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ANALYSIS OF TOMATO FARMER INCOME INCREASING STRATEGIES IN KARO DISTRICT, INDONESIA

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Abstract:
The income of tomato farmers in Karo Regency has decreased due to internal and external factors in tomato farming. This study aims to identify internal factors consisting of the strengths and weaknesses of tomato farmers in Karo Regency and external factors that can be used as opportunities and threats for tomato farmers in Karo Regency, so as to formulate appropriate strategies to increase the income of tomato farmers in Karo Regency. The research method uses SWOT analysis and QSPM to analyze strategies to increase the income of tomato farmers in Karo Regency. The results show that the internal factors that become strengths in increasing the income of tomato farmers are having regular customers, extensive cultivation land, available human resources, experienced farmers, fertile land and for weaknesses in internal factors, namely low-educated workforce, the practice of seeds counterfeit, low technological adaptation, limited capital, lack of initiative in seeking market information, using simple equipment. Factors that become opportunities in increasing the income of tomato farmers are increased demand for tomatoes, product diversification, support from extension agents and agricultural services, broad consumers from all segments, favorable natural conditions. Some others include declining tomatoes, pest and disease attacks and unstable seasonal changes. Alternative strategies in increasing the income of tomato farmers in Karo Regency are adding business to farmer households, optimizing existing potential, providing training, improving the quality of human resources, increasing production, increasing post-harvest processing, reducing production costs, supporting ICT (Information and Communication Technology) growth, provide capital loans, and maintain the quality of tomatoes.

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1. Introduction

Indonesia has a variety of horticultural commodities, one of which is tomatoes. North Sumatra is a region that is quite extensive for the agricultural sector, especially tomato production. Although Karo Regency is a tomato producer, but the income of farmers in Karo Regency is still relatively low, along with the average data on the income of tomato farmers once harvesting in Karo Regency from 2018-2022. (BPS, 2022).

Table 1: Tomato Farmers Revenue Table in Karo Regency in 2018-2022

Year	Income (Rp)	Percentage (%)
2018	30.000.000	3.2
2019	33.000.000	2.5
2020	25.500.000	2.4
2021	25.000.000	2.3
2022	23.750.000	2.1
Average	**26.950.000**	**3.1**

The majority of farmers in the research area still have not reached income in accordance with the needs of the family for one harvest season seen in the table showing the income of farmers decreased every year or the average assessment decreased by 3.1 %. Therefore, the researcher conducted a research analysis to determine the right strategy for farmers, by first looking at the internal and external problems of farmers in the field. This is as to produce the most appropriate strategy to increase the income of tomato farmers in Karo Regency.

2. Method

The study was conducted for 3 months from 23 February 2023 to 23 May 2023 in Karo Regency which has 17 districts. The research method used is a quantitative descriptive method. The sampling technique uses saturated sample techniques where all members of the population are used as samples, namely as many as 120 farmers. Sources and types of data used in this study are primary and secondary data.

Data collection techniques in the study were carried out by observation, namely direct observation and semi-structured interviews with farmers, farmer group administrators, and extension workers, using the questionnaire that had been prepared, then conducted FGD. Focus Group Discussion (FGD), which is a qualitative data collection technique, involves many people discussing a topic of the problem and is directed by a facilitator (Paramita & Kristiana, 2013). The data analysis technique used is quantitative descriptive. Quantitative analysis is obtained from the farming analysis, with the study of how a farmer coordinates and organizes the factors of production as efficiently and as effectively as possible so that later it can provide benefits for farmers (Suratiyah, 2015). Followed by a SWOT analysis by identifying various factors

systematically to formulate company strategies using the IFE and EFE matrix to determine the strategies used (Rangkuti, 2018). This research also uses QSPM (Quantitative Strategy Planning Matrix) analysis, which is a technique for identifying alternative strategies that are appropriate or the best for company conditions (Febrianti and Susan, 2014).

3. Results and Discussion

3.1 Tomato farming in Karo Regency

Tomato farming in Karo Regency is one of the businesses in the field of agriculture by farmers to be used as a source of household income. Tomato farming can be said to be successful if the main objective of the farm can be achieved, namely the income is greater than the costs incurred during the farm. Income is an income obtained by farmers in a certain period of time.

Revenue is the result of a profit between the amount of revenue and the total cost of the total incurred by the farmers. While revenue is the result of the multiplication between the amount of tomato production and the selling price of tomatoes. Based on the results of the analysis of the Tomato farming that is carried out with 120 farmers in one harvest, an average of 8,190 kilograms with an average price of Rp. 3,460 per kilogram so the average amount of revenue obtained by tomato farmers during the harvest period is 30,849,375 with an average cost incurred Rp. 19,629,185 so the average revenue is Rp 11,220,190 during the harvest season. The results showed that the average income of farmers in Karo Regency had decreased from 2022 of Rp. 23,750,000/harvest season to Rp. 11.220.190/harvest season, so that the farming analysis can be concluded that the appropriate strategy is needed to increase the income of tomato farmers in Karo Regency by using SWOT analysis and QSPM analysis.

3.2 SWOT analysis

This study uses SWOT analysis to determine the right strategy for increasing the income of tomato farmers in Karo Regency by looking at the internal and external factors of tomato farmers in Karo Regency. Data processed by SWOT analysis is primary data obtained from the results of direct interviews with farmers using the questionnaire and the results of data processing using SWOT analysis.

3.2.1 Description of internal factors

A. Strength

a. Have a regular customer

One important component in farming is customers or consumers. According to Daryanto and Setyobudi (2014), customers are people whose activities buy and use a product both goods and services unremittingly. Consumers will become permanent of a business means that the consumer is confident and believes in the products offered so as to bring benefits and sources of routine income. Respondent farmers in Karo Regency already

have regular customers such as traders in the Berastagi Market, Kabanjahe and Market in every district and village.

b. Available resources

Human resources are available to both young farmers and old farmers in carrying out tomato farming by utilizing the potential that exists in human resources will be able to build a better agricultural field.

c. Extensive cultivation land

Agricultural land is a determining factor in the influence of agricultural commodity production. In general, the more area of land used, the greater the amount of production produced by the land. In 2023 in Karo Regency the area of tomato plants was approximately 100 ha.

d. Experienced farmers

Experience in farming-related activities has an influence on the results of farming production. Farmers, who have more experience, will be wiser in determining the production period, the use of *saprodies*, and processing systems. Farmers in the village of Karo Regency have possessed experience for 5-25 years, thus this is strength of farmers in cultivating tomato plants well and quality.

e. Fertile land

Fertility Tomato cultivation is very important, namely a Karo plant cultivation land is proven to have a good level of fertility. It is with the ability or quality of soil that provides plant nutrients in sufficient quantities of plants, in the form of compounds that can be utilized by plants and in balance which is suitable for the growth of tomato plants supported by other growth factors. Fertile land has the potential to utilize the Tumpeng Sari system for tomato farming.

B. Weakness

a. Low-educated labor

The number of farmers who have a lower secondary education level shows the relatively low level of education of farmers. This is because managing agricultural land requires applied skills; the level of education will allow farmers to have differences in insight, ways of thinking and differences in speed in understanding and receiving new things or new innovations. This is aligining to Fachrista and Sarwendah (2014) who stated in their research that the level of education has a significant effect on adoption.

a. The existence of a fake seed practice by farmers

Plant seeds is crucial determine the advantages of an agricultural commodity. Superior seeds are usually resistant to disease and the results are of high quality compared to other commodities so that the results can compete in the market, but superior seeds themselves are one of the weaknesses of tomato farming in Karo Regency because many farmers are

difficult to get superior seeds. The number of practices for making fake seeds that is synonymous in the market makes it difficult for some farmers to get superior seeds because they get fake seeds that have low quality so as to reduce the quality of tomato plants when harvested.

c. Low technology adaptation

Technology in the modern era is needed for a variety of things. The use of technology can create handling of plants to be more efficiently treated. The technology used directly by tomato farmers can be said to be inadequate because farmers still use simple technology in the farming that is carried out, for example, the use of sculpture technology that is carried out for a long time by some farmers. They do not all perform this because exercise technology requires complete understanding and equipment for applying directly to tomato plants that are being developed.

d. Limited capital

The field farmers complain of limited capital as it is not proportional to the increase in production costs so the income produced by farmers is not proportional to the expenses spent in tomato farming. Farmers also complain because there is no assistance from the local government or farmer groups, even if there is one; this assistance is not properly distributed. So that the solution to a limited capital is that farmers takes credit from cooperatives or loans from banks, and of course interest is charged from the loan.

e. Lack of initiative in finding market information

One of the weaknesses of tomato farmers in Karo Regency is the lack of farmers' initiatives in finding market information so they can only sell crops in the market with lack of knowledge about market conditions well, especially macro conditions.

f. Using a simple tool

Equipment used by farmers in tomato cultivation is still very simple and traditional. The lack of use that is less than optimal affects the amount of tomato productivity, tomato quality and tomato growth resistance so that it is easily attacked by pests that can experience crop failure.

3.2.2 Description of internal factors

A. Opportunity

a. Increased increases

Market demand for tomatoes from year to year continues to increase the high demand for tomatoes and the number of consumers who need tomatoes, farmers do marketing out of large areas such as Medan, Aceh and Pekanbaru.

b. Product diversification

Diversification of tomato products can be seen from the case study of "Diversification of Tomato Based Processed Products in the Kambang Tanjung Farmers Group, Parigi Kacil

Village, Tapin Regency" by Lya Agustina, et al (2019) and can be concluded that to process the tomato commodity, this program has diversified the products offered is the processing of tomatoes into tomkur (date tomatoes), Krispi tomatoes and Pazto (core spices). The method to be carried out is to provide training and assistance to partners in product processing technology, packaging, packaging design, financial management and marketing. The result to be achieved is that partners can already produce processed tomato products, carry out marketing both conventionally and with social media and partners can already manage simple finances.

c. Support of Instructor and Agriculture Service

Instructors in Karo Regency are expected to be the prospect that can provide directions about the latest innovations in the world of farming tomatoes, farmers are also expected to be more rigorous in tomato agriculture so that the income of farmers continues to increase. The government takes a role in efforts to develop innovation and provide solutions to farmers particularly to the problems faced in a sustainable manner.

d. Extensive consumers of all segments

Tomato commodity consumers including a broad consumer segment, consumers who are involved in tomato commodities are consumers who do not divide a market into different buyer groups in consuming a product. This eventually provides an opportunity for farmers to determine strategies in increasing the income of tomato farmer's right so that they are finally able to maximize the turnover of farming.

e. Supporting natural conditions

Natural conditions in Karo Regency are one of the areas that have very good natural conditions in terms of horticultural cultivation, especially tomato commodities, so it has good prospects for tomato cultivation to be developed because it is very suitable in terms of its climate, weather and soil conditions.

B. Threat

a. Increase in input prices

The increase in input prices most felt by tomato farmers in Karo Regency is the price of fertilizer and seedlings, to overcome the impact of increasing the price of farming input that reduces the welfare of farmers' households for non-agricultural businesses.

b. Fluctuations in selling prices

The selling price of agricultural products always fluctuates depending on the changes that occur in demand and supply. The ups and downs of prices can occur in the short term, namely per month, per week even per day, or can also occur in the long run. In Karo Regency farmers complained about the current selling price of tomatoes below Rp.5,000 / kg, even to the point of touching Rp.2,500 / kg according to farmers if the selling price is below Rp. 5000/kg farmers do not experience profits and suffer losses. Therefore, it is hoped that the government can make a policy regarding the selling price of tomato

commodities to provide an appropriate selling price for tomato farmers so that the farm costs are incurred in accordance with the income received.

c. Tomatoes are easily damaged

Tomatoes are included in the commodity that is vulnerable to damage, so it needs to be considered from nurseries to post-harvest so that the quality of tomatoes can be maintained in the hands of consumers, but in the post-harvest process, especially the distribution of tomatoes, there is usually damage to quality, such as when the slow trader distributes to markets large and other obstacles that are plastic bags that are used as a place to transport tomatoes to be given to traders and the distance from the farmers' location is quite far. It sometimes makes tomatoes easily destroyed because the tomatoes are inserted by stacked in the basket without using a bulkhead. This will cause tomatoes to be in the most basic section of squashed and sometimes bony/rotten. This is what makes farmers lose money because it causes the number of tomatoes to decrease when reaching marketing.

d. Pest and disease attacks

In tomato plants, pests and diseases are one of the threats that need to be considered because with pests and diseases that attack tomatoes will reduce the quality of tomatoes themselves. It will cause a decrease in the income of tomato farmers due to many tomatoes that are rotten due to pest attacks. Pests that attack tomato plants in general in the form of tomato are caterpillars (Helicoverpa Armina Hubn.), Kebul Lice (Bemicia Tabaci Genn.) as well as Grayak caterpillars (Spodoptera Litura F.). Some diseases that attack tomato plants in the form of flour dew disease caused by fungi and there are several plants attacked by jaundice caused by the Gemini virus. Handling of pests and diseases can be done chemically, namely by being controlled using active ingredients.

e. Unstable season changes

Unstable season changes faced by farmers are uncertain weather conditions which can interfere with tomato plants so that the harvest is not optimal.

3.2.3 Internal and external factor matrix

The internal and external factor matrix is the process of identification between internal factors (strengths and weaknesses) and external factors (opportunities and threats), this matrix determines the score to see whether these factors are included in internal factors as strengths or weaknesses and external factors as opportunities and threats as presented in Table 2 and Table 3.

Table 2: Internal Factor Matrix

Internal Factor Matrix				
No.	**Strengths**	**Weight**	**Rating**	**Score**
1.	Have regular customers	0,11	2,45	0,28
2.	Wide cultivation land	0,09	2,02	0,19
3.	Available human resources	0,13	2,80	0,36
4.	Experienced farmers	0,11	2,31	0,24
5.	Fertile land	0,10	2,18	0,22
Subtotal		**0,54**	**11,8**	**1,28**
No.	**Weaknesses**	**Weight**	**Rating**	**Score**
1.	Low-educated workforce	0,07	1,49	0,10
2.	The practice of fake seeds carried out by farmers	0,06	1,38	0,09
3.	Low technological adaptation	0,07	1,63	0,12
4.	Limited capital	0,06	1,41	0,09
5.	Lack of initiative in finding market information	0,07	1,54	0,11
6.	Using simple equipment	0,06	1,25	0,07
7.	Low farmers' knowledge	0,06	1,35	0,08
Subtotal		**0,46**	**10,06**	**0,46**
Total		**1,00**	**21,86**	**1,95**

Table 3: External factor matrix

External factor matrix				
No.	**Opportunity**	**Weight**	**Rating**	**Score**
1.	Demand increases	0,14	2,61	0,37
2.	Product diversification	0,14	2,51	0,34
3.	Support of Extension Workers and Agriculture Service	0,13	2,32	0,29
4.	Broad consumers of all segments	0,11	2,08	0,24
5.	Supporting natural conditions	0,11	2,01	0,22
Subtotal		**0,63**	**11,52**	**1,47**
No.	**Threats**	**Weight**	**Rating**	**Score**
1.	Increase in input prices	0,07	1,37	0,10
2.	Selling price fluctuations	0,08	1,47	0,12
3.	Tomatoes are easily damaged	0,08	1,44	0,11
4.	Pest and disease attacks	0,07	1,26	0,09
5.	Unstable season changes	0,07	1,24	0,08
Subtotal		**0,37**	**6,78**	**0,50**
Total		**1**	**40**	**1,97**

The results of Table 2 indicate that the internal factor that produces the highest score in the strength factor is the many human resources which produce a score of 0.36 while the lowest score on the strength factor is the area of land which produces a score of 0.19.

Whereas the highest score weakness factor is inadequate technology in tomato farming by producing a score of 0.12 while the lowest score is simple farming equipment by producing a score of 0.07 total internal strategy matrix is 1.95.

Based on Table 3, the results of external factors can be seen that the external strategy matrix that produces the highest score on the chance factor is increasing tomato demand by producing a score of 0.37. While the lowest score on the opportunity factor is the agro-climate condition which is appropriate by producing a score of 0.22. Whereas the highest score threat factor is the increase in the price of input and fluctuations in the selling price of tomato production which produces a score of 0.12 while the lowest score on the threat factor is a season change that is not suitable for producing a score of 0.08. So, the total external matrix is 1.97.

3.3 SWOT matrix

From Table 1 and Table 2, it shows that the difference between internal strategic factors (forces) of 0.82 means that the influence of strength is greater than the effect of weaknesses on the increase in the production of Barangan tomato production in Karo Regency. This means that internal power factors such as the availability of human resources, the experience of farming can minimize the factors of internal weaknesses possessed.

The difference between external factors (opportunities) of 0.97 means that the influence of opportunities is greater than the effect of threats in increasing the income of tomato farmers in Karo Regency. This means that external opportunities such as tomato demand, product diversification, extension workers and agricultural service, the use of the pollen system and appropriate agro -climate conditions are able to minimize external threat factors that hinder the increase in the income of tomato farmers in Karo Regency.

The strategic position to increase the income of tomato farmers can be described in the SWOT analysis diagram with the strategic position shown by the coordinates (X, Y). The X value is obtained from the difference in internal factors (strengths - weakness) and the value of Y is obtained from the difference in external factors (opportunities - threats). From tables 2 and 3 is obtained the value of x> 0 which is 0.41 and the value of y> 0 is 0.48. The position of coordinates x and y can be seen in the following figure:

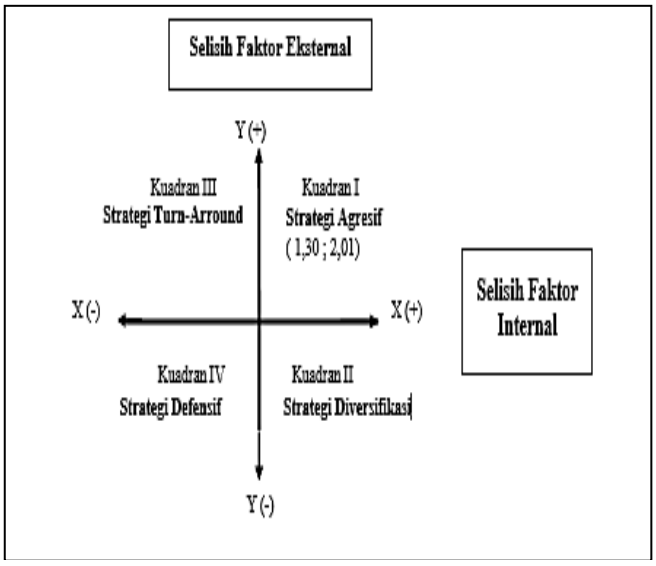

Figure 1: SWOT position matrix

Table 4: SWOT Matrix Strategy to Increase Tomato Farmers Revenue

	Strength (S)	**Weaknesses (W)**
	1) Have regular customers 2) Long cultivation land 3) Human resources are available 4) Farm experience 5) Fertile land	1) Low-educated labor 2) It's difficult to get superior seeds 3) Low technology adaptation 4) Limited capital 5) Lack of initiative in finding market information 6) Simple farming equipment
Opportunities (O)	**Strategy S-O**	**Strategy W-O**
1) Tomato's request increases 2) Product diversification 3) Success of extension workers and the Department of Agriculture 4) Extensive consumers of all segments 5) Appropriate agro-climate conditions	1) Add business in the farmers' household (S1, O1, O2, O4) 2) Optimizing the existing potential (S2, S3, S4, S5, O2, O5)	1) Provide training (W1, W3, O3) 2) Increasing the quality of HR (W1, W3, W5, O2, O3)
Treats (T)	**Strategy S-T**	**Strategy W-T**
1) First input price 2) Fluctuations in selling prices 3) Tomatoes are easily damaged 4) Attack of pests and diseases 5) Unstable season changes	1) Increase production (S1, S2, S3, T1, T2) 2) Increased post -harvest processing. (S4, T3, T4)	1) Reducing production costs (W4, T1, T2) 2) Supports the growth of ICT (Information and Communication Technology) (W3, W5, T1, T2) 3) Provide capital loans (W4, W6, T1, T2, T3, T4) 4) Maintaining the quality of tomatoes (W6, T3, T4)

4. Conclusion

The total farm revenue is Rp. 30,849,375/farmer planting season, for farming costs with an average of Rp. 19,628,185/ farmer planting season, net income or profit from tomato farming obtained by farmers is Rp. 11,220,190/farmers until the harvest season runs out. Internal factors that influence the strategy of increasing tomato farming revenue in Karo Regency are the most influential of strength, namely the availability of human resources and the highest weakness is the low technology adaption in the farming that is carried out, while regarding external factors that affect tomato farming from the highest opportunity, namely the demand for tomatoes is increasing and the highest threat is the increase in input prices accompanied by fluctuations in the selling price of tomato commodities.

The alternative strategy most prioritized for farmers is to optimize the existing potential. So that it is obtained in the expected analysis can be a priority alternative strategy to increase the income of tomato farmers in Karo Regency.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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