Maximizing opportunities towards brown rice farming production

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Abstract. One of the efforts made by the government in meeting the community’s food needs is through the use of dry land as an agricultural area. Dryland is one of the resources that have great potential for agricultural development, especially fields that produce rice. This research was conducted in Paminggalang Village, Sendana Subdistrict, with the consideration of this area utilizing dry land as farmland for paddy fields. Information collected is in the form of internal factors consisting of the position of resources and farm performance. Then external factors include the social environment, economic environment, ecological environment, technological environment, and government policy. The analysis was carried out using the SWOT approach, which uses IFE calculations, EFE, IE matrix, SPACE matrix, and SWOT matrix. There are nine attributes of strength, five attributes of weakness, five attributes of opportunity, and three attributes of threat. IFE and EFE calculations showed that internal factors are the most dominant factor, with the strongest factor being the most dominant compared to weakness. The position of Oryza nivara paddy farming in Paminggalang Village in the IE matrix and the SPACE matrix are respectively in a place to guard and maintain and support aggressive strategies. The results showed that there are three strategies to capture available opportunities (S-O) that need to be maximized. Such as developing brown rice field rice products by optimizing available resources, maximizing the use of the land area as well as the number of inputs available to obtain good quality brown rice with higher selling prices and developing markets and market share.

1. Introduction
Rice planting in Indonesia is more dominant in wetlands (paddy fields). However, some regions in Indonesia are not potential for lowland rice. So that to meet the needs of the community for staple food, planting of paddy fields is carried out on dry land. West Sulawesi, is one of the provinces that develops paddy field agriculture. Harvested area and total paddy production in West Sulawesi Province in 2014 and 2015 can be seen in table 1.
Table 1. Harvest land area and total rice production in 2014 and 2015.

| Regency / City   | Harvest area (Ha) | Production (Ton) | Harvest area (Ha) | Production (Ton) |
|------------------|-------------------|------------------|-------------------|------------------|
| Majene           | 2,002             | 6,097            | 2,416             | 8,57             |
| Polman           | 3,085             | 10,946           | 1,689             | 7,144            |
| Mamasa           | 368               | 1,193            | 418               | 1,319            |
| Mamuju           | 1,284             | 4,095            | 1,026             | 2,699            |
| North Mamuju     | 110               | 349              | 47                | 135              |
| Center of Mamuju | 72                | 230              | 0                 | 0                |
| **Total**        | **6,921**         | **22,910**       | **5,596**         | **19,554**       |

Majene Regency is one of the areas producing paddy fields in West Sulawesi. Field rice production in Majene Regency is spread in five sub-districts from eight sub-districts. Sendana District is one of the districts that have the largest area of harvested rice, in 2017 the harvested area reached 639 hectares with a total production of 2,189 tons [1].

The rice fields produced in Sendana District consist of several varieties such as white rice, brown rice, and black rice. Brown rice is one group of grains that has many benefits for human health. Rice is a grain that is high in fiber with simple carbohydrates. Therefore, brown rice is perfect to be used as a healthy diet menu. Although brown rice has more benefits when compared to white rice, this rice is still less desirable by the people of Indonesia. This is due to the habit of people who always consume white rice as a staple food. Also, the high price of brown rice is one of the reasons for the lack of interest of the general public to make brown rice a staple food source so that brown rice is consumed more by the upper class.

The high price of brown rice and the amount of Oryza nivara (brown rice) paddy production in Sendana Subdistrict were unable to increase the income of the paddy farmers. The reality on the ground shows that farmers in Paminggalang Village generally consume their own harvested brown rice, only a small portion is sold to Polman District. Lack of knowledge of farmers about business opportunities and marketing of brown rice is one of the causes of low income levels. It is necessary to develop a commercial brown rice field rice farm by taking into account development strategies starting from the cultivation process to the marketing process and increase farmers' income. In determining the strategy, farmers are required to pay attention to external and internal factors that are related [2–4].

Therefore, there is a need for farm development strategies that can be applied with the aim of increasing farmers' income and welfare. This development strategy can be formulated based on a SWOT analysis of internal factors including strengths and weaknesses, and external factors include opportunities and challenges.

There is a previous study that is used as a reference. One of that was conducted by Aji et. Al [5] with the title strategy of developing rice commodity agribusiness in improving food security in Jember Regency. The results of this study indicate that farmer motivation is the main force possessed by the government of Jember Regency. The main weakness that must be corrected is a weak financial condition. The main opportunity is an increasing demand for rice and the main threat is in the form of attack by plant pests. Alternative strategies that can be carried out by the government include, intensification of rice farming, a synergy between farmers, entrepreneurs, and the government, strengthening regional food policies in favor of farmers, revitalizing facilities and infrastructure and product differentiation. The strategy that became the main priority in this study was the strategy of intensification of rice farming.
2. Methods
Data collected through interviews using a questionnaire. The type of primary data collected is in the form of internal factors consisting of the position of resources and farm performance. While external factors include the social environment, economic environment, ecological environment, technological environment, and government policy. Secondary data in the form of statistical data from the central statistical body, reports on research results of universities and research institutions, and from other literature sources and internet media. This research was analyzed using the SWOT approach.

SWOT analysis is used as an analysis tool to develop Oryza nivara rice farming in Paminggalang Village, Sendana Regency, first analyzed to determine internal and external factors of agricultural methods that are analyzed using IFE and EFE by looking at data obtained from informants related to internal factors, namely the position of resources and agricultural performance. Also, data on external factors consisting of social, environmental, economic, ecological, technological and government policies are used.

Formulation of internal and external factors is obtained from in-depth interviews with each informant, both the main informant and key informants. The results of the interview produced several attributes of each of the strengths, weaknesses, opportunities, and threats. The next step is to quantify weights and scores of each of the attributes that have been previously identified. The weighting of each factor ranges from 0.0 (not important) to 1.0 (all important) to 1.0 (all important). The factors considered to have the greatest influence on organizational performance must be given the highest weighting. The sum of all weights must be equal to 1.0. Rating 1 to 4 on each factor to indicate whether the factor is very weak (rank = 1), weak (rank = 2), strong (rank = 3), or very strong (rank = 4). Strength must be ranked 3 or 4 and weakness must be ranked 1 or 2. The final step is to multiply the weight and rating.

After that, the position of Oryza nivara field rice farming in Paminggalang Village will be identified in the internal-external matrix (IE) to determine the decision making steps for the development strategy. This matrix will be divided into three regions, namely, regions covering cells I, II, and IV, namely the position of grow and build with appropriate strategies, namely intensive strategy, areas covering cells III, V, VII namely the hold and maintain position with penetration strategies market and product development, as well as areas including cells VI, VIII, IX, namely the harvest and divest position (Ermayani, Hubeis & Sarma 2010). The next step is to create a Strategic Position and Action Evaluation (SPACE) matrix and SWOT matrix [6].

3. Results and discussion

3.1. General description of farming rice farm.
Paminggalang Village is a plateau region, with altitude reaching 800 meters above sea level, red and yellow mediterian soil types. Field rice farming in Paminggalang Village is carried out from generation to generation using local varieties. The process of cultivating paddy fields in Paminggalang Village consists of the process of land clearing, planting, maintaining, harvesting and post-harvesting. Field rice farming in Paminggalang Village, produces several types of varieties, such as white rice, brown rice and black sticky rice.

3.2. Identification of internal and external factor attributes.
Internal and external factors that were identified based on the results of in-depth interviews by looking at the position of resources and farm performance owned by Informants in Paminggalang Village were obtained by several attributes namely nine strength attributes, five weakness attributes, five opportunity attributes, and three threat attributes.
a. Strength
The strength of Oryza nivara rice farming in Paminggalang Village is experienced brown rice farmers, productive farmers age, farmers begin to settle on one land, allocation of land planted with brown rice is wider than white rice, the cooperation system is still powerful, the land planted is suitable for brown rice, using local varieties, good quality brown rice, and guaranteed seed availability.

b. Weakness
The disadvantages of Oryza nivara field rice farming in Paminggalang Village are the low level of farmer education, farming equipment is still simple, relatively long planting waiting periods, sales based on orders, and relatively small increases in production.

c. Opportunity
The opportunity attribute possessed by Oryza nivara field rice farming in Paminggalang Village is the high interest of farmers in cultivating brown rice, the selling price of brown rice is relatively higher compared to white rice, the demand for brown rice is increasing, there is help/support from the regional government.

d. Threat
The threat attributes possessed by Oryza nivara field rice farming in Paminggalang Village are the absence of financial institutions that support, the existence of substitute products, as well as the weather and climate, are uncertain. The results of the evaluation of IFE and EFE are presented in table 3 and table 4.

| Internal strategy factors                      | Weight | Rating | Value |
|-----------------------------------------------|--------|--------|-------|
|_strength                                      |        |        |       |
| Experienced patani                           | 0.06   | 4      | 0.24  |
| The age of the farmer is still productive     | 0.06   | 3      | 0.18  |
| An agricultural system that began to settle   | 0.10   | 3      | 0.30  |
| The land planted is wider than white rice     | 0.06   | 4      | 0.24  |
| Mutual cooperation system                    | 0.07   | 3      | 0.21  |
| The planted land is suitable for brown rice   | 0.09   | 4      | 0.36  |
| cultivation                                   |        |        |       |
| Using local varieties of seeds                | 0.09   | 3      | 0.27  |
| Good quality brown rice                       | 0.07   | 3      | 0.21  |
| Total strength                                | 0.69   |        | 2.22  |

| Weakness                                      |        |        |       |
| Low education level                           | 0.06   | 2      | 0.12  |
| Simple farming equipment                      | 0.05   | 1      | 0.05  |
| The waiting period for planting is relatively long | 0.06   | 2      | 0.12  |
| Sales by order                                | 0.07   | 3      | 0.21  |
| The increase in production is relatively small| 0.07   | 2      | 0.14  |
| Total weaknesses                              | 0.31   |        | 0.64  |
| Total                                         | 1.00   |        | 2.86  |
### Table 3. External Factor Evaluation results (EFE)

| External strategy factors | Weight | Rating | Value |
|---------------------------|--------|--------|-------|
| The high interest of farmers in the cultivation of brown rice fields | 0.10   | 4      | 0.40  |
| The selling price of brown rice is high | 0.15   | 2      | 0.30  |
| Village government support | 0.10   | 2      | 0.20  |
| Demand for brown rice increases | 0.15   | 2      | 0.30  |
| Assistance from the regional government | 0.10   | 2      | 0.20  |
| Total opportunities | 0.60   |        | 1.40  |
| Lack of a supporting financial institution | 0.10   | 1      | 0.10  |
| Substitution products | 0.15   | 2      | 0.30  |
| Uncertain weather and climate | 0.15   | 2      | 0.30  |
| Total threats | 0.40   |        | 0.70  |
| Total | 1.00   |        | 2.10  |

The results of the evaluation of internal and external factors in Oryza nivara field rice farming in Paminggalang Village are currently in quadrant V. This score is shown by the IE matrix (2.86;2.10). Hold and hold). In this position, Farming is in a condition that indicates a moderate internal and external position, so Paminggalang Village needs efforts to increase farm sales. IE Matrix Position is presented in figure 1.

### TOTAL SCORE IFAS

| IFAS 2.86 | Strong (3.0-4.0) | Medium (2.0-2.99) | Weak (1.0-1.99) |
|-----------|------------------|------------------|-----------------|
| I         | II               | III              |
| IV        | V                | VI               |
| VII       | VIII             | IX               |

**Figure 1.** IE Matrix of oryza nivara rice farming in Paminggalang Village.

The position of Paminggalang Village as the center of rice production in the brown rice fields in the Majene Regency is supported by the results of the SPACE matrix which shows that the Oryza nivara Rice Farming in Paminggalang Village is in the first quadrant. The strategic position that needs to be taken to develop as a national onion production center is an aggressive strategy by maximizing all the power it has to seize available opportunities (SO).
Based on the IE matrix and the SPACE matrix, the results show that the strategies taken by farmers in Paminggalang Village to develop their farms are a guard and maintain procedures also support aggressive strategy. This strategy is made based on the way of farming considerations, namely by utilizing all the power to seize and take advantage of maximum opportunities. SO strategies that can be pursued by the brown rice field rice farming in Paminggalang Village, namely: a) Developing brown rice field rice products by optimizing existing resources. b) Maximizing the use of the land area and the amount of input available to obtain good quality brown rice at a higher selling price. c) Develop markets and market shares.

| Internal | External |
|----------|----------|
| **Strengths** | **Weakness** |
| S-1 Experienced farmer  
S-2 Farmer's age is still productive  
S-3 Farmers begin to settle  
S-4 The land planted with brown rice fields is wider than white rice  
S-5 Workers use the mutual cooperation system  
S-6 The land planted is suitable for brown rice  
S-7 Local variety seeds  
S-8 Good quality brown rice  
S-9 The availability of brown rice seeds is guaranteed | W-1 Low education level  
W-2 Equipment is still simple  
W-3 The waiting period before planting is relatively long  
W-4 still uses the scatter planting system  
W-5 sales based on order  
W-6 increased production is relatively small |

| Opportunity | S-O Strategy | W-O Strategy |
|-------------|--------------|--------------|
| O-1 The high interest of farmers in the cultivation of brown rice fields  
O-2 The selling price of brown rice is high  
O-3 Availability of village government support  
O-4 Brown rice demand increases  
O-5 Availability of fertilizer and seed assistance | SO-1 Developing brown rice field rice products by optimizing available resources (S1, S2, S3, S5, S6, S7, O1, O5)  
SO-2 optimizes land use and the amount of input available to obtain good quality brown rice at higher selling prices (S4, S6, S9, O5)  
SO-3 Developing markets and market share (S8, O2, O4) | WO-1 Improving the quality of human resources and supporting staff through training. (W1, W2, W4, W6, O1)  
WO-2 Conduct advertisements/promotions specifically introducing brown rice field rice products originating from the study area so that the product is known both inside or outside the region (W5, O2, O3, O4) |

| Threats | S-T Strategy | W-T Strategy |
|---------|--------------|--------------|
| T-1 There is no supporting financial institution yet  
T-2 Substitution products  
T-3 Erratic weather and climate | ST-1 Increases the quality of brown rice optimally and creates stable prices to produce products ready to compete in the market. (S4, S5, S6, T2, T3) | WT-1 Coordinates each farmer to improve the quality of human resources in developing brown rice (W3, W4, T2,) |

**Figure 2.** SWOT Matrix of brown rice farming.
The strategy of developing brown rice field rice products by utilizing available resources is supported by government efforts, especially the agriculture service, to provide inputs for production facilities in the form of fertilizers and superior seeds. Field rice products such as brown rice need to be developed to support the improvement of farming quality in terms of outcomes. Strategy to optimize the use of the land area and the number of available inputs to obtain good quality brown rice at a higher selling price. This strategy is used because it looks at the opportunities possessed by brown rice products namely high selling prices and sizable demands, as well as the strength of agriculture that has sufficient land area to be used as cultivated land. Strategies To develop markets and market share. This strategy is based on the weakness of the agricultural business, namely sales, which are only based on existing orders. Brown rice products in Paminggalang Village are exclusively marketed around the Sendana Regency and a small part of Polman Regency. A limited market share results in a low level of product sales; therefore, this strategy is expected to contribute to increasing farmers' incomes.

4. Conclusion
The development strategy of appropriate paddy farming to be implemented in Paminggalang Village is an aggressive strategy, namely a) Developing brown rice paddy products with the optimization of available resources, b) Optimizing the use of land area and the amount of input available to obtain good quality brown rice at a higher selling price, c) Develop markets and market shares.

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