usually expensive, but during the harvest season, the price of corn decreases due to price manipulation by middlemen; Transportation that has not been supported. Transportation is also an obstacle for farmers in Palolo district, where when the rainy season comes farm roads or roads that lead to agricultural areas will be difficult for cars to pass because the road conditions are hilly and many have not been well asphalted, forcing corn farmers to wait a long time in the procession of corn crop needs due to the difficulty of entering vehicles; The presence of pests that attack corn plants. Pests are one of the threats to farmers in increasing maize production because their attack can reduce the production of the maize farming business itself (Alam et al., 2024).

The strategy of concentration through horizontal/stability is an activity that has a balanced or mediocre production attraction and to increase the production of maize must be by continuing to farm carefully, meaning that the strategy that must be prepared by farmers is a strategy for how to develop the growth of maize production for how to avoid losing profits of respondent farmers in Palolo district. The SWOT analysis matrix containing the internal and external circumstances of the business to generate alternative strategies that can be implemented by maize farmers can be seen in Table 9.

Table 9. SWOT Matrix

	Strength (S)	Weakness (W)
IFAS	The existence of human resources in corn farming The existence of seeds superior seeds assistance from the government Increased maize production The existence of fertilizer subsidies The existence of help machine spray machine from the local government There is a lot of direction from extension workers to farmers	Market price uncertainty Fertilizer that is difficult to obtain Some farmers have not followed the direction of the extension workers There is no patented corn peeling machine There is no cooperative that accommodates the production results of corn farming
EFAS		
Opportunities (O)	SO Strategy	WO Strategy
The development of agricultural technology	Develop maize quality with recommended improved seeds (S2+O3)	With government support, it is easy to establish a cooperative as a shelter for maize production and meet the fertilizer needs of maize farmers (W1+W5+O2+w2).
Local government support related to maize farming	Increase maize production by utilizing human resources and increasingly sophisticated agricultural technology (S6+S1+O1)	Develop agricultural technology related to maize shelling to meet market needs (W4+O1+O3)
Increased market demand associated with maize farming		
Affordable facilities and infrastructure		

	Strength (S)	Weakness (W)
Farmers' understanding Related with corn plants	Maintaining maize production with farmer skills related to maize production (S3+O5)	
Threats (T)	Strategy ST	WT Strategy
Weather conditions are sometimes unfavorable which makes production decline	Developing the direction of the extension worker, namely the <i>jajar legowo</i> planting system so that it is not easily attacked by pests (S6 + T4)	Increase the number of transportation facilities to market maize production (W1+T3)
The abundance of corn producers so that the price of corn is easily played by middlemen	Strive for increased maize production (S3+T2)	Farmers follow the direction of extension workers in maize farming so that weather and pests are not a barrier to increasing maize production (W3+T1+T4)
Transportation that does not yet support	The use of improved seeds can maintain production when the weather worsens (S2+T1)	
The presence of pests that attack corn plants		

Based on Table 9, there are several alternative strategies that can be implemented by respondent farmers and informants, including the following:

approach; Seek to increase maize production The use of superior seeds can maintain rice production when the weather worsens (Du & Xiong, 2024).

S-O Strategy (Strength-Opportunities)

Develop maize quality with recommended improved seeds. What is the direction of the extension worker is something that can help farmers in farming so that the extension worker directs the use of superior seeds, namely Hybrid, Composite, BISI-2 and Premium 191 varieties; Increase maize production by utilizing human resources and increasingly sophisticated agricultural technology; Maintaining maize production with farmer skills about maize production because farmer skills are able to maintain something good or bring changes to maize production.

W-T Strategy (Weakness-Threats)

Increase the number of transportation facilities to market maize production; Farmers can follow the directions of extension workers in maize farming so that weather and pests do not become obstacles to increasing maize production. Quantitative Strategic Planning Matrix (QSPM) analysis. In the QSPM matrix there are AS (Attractiveness Score) and TAS values. The AS value shows the attractiveness of each strategy to its key factors (Zulkarnain et al., 2018). The TAS value is the result of multiplying the average weight by the AS value of each strategy key factor.

W-O Strategy (Weakness-Opportunities)

With the support of the government, farmers can easily establish a cooperative as a shelter for maize production and meet the fertilizer needs of maize farmers; Developing agricultural technology related to corn peeling machines in meeting market needs to facilitate farmers' farming.

Based on the QSPM analysis, the results show that the selected priority program from the S-T strategy with the Total Attractiveness Score (TAS) obtained shows the best strategy in increasing maize production. The QSPM analysis shows that the best program in increasing maize production in Palolo district, Sigi Regency is the 1st program, namely "Increase production by using superior seeds that are resistant to erratic weather changes and adopting the direction of extension workers by cultivating maize plants using the *jajar legowo* planting system in order to increase maize production" with the highest total attractiveness score (TAS) of 1.604.

S-T Strategy (Strength-Threats)

Developing directions from the extension worker, namely the *legowo* planting system so that it is not easily attacked by pests because this tool has a measured distance which is a distance that is difficult for pests to

Table 10. Results of QSPM Analysis of Strategy Priorities for Potential Increases in Maize Production in Palolo District

Strategy Factors	Weight	Strategy 1		Strategy 2		Strategy 3		Strategy 4	
		US	TAS	US	TAS	US	TAS	US	TAS
The existence of human resources in farming corn	0.56	4	0.224	3	0.168	4	2.24	4	0.224
The existence of superior seeds from the government	0.33	3	0.99	2	0.66	2	0.66	3	0.99
Increased maize production	0.33	3	0.99	3	0.99	1	0.33	2	0.66
The existence of fertilizer subsidies	0.33	3	0.99	2	0.66	3	0.99	3	0.99
Assistance with syringe machine from the government local	0.33	2	0.66	1	0.33	2	0.66	2	0.66

Strategy Factors	Weight	Strategy 1		Strategy 2		Strategy 3		Strategy 4	
There is a lot of direction from extension workers to farmers	0.14	2	0.28	3	0.42	1	0.14	3	0.42
Weakness									
Market price uncertainty	0.33	3	0.99	2	0.66	4	0.132	3	0.33
Fertilizer that is difficult to obtain	0.14	2	0.28	2	0.28	2	0.28	3	0.42
Some farmers have not followed the direction of extension agent	0.14	2	0.28	3	0.42	1	0.14	2	0.28
There is no patented corn peeling machine	0.14	2	0.28	3	0.42	3	0.42	2	0.28
Not yet the existence of cooperative that accommodates the results of production from corn farming	0.33	1	0.33	1	0.33	2	0.66	2	0.66
Opportunity									
The development of agricultural technology	0.64	4	0.256	3	0.192	4	0.256	4	0.256
Support from the local government regarding with corn farming	0.39	3	0.117	3	0.117	3	0.117	2	0.78
Increased market demand associated with business corn farming	0.18	2	0.36	3	0.54	4	0.72	2	0.36
Affordable facilities and infrastructure	0.39	3	0.117	4	0.156	2	0.78	2	0.78
Farmers' understanding of crops corn	0.18	2	0.36	1	0.18	2	0.36	2	0.36
Threat									
Unfavorable weather that makes production decline	0.39	3	0.117	2	0.78	3	0.117	3	0.117
There are many corn producers so the price of corn easy to be played by middlemen	0.18	2	0.36	3	0.54	2	0.36	2	0.36
Less supportive transportation	0.18	2	0.36	2	0.36	3	0.54	2	0.36
The presence of pests that attack plants corn	0.18	2	0.36	1	0.18	2	0.36	2	0.36
STAS	1.465	1.408	1.604	1.502	1.465	1.408	1.604	1.502	
Priority	3	4	1	2	3	4	1	2	

Conclusion

Based on the results of research on the potential for increasing maize production in Palolo District, Sigi Regency, Central Sulawesi Province, the following conclusions as follows: Maize production in Palolo District, Sigi Regency, Central Sulawesi Province has the potential to increase production by maximizing the internal and external supporting factors available to further optimize agricultural technology, increase maize production, hone farmers' skills, develop more legowo planting systems, use superior seeds, increase the amount of transportation and so that farmers can follow what the extension agent directs related to maize farming. Based on the results of the study, it shows that the best alternative strategy in increasing corn production in Palolo district, Sigi Regency is "Increasing production by using superior seeds that are resistant to erratic weather changes and adopting the direction of extension workers by cultivating corn crops using the jajar legowo planting system in order to increase corn production".

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Author Contributions

Conceptualization; methodology; validation; formal analysis; M. Y.; investigation; resources; data curation; H. N.; writing – original draft preparation; writing – review and editing; H. I.; visualization: M. Y. All authors have read and approved the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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