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**SPREADSHEET BASED BUSINESS DECISION MAKING SYSTEM (CASE STUDY IN BONOROWO LAND, LAREN, LAMONGAN)**

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| **ARTICLE INFO** |  | **ABSTRACT** |
| *Article history :* |  | Bonorowo land in Laren Subdistricts, Lamongan Districts, is one of the areas that uses its land for rice, corn and kenaf cultivation. The agricultural sector in Laren does not yet have a detailed economic analysis. Farmers ignore the importance of considering initial capital and some “small” costs in this activities. Therefore, in this study, the calculation of business feasibility was carried out on rice, kenaf, and corn farmer groups in Bonorowo land, West Laren. Business feasibility analysis is conducted through calculation of the value of NPV, IRR, and IP. The calculation system uses a Microsoft Excel spreadsheet formula. The results of this economic analysis show that corn and kenaf cultivation is a feasible and profitable business for farmers. The NPV, IRR, and PI values of the corn cultivation business are Rp. 524,182.40; 144.43%; and 2.9. The NPV, IRR, and PI values of the kenaf cultivation business are Rp. 1,145,532,39; 266.43%; and 5.15. In the other hand, rice cultivation business is not feasible and it cause losses for farmers. The NPV, IRR, and PI value of rice cultivation is Rp. -495,085.78; -25.18%; and -0.79. |
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**INTRODUCTION**

The agricultural sector is the livelihood and the main sector of the Indonesian population. Based on the results of the 2018 Inter-Census Agriculture Survey, the number of households relies on agricultural business in Indonesia is 27,682,117 people. According to the SUTAS2018 Team (2018), the top five of agricultural sub-sectors are rice farming (13,155,108 people), plantations (12,074,520 people), horticulture (10,104,683 people), crops (7,129,401 people), and forestry plants (5,408,409 people). The agricultural sub-sector becomes a provider of jobs, the fulfillment of food diversity, an export’s support for both the industrial sector and agricultural products, a contributor to national foreign exchange, and it reduces of the number of poor people in rural areas. Laren Subdistrict, Lamongan Regency is one of the area that utilizes its land for several agricultural subsectors. The type of land in Laren Subdistrict is seasonal flood land, or often called Bonorowo land. Bonorowo is a Javanese term consisting of the words "beno" and "rowo" which means flood and swamp (Soegiyanto et al., 2015).

The rice cultivation in Bonorowo Laren land is carried out in the transition season from rain to dry season, which is from April to August. Coincidentally, the corn cultivation is also carried out in the same period as rice. Another agricultural sub-sector product from Bonorowo land is kenaf, which is the largest kenaf cultivation in Indonesia (Irawati, D.Y. and Wulandari, L. M. C., 2019). Kenaf (Hibiscus cannabinus L) is a plant in the the family of cottons and herbs and it is planted seasonally. In order to maximize the cultivation in Bonorowo Laren land, it is carried out in September to March in turn of rice and corn, which suits the flooded and swampy condition of Bonorowo land at that period. Almost all of the kenaf parts can be used for raw materials in various industries, one of which is the fiber from the stem. Kenaf fiber is used as the material for making cement wall panels (Saba, N., Paridah, MT, and Jawaid, M., 2015; Zhou, C. et al., 2018), automotive structural components (Hassan, F. et al., 2017 ; Verma, D., and Sharma, S., 2017), fiber drain (Nguyen, TT, and Indraratna, B., 2017), geo textiles (Chaiyaput, S., Bergado, DT, and Artidteang, S., 2014 ; Shirazi, MG et al., 2019), and fiber board (Ding, Z. et al., 2015). Kenaf agriculture products are sold by farmers to one of the natural fiber production companies. The agricultural sector in Laren does not yet have a detailed economic analysis. The farmers always do not consider the initial capital as an important matter to the whole cashflow calculation, ignoring the burden of small amounts of costs, and the labor costs are not counted specifically between farmer’s family. The whole cultivation business is run conventionally without detailed calculations even though the cultivation has potential advantages in terms of quality and share market.

Research on the feasibility of agricultural business in several countries has been widely carried out. In rice cultivation, they analyzed the costs and profitability of small-scale rice farming in Nigeria (Ohen, SB, and EA Ajah, 2015; Bwala, Madu Ali and John, Aniobi U., 2018), conducted an analysis of income from rice cultivation in two different regions in Nigeria (Nwalieji, HU, 2016), calculated the Benefit Cost ratio in rice cultivation in Bangladesh (Sujan, Md. Hayder Khan et al., 2017; Haider, Mohammed Ziaul and Akter, Rabeya, 2018), conducted research on calculating profitability and productivity from rice cultivation for three categories of farmers (small, medium and large farmers) on the coast of Bangladesh (Islam, Md. Zohurul et al .. 2017), and made a comparison of rice financing and income with brick production businesses in South Sulawesi (Saediman, Haji et al ., 2019). While in corn cultivation, some researchers compared the profitability and productivity of corn sales using organic farming systems with conventional systems in Kenya (Adamtey, Noah et al., 2016), conducted research on the selection of hybrid corn from several different varieties in Nepal, economically and statistically (S , Ghimire et al., 2016; Bajracharya, M., Sapkota, M., and Dhungana, SM, 2016), analyzed the sale of corn yielded with organic fertilizer and inorganic fertilizer (Sekumade, Adelomo Bosede, 2017), and made a comparison feasibility of corn and tomato business in Nigeria (Ammani, Aliyu A., 2015). Feasibility analysis of rice and corn cultivation business by has also been done in Indonesia (Silitonga, P.Y. et al., 2016; Nuryanti, D.M. and K, Niken Nur, 2017; Nuswardhani, Sri Karuniari, 2017) by taking cost and revenue into consideration. However, so far, a feasibility analysis of the kenaf cultivation has only been carried out by two researchers. They calculated the Benefit Cost ratio for kenaf agriculture in Malaysia when the kenaf yield was 10 tons/hectare, 12 tons/hectare, and 15 tons/hectare (Abdelrhman HA et al., 2016; Paridah M.T. et al., 2017).

The unique characteristics between different regions leads to the difference of how the technology, land, and human resources is used and processed. Therefore, the results of the business feasibility analysis in each region would be different as well. In this case, a research was conducted to analyze the feasibility of business in rice, kenaf, and corn farmer groups in West Laren. This business feasibility analysis can inform us which farmer group activities are the most economically feasible. The difference of this research with the previous one is the utilization of Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability index (IP) between three commodities, which is rice, corn, and kenaf as the tools to analyze business feasibility. Furthermore, from the NPV, IRR, and IP values, we can obtain the information about which commodity cultivation is feasible and profitable. The calculation system uses a simple Microsoft Excel spreadsheet formula to optimize financial models. This research is expected to be a reference for farmers to maximize cultivation activities that are feasible to produce higher income. Besides that, it also can be a reference in developing Bonorowo land as a potential land with great agricultural sector potential in Laren Subdistrict.

**RESEARCH METHOD**

1. **Data Collection**

The study was conducted in a farmer group in Laren, Lamongan Districts. The choice of location is based on the consideration that the location is Bonorowo land and the largest kenaf planting area in Indonesia. The data collected in this study is secondary data in the form of records and documentation of all costs of rice, corn and kenaf cultivation activities carried out in 2017/2018, 2018/2019 and 2019/2020 in West Laren District, which covers the villages of Pelangwot, Bulutigo, Siser, Mojo Adem, Pesanggrahan, Keduyung, Centini, Durikulon, Jabung, Dateng, and Gelap. Cost data includes all costs of the rice, corn and kenaf cultivation process with a land boundary per 0.1 hectare. The data consists of the amount of harvest, the selling price, the cost of purchasing fertilizers, pesticides, water, rat poison, raffia, plastic dividers, purchasing seeds, land rent, tractor rental, depreciation of equipment, wages for workers in the family, and wages for workers outside family. All of these data were obtained from the head of the farmer group in the Bonorowo land, Laren.

1. **Data Processing**

The research data needed includes the calculation of costs, revenues, and profit. The costs includes labor costs, the overall cost of materials and tools during cultivation. The revenue is the gross income obtained when the unit product from yield is multiplied by the market price. The data processed is data for 3 years, which is 2017/2018, 2018/2019, and 2019/2020. The profit is the difference between total revenue and total cost. The cost of the tools is calculated from the cost of the depreciation of the tools. Depreciation of the tools is calculated using the straight-line method, which shrink linearly during its life. Depreciation of the equipment calculated in this study is the depreciation of the use of hoes, buckets, gloves, masks, sickles, and pesticide sprayer tools. Depreciation formula is:

Depreciation = (Price- Residual value)/( Economic age) (1)

This study uses the calculation of Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI). NPV is the difference between the present value of an investment and the present value of future net cash receipts (Lukman, M., 2019). A business is feasible if the NPV value is greater than 0 or positive. Otherwise, if the NPV value is less than 0 or negative, then the business is considered not feasible. A business that has an NPV value of less than 0 or negative means that all revenue received has not been able to cover all costs incurred. NPV > 0, then a business is considered feasible. NPV ≤ 0, then a business is considered not feasible (Susinto, Albert C., 2017). NPV calculation in Microsoft Excel can be seen in equation 2.

=(NPV(Reinvestment rate;Net cashflow1:Net cashflown))+Net cashflow0 (2)

IRR is a method of valuing investments with a maximum interest rate to arrive at an NPV value of 0 (Yarni, Yuli et al., 2017). IRR of a business is feasible if the IRR value is greater than the desired level of profit. Conversely, if the IRR is smaller than the desired level of profit then the business is considered not feasible to run (Ediwodjojo, Sotya Partiwi and Ginting, Ika Raniya, 2018). IRR calculation in Microsoft Excel can be seen in equation 3.

=IRR(Net cashflow1:Net cashflown) (3)

PI or Profitability Index is a method of calculating business feasibility by comparing the present value of cash flow values with the investment value of a business. A business is considered feasible if the PI value > 1 (Lukman, M., 2019). The calculation of PI in Microsoft Excel can be seen in equation 4.

=(NPV(Reinvestment rate; Net cashflow1:Net cashflown))/ Net cashflow0 (4)

**RESULTS AND DISCUSSION**

Laren is a region of Lamongan Districts, East Java Province. Laren is located 36 km northwest of the city of Lamongan. In the north, Laren Subdistricts is bordered by Solokuro and Brondong Subdistricts, Gresik Districts in the east, Karanggeneng Districts in the south, and Tuban Districts in the west. Land with seasonal flooding makes Laren Subdistricts holds great potential in agriculture. Rice and corn are cultivated in the dry season, from April to August while kenaf is cultivated in the rainy season, which is from September to February, harvested in March. Farmers plant kenaf to use their fiber. Kenaf planting is suitable in Bonorowo land because kenaf plants are able to adapt to abiotic stress conditions puddle, drought, and soil with pH between 6 to 6.8 (Akil, H., Zamri, M. H., & Osman, M. R., 2015). In this study, a financial and feasibility analysis of rice, corn and kenaf cultivation was carried out for 3 years. Some assumptions used in this study are the capital used is farmers’ own capital, the discounted factor is 12% per year, revenue is obtained only from farmers' harvests, and year 0 is labelled as the initial year when the investments are purchased .

1. **Cashflow Calculation**

Cashflow calculation is obtained from income after deducting taxes and depreciation or depreciation of fixed assets. Data needed in the calculation of cashflow are the total costs and the total income received by farmers during one period. The calculation for 3 years per 0.1 hectare is shown in Table 1, Table 2, Table 3, and Table 4.

Table 1. Calculation of Total Revenue from Rice, Corn, and Kenaf Cultivation for 3 Years Per 0.1 Hectare

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2017/2018** | **2018/2019** | **2019/2020** |
| Rice yields | 515 kg | 800 kg | 800 kg |
| Selling price of rice grain | Rp. 4,225 | Rp. 5,150 | Rp. 5,300 |
| Total income from rice | Rp. 2,175,875 | Rp. 4,120,00 | Rp. 4,240,000 |
| Yields of corn | 740 kg  | 700 kg | 700 kg |
| Selling price of corn | Rp. 3,250 | Rp. 4,250 | Rp. 4,200 |
| Total income from corn | Rp. 2,405,000 | Rp. 2,975,000 | Rp. 2,940,00 |
| Kenaf fiber yields | 300 kg | 300 kg | 300 kg |
| The selling price of kenaf fiber | Rp. 6,500 | Rp. 6.700 | Rp. 7,000 |
| Total income from kenaf fiber | Rp. 1,950,000 | Rp. 2,010,000 | Rp. 2,100,000 |

Table 2. Calculation of Cashflow for Rice Cultivation for 3 Years Per 0.1 Hectare

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2017/2018** | **2018/2019** | **2019/2020** |
|  | **Nilai (Rp.)** | **Nilai (Rp.)** | **Nilai (Rp.)** |
| A. Total income | 2,175,875 | 4,120,000 | 4,240,000 |
| B. Costs |   |   |   |
| Urea fertilizer | 60,000 | 60,000 | 60,000 |
| TSP fertilizer | 40,000 | 40,000 | 40,000 |
| Pesticide | 80,000 | 90,000 | 90,000 |
| Rat poison | 130,000 | 150,000 | 150,000 |
| String of raffia | 30,000 | 70,000 | 75,000 |
| Border Plastic | 315,000 | 320,000 | 335,000 |
| Outside the family workforce | 915,000 | 1,250,000 | 1,300,000 |
| Water | 320,000 | 340,000 | 350,000 |
| Seeds | 240,000 | 240,000 | 250,000 |
| Labor in the family | 635,000 | 790,000 | 850,000 |
| Land lease | 0 | 0 | 200,000 |
| Rent a tractor | 190,000 | 190,000 | 210,000 |
| Depreciation | 91,950 | 91,950 | 91,950 |
| Total Cost | 3,046,950 | 3,631,950 | 4,001,950 |
| Net Cashflow | -871,075 | 488,050 | 238,050 |

Table 3. Calculation of Cashflow for Corn Cultivation for 3 Years Per 0.1 Hectare

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2017/2018** | **2018/2019** | **2019/2020** |
|  | **Nilai (Rp.)** | **Nilai (Rp.)** | **Nilai (Rp.)** |
| A. Total income | 2,405,000 | 2,975,000 | 2,940,000 |
| B. Costs |  |  |  |
| Urea fertilizer | 100,000 | 100,000 | 100,000 |
| Pesticide | 30,000 | 40,000 | 40,000 |
| Outside the family workforce | 810,000 | 1,025,000 | 1,025,000 |
| Water | 60,000 | 80,000 | 80,000 |
| Seeds | 200,000 | 250,000 | 250,000 |
| Labor in the family | 770,000 | 950,000 | 950,000 |
| Land lease | 0 | 0 | 200,000 |
| Depreciation | 91,950 | 91,950 | 91,950 |
| Total Cost | 2,061,950 | 2,536,950 | 2,736,950 |
| Net Cashflow | 343,050 | 438,050 | 203,050 |

Table 4. Calculation of Cashflow for Kenaf fiber Cultivation for 3 Years Per 0.1 Hectare

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2017/2018** | **2018/2019** | **2019/2020** |
|  | **Nilai (Rp.)** | **Nilai (Rp.)** | **Nilai (Rp.)** |
| A. Total income | 1,950,000 | 2,010,000 | 2,100,000 |
| B. Costs |  |  |  |
| Urea fertilizer | 100,000 | 100,000 | 100,000 |
| Pesticide | 40,000 | 40,000 | 40,000 |
| Outside the family workforce | 400,000 | 650,000 | 650,000 |
| Seeds | 30,000 | 36,000 | 36,000 |
| Labor in the family | 440,000 | 600,000 | 600,000 |
| Land lease | 0 | 0 | 200,000 |
| Depreciation | 91,950 | 91,950 | 91,950 |
| Total Cost | 1,101,950 | 1,517,950 | 1,717,950 |
| Net Cashflow | 848,050 | 492,050 | 382,050 |

Based on the cashflow calculation in Table 2, Table 3, and Table 4, it can be seen that the net profit from rice cultivation for 3 years per 0.1 hectare is Rp. -871,075, Rp. 488,050 and Rp. 238,050. Every year the net profit obtained by farmers is not always the same because of different natural conditions each year. Even in 2017/2018 farmers suffered losses due to decreased rice yields compared to 2018/2019 and 2019/2020. Net profit from corn cultivation for 3 years per 0.1 hectare is Rp. 343,050, Rp. 438,050, and Rp. 203,050. Net income from kenaf cultivation for 3 years per 0.1 hectare is Rp. 848,050, Rp. 492,050, and Rp. 382,050.

1. **Perhitungan NPV, IRR, dan IP**

All NPV, IRR, and IP calculations use Ms. Excel. This should simplify and increase the accuracy of the calculations. NPV and IRR for the 3 cultivation business can be seen in figure 1 below.

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Figure 1. Calculation of NPV and IRR with Ms. Excel

Based on the results of the NPV calculation in Figure 1, it can be seen that for all 3 years the NPV value of the rice cultivation business has negative value of Rp. -495,085.78, so rice cultivation business is not feasible to be continued. Meanwhile, the NPV value of corn cultivation business is Rp. 524,182.40. and the NPV value of kenaf cultivation business is Rp. 1,145,532.39. This results show that corn and kenaf cultivation business is feasible to be continued.

Calculation from Figure 1 also show that the IRR value for rice cultivation is -25.18%. Based on previous research, the cultivation should be continued if the IRR value is greater than the value of discounted factor (Wismaningrum, K.E.P., Ismail and Aristi D.P.F., 2013). In this research, the discounted factor is 12%, so the rice cultivation business in Bonorowo land is not feasible to be continued. The IRR value of corn cultivation is 144.43% and the IRR value of kenaf cultivation is 266.43%. The IRR value of corn and kenaf cultivation is above 12% so that the cultivation of corn and kenaf is feasible to be continued.



Figure 2. Calculation of NPV and IRR with Ms. Excel

IP calculations using Ms. Excel is presented in Figure 2. Based on that, the IP value of rice, corn and kenaf cultivation is consecutively -0.79; 2,9; and 5.15. Hence, we can conclude that the rice cultivation business is not feasible to be continued because the IP value is smaller than 1. While the corn and kenaf cultivation businesses is feasible to be continued because the IP value is more than 1.

From all the economic analysis that has been done, the cultivation business that is feasible and profitable for farmers in are corn and kenaf cultivation. And the cultivation business that is not feasible to be continued and cause losses is rice cultivation. The rice cultivation business causes losses because the process of rice cultivation is more complicated so it requires more workers and materials. The most profitable cultivation business is kenaf cultivation. It has an easy process to do, does not require special treatment, utilize simple supporting materials, and the plants itself are not easily attacked by pests. Therefore, the overall costs for kenaf cultivation is much lower for farmers. Besides that, the selling price of kenaf fiber is higher than the selling price of rice and corn.

**CONCLUSIONS**

The results of an economic analysis of the cultivation of rice, corn and kenaf in Bonorowo land, Laren Subdistrict, are that corn and kenaf cultivation is feasible and profitable for farmers. On the contrary, rice cultivation is not feasible and results in losses for farmers. The NPV, IRR, and PI values of the corn cultivation business are Rp. 524,182.40; 144.43%; and 2.9, while the NPV, IRR, and PI values from the kenaf cultivation business are Rp. 1,145,532,39; 266.43%; and 5.15. Rice cultivation business leads to negative NPV, IRR, and PI values, which are Rp. -495,085.78; -25.18%; and -0.79. The selling price of kenaf fiber is higher than the selling price of rice and corn. Economically, farmers can still use Bonorowo land which has been considered unprofitable, by planting corn in the dry season and kenaf in the rainy season.

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