Institutional Characteristics of Supporting Potato Farming in South Sulawesi

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Abstract. Potatoes are one of the commodities that have been prioritized for development which considered as a source of carbohydrates, highly nutritious and have the potential for food diversification. In this case the institutional activities of potato farmers may contribute to support their agribusiness aspects. The purpose of the study was to analyze the feasibility of potato farming as well as to characterize the farmer institutions. Data collection was carried out through FGD (Focus Group Discussion) with 25 respondents of potato farmer group members and secondary data as supporting data. The survey was conducted in 2017 in South Sulawesi Province. Data were analyzed descriptively and R/C ratio was measured to determine the potato farming feasibility. The results showed that potato farming was feasible economically. The farmers were mostly active in supporting institutional activities, including group meeting activities, paying fees and extension activities.

1. Introduction

The horticulture sub-sector in agricultural development is a strategic position. Horticulture's contribution to agricultural development continues to increase as reflected in several growth indicators, including Gross Domestic Product (GDP), export volume of horticulture, labor absorption, Farmer Exchange Rate, nutrition and aesthetics. According to [1], the strategic role of the horticulture sub-sector can still be improved due to the high diversity of horticultural genetic resources (SDG), large land area, abundant human resources, and a conducive agro-climate.

Apart from being a center for rice production in Eastern Indonesia, South Sulawesi also produces vegetables including tomatoes, potatoes, cabbage and mustard greens. Potatoes are a plant that is cultivated intensively, especially in highland areas, one of which is Gowa Regency. Potato farming in the Gowa area requires relatively high organic matter, which is around 10-30 tonnes/ha. Potato farmers still feel the need for large enough inputs, both organic materials and energy. Thus, farmers only use small amounts of organic fertilizers, even not using fertilizers at all [2]. Potato production centers in South Sulawesi Province are located in 4 districts, including the regencies of Gowa, Bantaeng, Enrekang and Tana Toraja, where Gowa district ranks as the largest potato producer with an area of about 6.9 thousand hectares per year. The largest contribution of potato production to total production is Gowa Regency at 50%, followed by Bantaeng Regency 34%, Enrekang Regency 8% and Tana Toraja Regency and other districts only 4% [3].
Potato (*Solanum tuberosum* L.) is one of the vegetable crops that gets priority in development, because potatoes are considered to have high competitiveness compared to other vegetables. The demand for potatoes in Indonesia is increasing, both as a fresh product and as a processed product. In addition, the position of potatoes as food for the future is increasingly important, because they can be used as vegetables and for diversification of carbohydrate sources that substitute rice and are a reliable source of food security [4]. Potato is well adaptive under varieties of soil, even under saline stress, especially treated with suitable combination of fertilizers [5].

According to [6], the production, acreage and productivity of potatoes in Indonesia from 2014 to 2017 have always fluctuated. In 2014, a land area of 76,291 ha resulted in a production of 1,347,815.1 tonnes with a productivity of 17.66 tonnes/ha. In 2015, the land area of 66,983 ha resulted in a production of 1,219,269.7 tonnes with a productivity of 18.20 tonnes/ha. In 2016, the land area of 66,450 ha resulted in a production of 1,213,038.4 tonnes with a productivity of 18.25 tonnes/ha. In 2017, the land area of 76,611 ha resulted in a production of 1,164,738.1 tonnes with a productivity of 15.40 tonnes/ha. According to General Hortikultura (2018), production, acreage and productivity of potatoes in Indonesia from 2014 - 2017 always fluctuated. In 2014 the land area of 76,291 ha resulted in a production of 1,347,815.1 tonnes with a productivity of 17.66 tonnes/ha. In 2015, the land area of 66,983 ha resulted in a production of 1,219,269.7 tonnes with a productivity of 18.20 tonnes/ha. In 2016 the land area of 66,450 ha resulted in a production of 1,213,038.4 tonnes with a productivity of 18.25 tonnes/ha. Meanwhile, in 2017 the land area of 76,611 ha can produce a production of 1,164,738.1 tonnes with a productivity of 15.40 tonnes/ha.

In agricultural development, the farming community has an important role. Therefore, it is necessary to empower the farming community, so that the farmers are able to solve the problems faced in their farming activities. One of the government’s efforts for farming communities is to build farmer groups in rural areas. Farmer groups are farmers formed on the basis of common interests and similar environmental conditions (social, economic, resources), familiarity and harmony led by the chairman [7]. With the existence of farmers groups, the goal will be easier to achieve than individual farmers, because farmers can exchange experiences, knowledge and farming abilities to increase their productivity. This study aims to determine the feasibility of potato farming as well as to characterize the potato farmer institutions in South Sulawesi.

2. Methods

The research location was determined purposively at Patapang Village, Tinggi Moncong District, South Sulawesi Province, with the consideration that this place is a potato producer. Data collection was conducted through FGD (Focus Group Discussion) with 25 respondents and secondary data using data from BPS South Sulawesi in Figures and other supporting data. Data collection methods, using polymer data obtained from interviews, questionnaires, documentation, and secondary data obtained from library data. The research method used is descriptive analysis. The survey was conducted in 2017. Data were analyzed descriptively using R/C for farming feasibility tests.

3. Results and discussion

3.1. Institutional characteristic

Institutional characteristics of Mitra Bandenganja farmer group and several other farmer groups in Patapang Village, Tinggi Moncong District are farmer groups that are active in activities that support the institution, including actively participating in farmer group meetings, paying contribution for group needs, participating in extension programs and other activities that support the institution. The culture of mutual cooperation is still reflected in the people there.

| Activity            | Active (respondent) | Middle (respondent) | As needed (respondent) |
|---------------------|---------------------|---------------------|------------------------|
| Meeting activity    | 10                  | 7                   | 8                      |
| Farmer group saving | 16                  | 5                   | 4                      |
| Extension program   | 11                  | 8                   | 6                      |
3.2. Meeting activities
The meeting activities were carried out with the agreement of each farmer group according to the agreed agenda. The number of group meetings held by the farmer groups in Patapang Village was twice a month. The highest result with 10 respondents shows that respondents attend meetings regularly. Meanwhile, seven (7) respondents stated that sometimes this is because the respondent has other activities. There were eight (8) respondents who attended meetings as needed. The respondent was allegedly passive in conducting meeting activities.

3.3. Farmer group saving
Paying fees for the farmer group saving is an obligation for the farmer. This fee can be used as a loan fund if a member experiences difficulties, but the member is still obliged to repay the loan. 16 respondents have a high awareness of paying fees because they were considered that the fees will be used for their own interests as well. However, five respondents do pay dues sometimes; it is possible that the respondents in this category think this is not too important. Four respondents paid non-routine contributions, only as needed. The respondent may have other activities that involve making contributions as well.

3.4. Extension program
The extension program has several agendas, one of which is learning activities or non-formal education carried out by extension agents to farmers with the aim of providing information so that farmers can be independent in dealing with problems. This is consistent with the statement of [8] which states that there is a change in behavior among farmers who participate in extension activities because there will be more useful information for farmers, new skills, as well as stronger mental attitudes and motivation as expected. Extension activities are carried out twice per month. Eleven respondents routinely participate in extension programs because they consider this program very important and support institutional activities which are expected to be sustainable. Eight (8) respondents stated that they sometimes participate in extension programs, which generally depend on time availability. If the respondent has free time to take part in the extension program, the respondent will attend, and vice versa. Such respondents are not too serious in supporting these activities. There were six (6) respondents who participated in the extension program according to their needs, such respondents were considered respondents who had other activities.

3.5. Potato Farmer Performance
One of the potato production centers is in Gowa Regency, with a total potato production averaging 6.9 thousand tons per year. One of the potato production centers is in Tinggi Moncong District, Patapang Village. In this village there are 37 farmer groups working on horticultural crops. The horticultural crops commonly cultivated by farmers in Patapang Village are potatoes, cabbage, carrots, tomatoes and mustard greens. About 75 percent of farmers in this village cultivate potato crops with an average group area of around 20 hectares with a number of farmer members per group ranging from 20 to 25 people. The average area planted with potatoes per farmer ranges from 0.5 to 1 hectare. Potato plants are cultivated 2 times a year, first planted in March and harvesting in June, the second planting of potatoes is planted in July and harvest time around October. Farmers in this village have been cultivating potato crops for the past 20 years, with an average age of farmers ranged from 30 to 54 years.

Farmers in this village know the potato plant from farmers who come from West Java and live in this village. Until now, the potato seeds planted by farmers come from West Java. Through this intermediary farmer from West Java, they order a number of seeds that are needed; the potato seeds that are planted generally come from West Java Canning. After this sub-district became known as a center for potato production, the local government through the Agriculture Office helped increase community potato production.

3.6. Farming analysis
Prior the technology is adopted by the farmers, the technology have to be feasible either economically, technically and socio-culturally, because the technology is considered to provide more profitable income. Farmers are always faced with costs. [9] stated that there are three (3) ways to maximize farm income, namely: 1) technical efficiency, 2) input efficiency, and 3) production efficiency. Achieving high technical efficiency is very important to increase the competitiveness and profitability of farming. Profitable farming is also supported by environmental factors [10]. However, when the existing problems can be solved and the inputs are available and used properly, then the production and income can be optimized [11].

In principle, production costs are the sum of all costs (fixed costs and variable costs) that have been incurred to obtain production. Fixed costs that are calculated are the rental of land, equipment and other supporting materials. Meanwhile, variable costs include seeds, fertilizers, pesticides and labor.

Table 2. Analysis of potato crop farming using NPK 300 kg/ha + 0.15% HA/ha per planting season

| No | Detail | Volume | Price/unit (Rp) | Total (Rp) |
|----|--------|--------|----------------|------------|
| I. | Production Cost | | | |
| 1. | Potato seed | 1.500 Kg | 15.000 | 22.500.000 |
| 2. | Fertilizer | | | |
|   | NPK Super | 300 Kg + HA 0.15% | 2.800 | 840.000 |
| 3. | Pesticide | | | |
|   | Fungicide | 13 kg | 240.000 | 3.120.000 |
|   | Insecticide | 10 l | 260.000 | 2.600.000 |
|   | Total Input cost | | | 29.060.000 |
| II. | Labor Cost | | | |
| 1. | Soil Processing | 50 HOK | 30.000 | 1.500.000 |
| 2. | Planting | 60 HOK | 30.000 | 1.800.000 |
| 3. | Weeding I | 50 HOK | 30.000 | 1.500.000 |
| 4. | Weeding II | 50 HOK | 30.000 | 1.500.000 |
| 5. | Plant Pest Control | 40 HOK | 30.000 | 1.200.000 |
| 6. | Harvesting | 60 HOK | 30.000 | 1.800.000 |
| 7. | Transportation of Harvest | 16.506 Kg | 50 | 810.500 |
|   | Total labor cost | | | 10.125.333 |
| III. | Other cost | | | |
| 1. | Land Rent Per Season | | | 1.500.000 |
| 2. | Hand Sprayer | 2 pcs | 400.000 | 800.000 |
| 3. | Plastic Drum 200 l | 3 pcs | 60.000 | 180.000 |
| 4. | Sack | 200 pcs | 2.000 | 400.000 |
|   | Total other fees | | | 2.880.000 |
|   | Total production cost (I+II+III) | | | 42.065.333 |
| IV | Production/Revenue | 16.470 Kg | 7.000 | 115.546.672.44 |
| V | Income | | | 73.481.330.07 |
| VI | R/C ratio | | | 2.75 |

Source: analyzed primer data, 2017

Assumption:
- Potato seed tubers prices = IDR 15.000/kg
- NPK Super + HA 0.075 = IDR 2.600 /kg
- Consumption tubers prices = IDR 7.000/kg
- NPK Super + HA 0.15 = IDR 2.800/kg
- NPK Super = IDR 2.300/kg

According to the types of costs used, the production facilities and labor were the components of the highest cost, reached IDR 29.06 million and 10.1 million, respectively, and followed by other cost components of IDR 2.88 million. Then the total cost of potato farming is IDR 42.065 million per
hectare per planting season. In accordance with the treatment (NPK super 300 Kg / h + 0.15% HA) can produce high production which reached 16,506 kg/ha consisting of 1,351 kg of consumption potato and 15,154 kg of seed potato tubers. The current price of consumption potatoes is IDR 7,000, and the price of seed tubers is IDR 12,000. Thus with this production assumption, an income of IDR 181,848,000 can be obtained. If it is reduced by the total production costs, the net income received by the farmers is IDR 139,782,667. However, if all production is sold as consumption potatoes, the net income received by farmers is IDR 73,481,390.7. The results of potato farming analysis can be seen in Table 1. From the table, it can be seen that the R/C ratio analysis reaches 2.75 if the production is sold in the form of consumption potatoes. This illustrates that the treatment is assumed to be economically viable. Nevertheless, [12] revealed that the potato feasibility depends on differences in yield, N fertilizer source and dose, as well as the selling price. Besides cultivated in the field, potato are feasible to be cultivated aeroponically [13]. However, [14] stated that there are some major constraints on potato agribusiness which should be taken into account, namely price instability, high storages charges, uncertainty of water, inadequate marketing facility and spoilage of potato, even though the problems may varies by location.

4. Conclusion
The institution in Patapang Village is a group that is active in supporting institutional activities, including group meeting activities, paying fees and extension activities. The meeting activities carried out by the farmer groups are considered important to advance the group's institution. Paying dues is very beneficial for the group and for themselves because they can help personally when experiencing difficulties. Extension program Conducted so that farmer groups can learn from extension agents who demonstrate through extension programs, including demonstration plots and technical assistance activities.

Efforts to increase potato productivity should have strong support from the local government, including a commitment to always demonstrate technology for potato farming through a demonstration plot (demonstration plot). Demonstration activities must be carried out more frequently so that farmers are interested so that farmers can imitate it. Increased productivity in line with sustainable institutions, the farmer groups will always improve their standard of living. The increase in income has been seen with a profitable analysis of potato farming.

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