

## Feasibility Analysis of Organic Rice Cultivation Business in Semarang City

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### Abstract

This article describes how Benefit Cost (B/C) ratio, Return on Investment (ROI), Internal Rate Ratio (IRR), and Payback Period (PP) for organic rice cultivation in Semarang, Indonesia. The purpose of this study was to calculate the feasibility of organic rice cultivation and support the country's food security in providing healthy food. The study used a quantitative approach with a sample size of 20 organic rice farmers in Semarang. The variables studied include the amount of immersed investment, cash flow, total costs required and net income in one planting period. The data were collected through observation techniques, questionnaires, and interviews. The results showed that 10 farmers suffered losses so that the business was not feasible to continue because the ROI & IRR were at the level of -15% to -80%, PP was more than 1 year with the assumption of a reference interest rate of 3.5%. Meanwhile, the other 10 farmers have a decent business to continue because they get a profit of 6% to 168% per harvest with a maximum PP of 10 months. The biggest cost lies in the means of production, maintenance and product certification. The implication of this research is that the government should provide incentives or compensation for farmers who are just starting to practice organic cultivation and develop an integrated organic farming demonstration plot model so that it is possible for many people to learn how good organic farming practices are. This incentive can be supported by APBD funds or from other sources of funds, either in the form of venture funds, subsidies, exemption from certification fees, or livestock assistance.

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### 1. Introduction

The agricultural sector is one of the Semarang City Government's development programs that get priority. Although not too large, the agricultural sector contributes to the GRDP of Semarang City by 0.83% (BPS, 2018). The city of Semarang has a highland area and a lowland area. It has a population of 1,729,428 people, of which 45,815 people are recorded as

farmers. Within the framework of supporting the national food security program to provide healthy and nutritious food, as well as the "One Thousand Organic Farming Villages" program. Semarang City already has an organic rice agricultural land development program which is centered in Purwosari Village, Mijen District. The farmer groups involved in the development of the organic rice fields include the Sumber Rejeki Farmer

Group and the Lumintu Farmer Group with a total member of 20 people.

The area of organic rice farming managed by the SumberRejeki Farmer Group is 4.44 ha and the Lumintu Farmer Group is 6.28 ha. The development of organic rice land is pursued through the cultivation of varieties of Baroma, MentikSusu, INPARI 33, black rice and red rice. The duration of land use per production cycle ranges from 90 to 130 days, where each year it can be done 1-2 times the production cycle. The average productivity of organic agricultural land ranges from 6-7 tonnes per hectare, the yield is lower when compared to conventional farming systems (Amipurba & Widiatmi, 2018).

However, it is not easy to develop organic agriculture because it reorganizes indigenous agriculture into a political-economic system of agriculture that is integrated with the state and market, which dominantly controls all instruments ranging from local to national levels, even linking them to the global agricultural system (Aji & Ningrum, 2019).

The problems faced by farmers include are: first, related to human resources aspects. It is known that farmers have not implemented good business management. Second, there are some farmers who still use chemicals that are not allowed in cultivation activities in accordance with SNI 6729: 2016, on the other hand, the technical aspects of land irrigation are still joined by conventional rice fields. In the rainy season, several locations of organic rice fields are polluted by overflow of conventional irrigation rivers so that it becomes a problem for farmers to obtain organic certification. Several cases of organic certificate issuing institutions recommended farmers to repeat the land conversion process. In fact, the land conversion process requires a minimum of 1 (one) year or 2 (two) production cycles at a high cost, approximately 30 million rupiah.

Various regulatory instruments either made by the government or together with certain authorities such as SNI cannot be separated from the centralistic and generalization nature. Almost everything related to organic is regulated by the "central" which is very likely to ignore

the organic principle at the local (ecosystem) level. Organic agriculture tends to simplify the meaning of organic to the extent of the label, is more consumer-oriented rather than producer, complicated registration prioritizes administrative aspects, and provides access to legal organic business actors rather than farmer household units.

Through this regulatory instrument, the profile of organic agriculture in Indonesia appears to be directed by organic business actors who control legal entities such as large organic companies that control the organic market chain from farmers to consumers, not by small farmer household units. Data on certification bodies and business actors published by a number of institutions, including *Global Organic Trade* and *AOI*, at least shows the profile of organic agriculture in Indonesia which is dominated by private organic business actors and group-based business entities which also tend to be elite business activities (AOI, 2017)

There are several reasons why we have to leave conventional agricultural systems that are not environmentally friendly, namely: first,  $\pm 60\%$  of the livelihood of the rural population depends on agriculture; second, 31.2 million poor Indonesians mostly live in rural areas; third, the agricultural sector has the potential to create economic growth in rural areas; fourth, population increase requires food; and fifth, Indonesian farmers are still classified as small-scale farmers with an average land ownership area of 0.2 ha.

The purpose of this study was to calculate how much the costs and benefits arising from organic rice cultivation and to support the country's food security in providing healthy and nutritious food.

## 2. Literature Review

The meaning of organic agriculture as defined by *The International Federation of Organic Agriculture Movements (IFOAM)*, is the principle of health, the principle of ecology, the principle of fairness, and the principle of care (Freyer & Bingen, 2015). Organic agriculture is a holistic production management system to improve and develop the health of agro-ecosystems including

biodiversity, biological cycles and soil biological activities (BSN, 2016). Organic agriculture emphasizes the application of management practices that prioritize the use of inputs from cultivation activity waste, taking into account the adaptability to local conditions. Organic farming activities from an ecological perspective offer great potential in environmental sustainability (Lopes et al., 2011). The organic farming system starts from the implementation of land conversion, at this stage it becomes the key to the success of organic farming (Hokazono & Hayashi, 2012). The percentage of the suitability of the organic farming system implemented by the MekarTani Jaya Farmer Group with SNI 6729: 2016 is only 94 percent (%). The problems are variations in product quality, price fluctuations between farmer groups, and organic seeds are difficult to obtain (Subejo et al, 2019). Institutional support in the development of an organic farming system has an important role in every activity of each agribusiness subsystem. The existence of a farmer institution can motivate its members to adopt the new technology it receives. Several studies have shown that organic fertilizers play a role in improving physical, chemical and biological soil fertility. Empowerment of communities and farmer groups in the procurement of organic fertilizers can be carried out through training to make insitu organic fertilizers derived from composted livestock manure and crop residues, diversification of livestock-based agricultural businesses, and encouraging farmers to manage insitu organic materials. The use of organic fertilizers has been applied in organic farming systems and *rice of intensification* (SRI) systems (Hartatik et al., 2015).

## 2.1 Business Eligibility

Production activities are basically combining various inputs to produce outputs. The relationship between input and output is formulated by the production function:  $Q = f(K, L, M \dots\dots)$ , where Q represents the output during a certain period, K represents the use of capital during a certain period, L represents the hours of labor input, and M represents the raw materials used in the

process production (Nicholson & Snyder, 2010). In addition to the technical feasibility aspects of production such as labor, equipment and others, it is necessary to consider the financial feasibility aspect of whether the business is profitable or not. Meanwhile, to see the feasibility of a business requires a cost and benefit analysis which is the basis for farmers to work efficiently. This analysis is needed not only for short-term interests, namely "profit maximization" but also for long-term interests, namely "wealth maximization". For the long term, investment emphasizes a steady and regular income. To measure the profits that will be obtained by the entrepreneur on the assets used, it is reflected in

$$\text{Return on Investment} = \frac{\text{Net Profit After Taxes}}{\text{Total Assets}}$$

Meanwhile, the main criteria used to calculate business feasibility are Net Present Value (NPV), Internal Rate of Return (IRR) dan Net Benefit Cost Ratio (Net BCR) (Bellinger, 2007).

$$NPV = \frac{\sum(B_t - C_t)}{(1 + r)^t}$$

$$BCR = \frac{\sum_{t=0}^n(B_t)}{(1 - r)^t}$$

$$IRR = \frac{\sum_{t=0}^n(C_t)}{(1 - r)^t}$$

NPV is the difference in the present value of the total cash inflows compared to the current value of cash outflows over a certain period of time. The purpose of calculating NPV is to find out the current value of the company's assets or cash, which is equated with the cash value in the future. "Bt" means revenue of year "t", "Ct" means cost of year "t", "n" is the program length, "t" is the production period, and "r" is the Interest Rate. Then IRR is the rate of return compared to the prevailing interest rate. A business plan is said to be feasible when the IRR value > the prevailing interest rate. The B/C ratio is a comparison between benefits and costs. If the value is < 1 then the business is not economical, and if > 1 means

the business is feasible Meanwhile, to calculate when the investment returns is called "payback period" (Ibrahim, 2009).

$$pp = n + \frac{a - b}{c - b} \times 1\text{year}$$

In above equation, "a" is the initial investment amount, "b" is The cumulative amount of cash flows in year n, and "c" is the cumulative amount of cash flows in year n +1. Efficiency in production is the ratio of output and input related to achieving maximum output with a number of inputs, meaning that if the output ratio is large, the efficiency is said to be higher. Economics distinguishes efficiency into three, namely: 1) technical efficiency, 2) allocative efficiency (price efficiency), and 3) economic efficiency. Engineering efficiency as the ratio of actually used inputs to available output. Allocative efficiency shows the relationship between costs and output. Allocative efficiency is achieved if the company is able to maximize profits. Economic efficiency can be achieved if both efficiencies are achieved.

### 3. Research Method

#### 3.1 Method of Collecting Data

The type of data in the study was primary data with 20 organic rice farmers as respondents in the Semarang area using purposive sampling technique. Data were collected using techniques: in-depth interviews; field observation / survey; questionnaire; and documentation study.

#### 3.2 Data Processing Method

The variables studied included:

**Table 1. Research Variable**

No	Variabel	Sub Variabel	Indicator
1.	Cost	Labor	Rp
		Cultivation	Rp
		Production means	Rp
		Maintenance	Rp
		Irrigation	Rp
		Harvesting	Rp
2.	Receipt	Total receipts	Rp
		Net receipts	Rp

Business feasibility analysis is calculated by measuring the Return on Investment, B/C ratio, Internal Rate of Return, and Payback Period.

The calculation criteria are as follows:

- 1) ROI > 0%, profitable, the higher the profit the greater
- 2) ROI < 0%, loss of business
- 3) B/C ratio > 1 then the business can be continued
- 4) B/C ratio < 1 then the business is not feasible
- 5) IRR < bank interest, so the business is not feasible
- 6) IRR > bank interest, then the business is worth continuing
- 7) IRR = bank interest, then a break even point is reached
- 8) PP faster is better
- 9) PP longer, then it is not feasible

## 4. Result & Discussion

### 4.1. Return On Investment & Benefit Cost Ratio

ROI is intended to measure the profits obtained by the entrepreneur on the assets used. Meanwhile, the B/C ratio is used to measure the relative profitability of farming activities, which means that the farming is profitable or not. The advantages or disadvantages of 20 organic rice farmers are reflected in table 2.

**Table 2. ROI & B/C Organic Rice Farmer Ratio**

No	Total Cost (Rp)	Net Benefit (Rp)	ROI	B/C Ratio
1	6.081.000	5.169.000	-15%	0,85
2	5.750.000	1.450.000	-75%	0,25
3	7.800.000	2.100.000	-73%	0,27
4	7.965.000	2.535.000	-68%	0,32
5	16.615.000	12.185.000	-27%	0,73
6	5.373.500	4.501.500	-16%	0,84
7	4.828.000	5.372.000	11%	1,11
8	9.330.000	9.870.000	6%	1,06
9	5.055.000	7.545.000	49%	1,50
10	12.465.000	13.835.000	11%	1,11
11	7.895.000	17.655.000	124%	2,24

No	Total Cost (Rp)	Net Benefit (Rp)	ROI	B/C Ratio
12	9.659.000,	3.941.000	-59%	0,41
13	5.227.500	14.022.500	168%	2,68
14	4.375.000	8.825.000	102%	2.02
15	7.245.000	18.975.000	162%	2,62
16	16.550.000	24.700.000	49%	1,59
17	28.290.000	5.610.000	-80%	0,20
18	20.416.750	11.983.250	-41%	0,59
19	25.665.000	30.335.000	18%	1,18
20	9.578.000	2.962.000	-69%	0,31

From 20 organic rice farmers, it turns out that 10 farmers are losing money and 10 others are profitable. The biggest costs lie in the means of production and maintenance. The means of production include fertilizer, POC, Pesnab, Booser & Amino Acid, while maintenance costs consist of labor costs and waiting time. One hectare field plowing package costs an average of 400,000 rupiah to 700,000 rupiah depending on the agreement. Apart from the cost of facilities & maintenance, the cost of organic certification ranges from 20-30 million rupiah. While there are so many certification institutions, like: Sucofindo (Persero), Inofice (LSO-003-IDN), LeSos (LSO-005-IDN), BIOCert Indonesia (LSO-006-IDN), Food Crops and Plantation Service (LSO-004-IDN), MAL Organic Certification Institute (LSO-002-IDN), PT PCU Indonesia (LSO-010-IDN).

#### 4.2 Internal Rate of Return, dan Payback Period, dan NPV.

Internal Rate of Return (IRR) shows the average annual internal profit of the company making the investment and is expressed in percent. Meanwhile, the Payback Period (PP) is the ability of a business to return all invested capital / investment. The shorter the payback period, the more feasible a business is, this means that the greater the net profit the company gets.

The use of production inputs will affect farm costs and income. The Sumber Rejeki Group's organic rice farming uses seeds of Baroma, INPARI 33 and Mentik Susu. With a

planted area of 4.4 hectares, an average of 18.5 tons / season. The average number of seeds used was 97 kg / ha including embroidery. The price of rice seeds ranges from Rp. 12,000 to Rp. 15,000, - per kg. Labor costs for planting & maintenance Rp.17,880,000/ha, production facilities (fertilizers, insecticides, fungicides) Rp.8,361,100,-/ha, irrigation Rp.3,333,300,-, labor harvesting Rp. 8,750,000,- and other costs (tax, milling, packaging) Rp.23,527,700,-. With the receipt of Rp.80,000,000,-/ha and a total expenditure of Rp. 46,152,700,-, the net income of Sumber Rejeki farmer group is Rp. 33,847,300,-/ha/planting season. In order to support the growth of rice plants, farmers use medicines which are mixed from natural ingredients. Apart from using vegetable pesticides, pest and disease control is carried out by removing weeds from the land and rice fields. Labor is one of the factors of production that has a big influence on farming costs.

Table 3. IRR and PP Organic Farming

No	Investasi Awal (Rp)	Cash Flow (Rp)	IRR (%)	PP (Year)
1	6.081.000	5.169.000	-15	1,17
2	5.750.000	1.450.000	-75	3,96
3	7.800.000	2.100.000	-73	3,71
4	7.965.000	2.535.000	-68	3,14
5	16.615.000	12.185.000	-27	1,36
6	5.373.000	4.501.500	-16	1,19
7	4.828.000	5.372.000	11	0,89
8	9.330.000	9.870.000	6	0,94
9	5.055.000	7.545.000	49	0,66
10	12.465.000	13.835.000	11	0,90
11	7.895.000	17.655.000	124	0,44
12	9.659.000	3.941.000	-59	2,45
13	5.227.500	14.022.500	168	0,37
14	4.375.000	8.825.000	102	0,49
15	7.245.000	18.975.000	162	0,38
16	16.550.000	24.700.000	49	0,67
17	28.290.000	610.000	-80	504
18	20.416.750	11.983.250	-41	1,70
19	25.665.000	30.335.000	18	0,84
20	9.578.000	2.962.000	-69	3,23

### 4.3 Discussion

Analysis of the sustainability of rice farming includes five dimensions of sustainability, which are ecology, economy, socio-culture, institutions, and technology. Analysis of the sustainability of rice farming will have a positive impact on the welfare of the farmers themselves, because from these results it can be seen the mapping of the factors that encourage and hinder the implementation of agricultural activities (Linda et al., 2018). Economic factors become an obstacle to the sustainability of organic rice farming because the organic market is still limited to certain groups (Artini, 2016).

In the field, many farmers do not consider costs and income (Wihastuti et al., 2017). In fact, the calculation of costs and benefits is very important to do to determine the feasibility of farming (Aminah, 2017). Farmers with negative benefits are farmers who have just cultivated organic farming with relatively low productivity gains. This condition shows the need for guidance and assistance to improve management capabilities and efficiency of organic rice farming.

The results of research in Badung Bali and Karanganyar, Central Java show that organic rice farming is feasible to be cultivated (Setiawati et al., 2015). The area of land and the education of the head of the family are factors that influence organic rice production (Sari et al., 2018). In Sawangan, Magelang City, organic rice development takes place through a gradual process and experiences dynamics in line with development opportunities and prospects as well as problems faced by organic farming actors and related stakeholders. Initial pioneering in the form of farmer group involvement in the Integrated Pest Management Field School with an emphasis on healthy rice cultivation by minimizing the use of pesticides and inorganic fertilizers or chemical fertilizers. The process of applying for certification by the group received support and facilitation from the farm mantri and agricultural extension agents, the Magelang District Agriculture Office and the Central Java Provincial Agriculture Office (Subejo et al., 2019).

The implementation of IPM as an initial step in the development of organic agriculture

emphasizes the principle of the need for plant foodstuffs that come from various materials and not only chemical fertilizers. Group member farmers should practice and produce compost and biological agents. Materials can be sourced from litter, organic waste and manure. Farmer group members also need to develop liquid organic fertilizer (POC).

The research results also show that farmers who have positive advantages have produced liquid fertilizer with amino acids from golden snails, milkfish, young pineapple, rhizobium / groundnut rhizome, Moringa leaves, water. Meanwhile, plant organic nutrition (NOT) is obtained through mixing fruit maja, Aloe vera, Waluh, Katul, brown sugar, rice flour, coconut water, washing rice water, pure milk, water. After the use of organic fertilizers, the addition of dolomite and the application of biological agents, the attack of plant disturbing organisms (OPT) was drastically reduced and rice plants became healthier. The use of POC by farmers has been proven effective in improving soil quality and can be used to control pests.

Organic land adjacent to conventional land must be provided with dividing plants or a distance of at least 2 meters from the organic land. Meanwhile, water for organic farming comes from springs or water that goes through a filtering treatment. Organic fertilizers must be completely fermented and not from poultry manure from intensive livestock, humans, or pigs. Agricultural tools for organic and conventional land must be separate. The schedule for harvesting, drying, transporting and storing organic rice must not coincide with and separate from conventional rice harvesting.

Farming revenue is the multiplication of production obtained and the selling price. The amount of revenue obtained by farmers is influenced by the large amount of production produced by farmers and the selling price accordingly, the greater the income that will be obtained by farmers. The SumberRejeki farmer group's average production obtained by farmers was 4.2 tonnes / ha with a selling price of Rp. 20,500, - / kg. The average income received by farmers is Rp. 86,100,000.

When compared with the Integrated Crop Management Method (PTT) and Conventional Method, the total income of organic farming methods is greater than the PTT (semiorganic farming) and conventional farming methods. Even though the labor cost of organic farming is higher, the income from the fixed costs is higher due to the amount of production and the high price of certified organic rice (Lestari, 2013).

Currently in world trade, guarantee of third party dominate the guarantee of organic products. Organic farmers in Indonesia, who are mostly small-scale farmers, find it difficult to obtain this third party guarantee. This is due to the high cost of certification and complicated procedures, which creates serious problems for small-scale family farmers to obtain it (Perbatakusuma et al., 2009) The International Federation of Organic Agriculture Movements (IFOAM) has developed a group certification method through the application of the Internal Control System (ICS) to address the issue of certification costs. This system was developed for the purpose of strengthening the organic agriculture movement in developing countries.

## 5. Conclusions

### 5.1 Conclusion

Based on the analysis of certified organic rice farming income conducted on the Sumber Rejeki and Lumintu groups, it can be concluded that 10 farmers suffered losses so that the business was not feasible to continue because their ROI & IRR were at the level of -15% to -80%, PP was more than 1 year with the assumption of a reference interest rate of 3.5%. Meanwhile, the other 10 farmers have a decent business to continue because they get a profit of 6% to 168% per harvest with a maximum PP of 10 months. The average area of farmer's land ownership is narrow, making it difficult to create a suitable environment for organic farming, to fix that there needs to be a fundamental change in attitude to make a shift from conventional agricultural systems to agricultural systems that are environmentally sound. Also the high cost of standardization of organic rice products and the process has made farmers reluctant to plant. The implication of this

research is that the government should provide incentives or compensation for farmers who are just starting to practice organic cultivation and develop an integrated organic farming demonstration plot model so that it is possible for many people to learn how good organic farming practices are. This incentive can be supported by APBD funds or from other sources of funds, either in the form of venture funds, subsidies, exemption from certification fees, or livestock assistance.

## 5.2 Research Limitation

This research is casuistic on organic rice farmer groups which have narrow land so that they do not meet the business scale. For further research, it is necessary to take stratified samples with land area as a parameter so that it can be obtained on what business scale the organic rice cultivation is profitable.

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