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Economic Sustainability of Certified Rice Farming at Piat UGM

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ABSTRACT
Rice productivity can be increased by using certified rice seeds, but the availability is still an obstacle for farmers, especially from information and prices. Therefore, The Center for Agrotechnology Innovation, Universitas Gadjah Mada (PIAT UGM) develops certified rice seeds so that the supply of seeds in the market will be increased and an expectation for a decrease in the price of seeds. PIAT UGM also has a close relationship with farmers in the form of cooperation. Thus, socialization related to certified rice seeds will be easier to inform farmers. Developing certified rice seeds is a commercial business, so it is necessary to research related to its economic sustainability. This study aims to determine the productivity, profitability, and financial return of the PIAT UGM in certified rice farming. The method that was used in this research is descriptive analysis by comparing the productivity, profitability, and financial return of PIAT certified rice with other lines and varieties. The results showed that the productivity, profitability, and financial return of PIAT certified rice seeds were higher than other lines and varieties. So that PIAT UGM certified rice farming is economically sustainable.

Keywords: *sustainability, economy, seeds, rice, new variety*

1. INTRODUCTION

The agricultural sector in Indonesia is the government's main priority to develop the national economy. This is due to the agricultural sector being the dominant sector that has been contributing to the national income, creating jobs for the residents thereby reducing the unemployment rate, as well as generating income for the country.

In agricultural development, seeds are an important part especially in the food crop sub-sector. Superior quality rice seeds will increase the frequency of harvesting, therefore it could affect rice productivity. The use of certified seed is also believed to control plant pests and diseases.

Obstacles faced by farmers in the use of certified seeds are the accessibility and the price to obtain these seeds. Some studies have even confirmed those problems. Who conducted research on farmer groups in Konawe Regency, Southeast Sulawesi, stated that farmers had difficulty in obtaining certified seeds due to the lack of information on how to obtain the seeds. Who conducted research on implementation of rice seed subsidy in South Sumatera, stated that the price of certified seeds was five times higher than the price of uncertified price.

Currently, The Center for Agrotechnology Innovation Universitas Gadjah Mada (PIAT UGM) is collaborating with Faculty of Agriculture UGM and PT Tunas Widji Inti Nayottama to conduct research in order to develop superior varieties of rice seeds. These rice seeds are planned to be registered at The Center for Plant Variety Protection and Plant Protection (PPVTPP) because it has met the established criteria, namely New, Superior, Stabil, and Homogenous. This seed is a series of *Gamapadi* that could be planted in paddy fields, dry land, and even under forest stands. Until this research was written, the rice seeds were still being tested in PIAT Berbah dan PIAT Mangunan.

Before the rice seed is submitted for certification and produced in mass quantities, the calculation of productivity [11], income [9], and financial returns need to be investigated to determine the price of the seed and also the feasibility of the business - whether certified rice seed farming could be sustainable economically or not. Therefore, the research on Economic Sustainability of Certified Rice Seed is very important because this could encourage PIAT UGM to assist farmers in providing certified rice seed at affordable prices.

2. RESEARCH METHOD

This research was conducted at PIAT UGM, with primary data, namely research data conducted by PIAT in developing superior rice varieties and secondary data from studies of supporting literature. A descriptive method is used in this research by comparing the productivity, income, and financial return of PIAT certified rice with other lines and varieties. Other varieties used include INPARI 30 and INPARI 33.

The indicator of economic sustainability consists of:

1) Productivity is the yield per land area [11].
2) Comparison of income can be calculated:
   a) Revenue means production is multiplied by selling price.
      TR = P x Q
      Where:
      TR = Total revenue (IDR)
      P = Selling price (IDR)
      Q = Quantity (kg)
   b) Income in research is revenue minus the explicit costs of farming [9].
      I = TR – Explicit Cost
      Where:
      I = Income
      Explicit cost is a cash payment for resources purchased in the market, for example cost of seed, fertilizer, pesticide etc.
3) Financial returns include an overview of [7]:
   a) the structural cost: overview of explicit cost component
   b) return per unit of labor: Cost of labor/output
   c) capital/output ratio
   d) revenue/cost ratio

3. RESULT AND DISCUSSION

Rice is one of staple foods and a strategic political commodity in Indonesia. Government has tried to increase rice production however domestic rice production was not able to meet its growing demand for more than three decades [6]. Several efforts aiming at revamping the rice sector have been repeatedly initiated and implemented by the government. One of these efforts is the introduction of adaptive seeds because the success of increasing rice production is largely contributed by increased productivity [13]. Another effort are introduction of some programs to support rice subsectors, introduction of financial support through small credits, and price control especially with the imported rice to protect local rice producers. The major purpose of the government interventions is to enhance rice productivity and benefit the rural farmers through increased income and food security. Efforts to provide food needs, especially rice and increase the welfare of rice farmers can be done by increasing production and productivity [3]. Increased production of rice farming especially with the development and adoption of new technologies and improving farm efficiency [1], [4], [8], [10]. The provision of seed becomes one of the biggest constraints of the consecutive adoption of improved varieties. Meanwhile, access to seed may be a necessary condition for improved seed adoption and the adoption of improved seed is a crucial component of agricultural productivity, food security and sustainable economic process.

3.1 Productivity and Revenue

Analysis of production aspects is one of the important approaches in food policy to fulfil food requirements especially that become staple food of society. Farmers in doing their farms expect that every money spent will generate a high income [2]. In addition to production analysis, the income from rice farming is also calculated. Revenue is the amount of seed farming production produced in a business activity multiplied by the price per unit. The amount of income from rice seed farming in one growing season is the result of the sum of total farm revenues. The production of planting *Gamapadi 3* varieties were compared with the *Inpari 30* and *Inpari 33* varieties, the following results were obtained:

Table 1. Productivity, Price and Revenue

Description	Rice Variety		
	Gamapadi 3	***Inpari 30***	***Inpari 33***
Productivity (Kg/Ha)	5,250	2,500	7,300
Price (IDR/Kg)	5,300	6,500	4,100
Revenue (IDR/Ha)	27,825,000	16,250,000	29,930,000

Based on the Table 1, the productivity of the *Gamapadi 3* variety is higher than productivity of Inpari 30 with a productivity of 5,250 kg/hectare although it is still below *Inpari 33* but the results are quite promising. With an adequate productivity and a selling price in the range of Rp. 5,300/kg, the revenue from *Gamapadi 3* seed farming is Rp. 27,825,000/hectare, which is higher than *Inpari 30*. Assessed from high productivity, as well as selling price and revenue, the *Gamapadi 3* variety is quite potential to be cultivated by farmer. In plant cultivation activities, seeds are one of the main factors that determine success [5]. The use of high-quality seeds

will reduce the risk of farming failure. The increase in production is also largely supported by the role of quality seeds. According to FAO in Wirawan and Wahyuni (2002), the increase in the mix of other varieties and the decline in production of about 2.6% per cropping generation are the result of the use of poorly controlled seeds. One of the factors for the low level of availability of quality seeds (certified) is the level of public awareness in this case farmers to use high quality seeds is still very lacking. In general, farmers use part of their harvest to be used as seeds for the next planting season. Of course, the quality of these seeds is not guaranteed [12]. The advantages of using certified seeds are that the use of quality seeds guarantees the success of the farming business, the progeny of the seeds are known, the quality of the seeds is guaranteed and genetic purity is known, the growth is faster and uniform and the plant population is optimum, so as to get high yields, produce healthy seeds with lots of roots, plants are tougher when the plants move, ripen and harvest simultaneously, high productivity, thereby increasing farmers' income.

3.2. Cost Structure

In the use of farming production factors, most of them did not show an important difference, namely in the use of seeds, fertilizers, and labor. The cost of seeds for the three varieties is the same, which is Rp. 250,000/hectare. The cost of fertilizer in *Gamapadi 3* farming has the highest quantity compared to *Inpari 30* and *Inpari 33*, which is Rp.2,938,000/hectare. Meanwhile, labor costs for farming in *Gamapadi 3* were lower than *Inpari 30* and Inpari 33 or the cheapest with a cost of Rp. 5,406,000. Labor costs are the result of Labor Day (HOK) work multiply with labor wages. However, there is a very different treatment of pesticide use where the pesticide cost in *Gamapadi 3* is significantly different, namely Rp. 2,195,000/ha compared to Inpari 30 which requires a pesticide cost of Rp. 400,000/hectare and Inpari 33 which is Rp. 410,000/hectare. Overall, farming production costs of the *Gamapadi 3* variety are the highest compared to *Inpari 30* and *Inpari 33*.

Table 2. Cost Structure

Description of Cost Structure	Rice Variety		
	Gamapadi 3	Inpari 30	Inpari 33
Seed (IDR/Ha)	250,000	250,000	250,000
Fertilizer (IDR/Ha)	2,938,000	1,120,000	2,350,000
Pesticide (IDR/Ha)	2,195,000	400,000	410,000
Labor (IDR/Ha)	5,406,000	5,642,000	5,900,000
Total cost (IDR/Ha)	10,789,000	7,412,000	8,910,000

Even though it has the highest production cost among the other two varieties, in terms of productivity and selling price, *Gamapadi 3* seeds can compete. In addition, seeds produced by research institutions or released by the government are generally relatively easy to accept by farmers. The yield to be achieved by each individual farmer will depend on several determinants, one of which is the maintenance of seed sources to ensure rice productivity. A result of research stated that the source of seed from the government was most preferred by rice farmers (28.89%) because the quality is more secure and reliable [6].

3.3. Financial Return

After calculating the productivity, costs and revenues, the financial return on rice farming of the Gamapadi 3 variety is also calculated by calculating the return per unit of labor, cost of labor/output, capital/output ratio and revenue/cost ratio compared to the Inpari 30 and Inpari 33.

Table 3. Financial Return

Description	Rice Variety		
	Gamapadi 3	Inpari 30	Inpari 33
Return per unit of labor (IDR)	1.030	2,257	808
Capital/output ratio	2,005	2,965	1,221
Revenue/cost ratio	2.58	2.19	3.36

Based on the labor cost required to produce 1 kg of seed, *Gamapadi 3* is below Inpari 30 and above Inpari 33 which is Rp 1.030 per kg of output. Based on the labor cost required to produce 1 kg of seed, *Gamapadi 3* is below Inpari 30 and above Inpari 33 which is Rp 1.030 per kg of output. This is in line with the need for capital in farming in *Gamapadi 3*, which requires less capital than Inpari 30 but more than Inpari 33, which is Rp. 2.005 per output produced. In the R/C analysis of Suratiyah (2006), it is stated that the higher the ratio of income received by farmers, the more profitable and feasible their business is. The R/C of captive farming of *Gamapadi 3* variety per growing season is 2.58. This means that for every single Rupiah, the cost incurred by the farmer will receive an income of 2.58 Rupiah, so that the *Gamapadi 3* variety of rice breeding farming has economic sustainability.

4. CONCLUSION

Based on the results of research and discussion, it can be concluded:

1. The productivity of the Gamapadi 3 variety is 5.250/kg/hectare/planting season with the cost of farming Gamapadi 3 being Rp10.539.000, with an income of Rp27.825.000, per hectare per growing season.

2. The value of R/C in captive breeding of rice seeds of Gamapadi 3 varieties per hectare per growing season in PIAT UGM is 2.58. This means that for every single Rupiah of costs incurred will receive an income of 2,58 rupiah.

Suggestion: Based on the results of the discussion and conclusions, it is recommended: Gamapadi 3 seed breeding farming can be continued by PIAT UGM.

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