Farm analysis and development strategy of strawberry farming (case: Dolat Rayat District, Karo Regency)

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Abstract. This study aims to determine the farming management system, to analyse the income, feasibility, and development strategy of strawberry farming in Dolat Rayat District, Karo Regency. The analysis method used is the descriptive method, income analysis, feasibility analysis, and SWOT analysis. The results showed that the strawberry farming management system in the study area was not as recommended. The income of the strawberry farmer is IDR. 74,255,470 / Hectare / Year. Analysis results R/C Ratio is 2.296 > 1 so the strawberry farming is feasible to continue. Development strategies that can be applied to strawberry farming are increasing the availability of land and agro-climate, utilizing available labour and production inputs to increase production so that demand for strawberries increases and the market for strawberries widens then conducts training from the government and looks for support institutions for strawberry farming to increase experience and mastery of technology that can increase production results.

1. Introduction
Consumer demand for strawberries tends to increase from year to year. The higher absorption capacity of the market indicates that the strawberry agribusiness has bright prospects in the future. In countries with subtropical climates, the development of strawberry farming is used as one of the main sources of income for farmers. Along with the development of increasingly advanced agricultural science and technology, strawberries are now receiving attention in their development in the tropics including Indonesia.

Indonesian strawberry production in 2014 reached 58,884 tons, in 2015 it reached 31,801 tons and in 2016 it reached 12,091 tons. This shows that the production of strawberries in Indonesia has decreased from 2014 to 2016 [1]. Efforts to increase strawberry farming can be carried out by expanding the planting area and increasing productivity, efforts to develop strawberries also require increased production efficiency, strengthening farmer institutions, improving product quality, increasing added value, improving market access, developing joint business units, improving the capital system, developing infrastructure [2], as well as arrangements for trade arrangements and business incentives. Based on the background that has been described, the authors are interested in researching "Farming Analysis and strawberry development strategies".
2. Research methods

2.1 Strawberry farming and marketing management system
The data analysis used was descriptive analysis by explaining the strawberries cultivation pattern to product marketing.

2.2 Farmers income analysis
Farm income formula is:

\[ I = TR - TC \]  

Information:
I = Income  
TR = Total Receipts  
TC = Total Cost \[3\]

2.3 Farm feasibility analysis
R/C Ratio is the abbreviation of return cost ratio, otherwise known as the ratio between revenue and costs. Mathematically it can be written as follows:

\[ A = \frac{R}{C} \]  

\[ R = P_y \times Y \]  

\[ C = FC + VC \]  

\[ A = \left\{ \frac{(P_y \times Y)}{(FC + VC)} \right\} \]

Information:
R = Revenue  
C = Cost  
P_y = Output Price  
Y = Total Output  
FC = Fixed cost  
VC = Variable cost

With the following conditions:
If R/C > 1 then the farming is feasible to be implemented  
If R/C = 1 then equal  
If R/C < 1 then it is not feasible to be implemented \[4\].

2.4 Analysis of the strawberry farming development strategy
The SWOT analysis tool is used (strength, weakness, opportunity, and threat). The analysis is implemented by determining the elements of strengths, weaknesses, opportunities, and threats. All elements will be given a rating and weights. Furthermore, the research process between rating and weights is implemented, and the score of all elements of strength, weakness, opportunity, and threat is calculated. Thus, it will be able to determine the conclusion of the SWOT analysis their Ratings for all elements of strengths, weaknesses, opportunities, and challenges are carried out with a rating value.
3. Results and discussion

3.1 Strawberry farming and marketing management system in Dolat Rayat District, Karo Regency, North Sumatra Province

The strawberry farming management system in the study area includes land preparation, planting, weeding, pruning, pest and disease control, fertilizing, and harvesting then marketing the strawberries.

3.1.1. Land preparation. Before planting, the land to be used must be cleared of weeds first, then digging and forming the beds and applying manure with a width of 1 meter and a length that is adjusted to the size of the land. After the formation of the soil beds, they will be covered with plastic mulch.

3.1.2. Planting. Before planting, strawberry seedlings were obtained from the stolon process for 1 month, then after the formation of the roots were transferred to the holes made in the mulch as a planting medium.

3.1.3. Weeding. Weeding is done approximately once a month depending on the speed of weed growth. Weeding is done because in general, the strawberry plants cannot stand to compete with weeds. Usually, weed cleaning is done using a cutter knife so as not to damage the roots of the strawberry plant.

3.1.4. Pruning. Pruning is done when the strawberry plants are dense, exposed to a disease, or before fertilization is carried out so that the photosynthetic results are only absorbed by the good fruit and leaves.

3.1.5. Pest and disease control. Strawberries are plants that are susceptible to pests and diseases. So that control is carried out very often a week or two weeks according to what pests and diseases attack the plants.

3.1.6. Fertilizing. Fertilize the strawberry plants directly or dilute the fertilizer for one day. Fertilization is done once a month to three months.

3.1.7. Harvesting. Harvesting is done every day or two days once after the age of the plant is over 3 months after planting. Harvesting is usually done in the morning to avoid hot air that will damage the strawberries.

3.1.8. Marketing. For the marketing of strawberries in the research area, some consumers buy directly to the location as an agro-tourism site at a relatively higher price, but the risk of damage is higher because consumers pick themselves, and some are sold directly to collectors at a lower price, with the risk of damage is lower.

We can see that the Farm Management and Marketing System for Strawberries in Dolat Rayat District, Karo Regency, North Sumatra Province are not following the cultivation recommendations [4].

3.2 Strawberry farmers’ income analysis

Farmers income analysis calculated as follows:

\[ I = 131,572,337 - 57,316,867 = 74,255,470 \]  

(6)

So that the income of the strawberry farmers is obtained IDR. 74,255,470 /Hectare /Year.
3.3 Farm feasibility analysis
R/C Ratio is the abbreviation of return cost ratio, otherwise known as the ratio between revenue and costs. R/C Ratio can be calculated as follows:

\[
A = \frac{131,572.337}{57,316.867} = 2.296
\]  

(7)

With the following conditions:
If \( R/C > 1 \) then the farming is feasible to be implemented
If \( R/C = 1 \) then equal
If \( R/C < 1 \) then it is not feasible to be implemented

The results of the analysis show that the R/C value of strawberry farming in Dolat Rayat District is more than 1, namely 2.296, where everyone rupiah spent by strawberry farmers can generate revenue of 2.296 so that strawberry farming in Dolat Rayat District experiences profits and is feasible to continue.

3.4 Analysis of the strawberry farming development strategy

Table 1. Evaluation results of internal factors

| Internal Strategy Factors | Rating | Relative Weights | Score |
|---------------------------|--------|-----------------|-------|
| Strength                  |        |                 |       |
| 1. Land availability and agro-climate | 4.00   | 0.18            | 0.70  |
| 2. The experience of farmers in strawberry cultivation | 2.73   | 0.12            | 0.33  |
| 3. Sufficient labour availability | 4.00   | 0.18            | 0.70  |
| 4. Availability of production inputs | 3.93   | 0.17            | 0.68  |
| 5. Convenience in marketing products | 3.97   | 0.17            | 0.69  |
| Weakness                  |        |                 |       |
| 1. Total production of strawberries | 1.00   | 0.04            | 0.04  |
| 2. Strawberry farming land area | 2.07   | 0.09            | 0.19  |
| 3. Farmers' management of strawberry farming | 1.00   | 0.04            | 0.04  |

Source: Primary Data Processing, 2020

Table 2. Evaluation results of external factors

| External Strategy Factors | Rating | Relative Weights | Score |
|---------------------------|--------|-----------------|-------|
| Opportunity:              |        |                 |       |
| 1. Strawberry request     | 3.97   | 0.18            | 0.71  |
| 2. Strawberry quality     | 3.93   | 0.18            | 0.69  |
| 3. Transportation         | 3.97   | 0.18            | 0.71  |
| 4. Strawberry market      | 3.87   | 0.17            | 0.67  |
| Threat:                   |        |                 |       |
| 1. Government training    | 1.00   | 0.04            | 0.04  |
| 2. Price at the producer level | 2.03   | 0.09            | 0.19  |
| 3. Farming support institutions | 1.03   | 0.05            | 0.05  |
| 4. Workforce skills       | 2.43   | 0.11            | 0.27  |

Source: Primary Data Processing, 2020
Table 3. SWOT Matrix

| IFAS | Strengths | Weakness |
|------|-----------|----------|
|      | 1. Land availability and agro-climate | 1. Total Production of strawberries |
|      | 2. Farmer's Experience in Strawberry Farming | 2. Area of strawberry farming |
|      | 3. Availability of adequate labour | 3. Management of strawberry farming by farmers |
|      | 4. Availability of production inputs | |
|      | 5. Convenience in marketing strawberry products | |

| EFAS | (Opportunity) | Strategy S-O | Strategy W-O |
|------|---------------|--------------|--------------|
|      | 1. Strawberry request | Increase the availability of land and agroclimatic, utilize available labour and production inputs to increase production so that demand for strawberries increases, and the strawberry market becomes wider. (S1, S3, S4, O1, O4). | Carry out farm management and expand the land to increase production and maintain the quality of strawberries. (W1, W2, W3, O2). |
|      | 2. Strawberry quality | Taking advantage of the experience trying to improve the quality of strawberries so that consumers are more interested so that production can be sold easily with supported transportation. (S2, S5, O2, O3). | Carry out marketing management to increase demand for strawberries with the available transportation facilities (W3, O1, O3, O4). |
|      | 3. Transportation | |
|      | 4. Strawberry market | |

| Threats | Strategy S-T | Strategy W-T |
|---------|--------------|--------------|
| 1. Government training | Conducting training from the government and looking for supporting institutions for strawberry farming to gain experience and mastery of technology that can increase production. (S2, T1, T3). | Conduct training, make farm management and look for supporting institutions to increase production and quality so that prices at farmer level can increase. (W1, W3, S1, SS2, S3). |
| 2. Price at the producer level | Farming experience must be accompanied by the skills or training of available manpower so that the appropriate land and agro-climatic and available inputs can be utilized optimally and then can be used as capital in opening agro-tourism so that the price of strawberries at the producer level can increase. (S1, S2, S3, S4, S5, T3, T4). | Increasing the land area must be accompanied by improving the skills of the workforce in using technology so that the amount of strawberry production can increase. (W1, W2, S4). |
| 3. Farming support institutions | |
| 4. Workforce skills | |

Source: Primary Data Processing, 2020

Based on Table 3, after analysis by compiling strategic factors in the SWOT matrix, this matrix produces four possible strategic alternatives, namely the S-O strategy (Strengths-Opportunities), S-T strategy (Strengths-Threats), W-O strategy (Weakness-Opportunities), W-T strategy (Weakness-Threats). Several specific strategies can be implemented to increase the prospect of developing strawberry farming in the research area, namely:

1. Increasing the availability of land, utilizing available labour and production inputs to increase production so that the demand for strawberries increases and the strawberry market becomes wider. This strategy is based on the conditions of strawberry farming in Dolat Rayat District which has limited land, seen from the low total area of strawberries. Limited land and modest ability of farmers make it difficult to increase farm production, even though the demand for strawberries is getting higher and higher.
2. Conducting training from the government and looking for supporting institutions for strawberry farming to gain experience and mastery of technology that can increase production. The implementation of this strategy plays an important role in encouraging the development of strawberry farming. The low quality of human resources results in uneven yields, decreasing quality, and unable to create continuity of strawberries. Through training and information from supporting institutions, it is hoped that it can reach farmers so that they can improve the quality and quantity of strawberries.

4. Conclusions
The strawberry farming management system in the research area includes land preparation, planting, weeding, pruning, pest control, fertilization, harvesting, and marketing of strawberries that are not yet as recommended. The income of the strawberry farmer is IDR 74,255,470/Hectare/Year. Strawberry farming is feasible to continue. Development strategies that can be applied to strawberry farming are increasing the availability of land, utilizing available labour and production inputs to increase production so that demand for strawberries increases and the market for strawberries widens then conducts training from the government and looks for supporting institutions for strawberry farming to increase experience and mastery of technology that can increase production results.

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