

## Financial Analysis of a Rice Transplanter Usage in Farming Activity at the Junrejo District in Batu City

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### Abstract

The rice transplanter machine is required to overcome the scarcity of agricultural workers particularly for labor of rice planting. The rice transplanter itself is a machine used to plant rice seedlings into a paddy field. The usage of rice transplanter in farming activity is necessarily studied for financial feasibility, whether it can affect or not an increase of farmer income. The method that used in this research is financial analysis includes basic costs, feasibility of farming activity which involves net present value (NPV), internal rate of return (IRR), net benefit cost ratio (net B/C Ratio), and payback period (PBP), afterward sensitivity analysis is committed. Data collection is conducted both in primary and secondary such as an interview stage to farmers and several another sources which relevance to the research. This research has conducted an observation towards farming activity at the Junrejo district in Batu City. The outcome of the research shows that the usage of rice transplanter can be said to be feasible at the Junrejo district in Batu City based on the basic costs Rp. 290,700,-/ha, NPV Rp. 65,797,914 IRR 45.29%, Net B/C ratio 2.02 and PBP 2.22 years. The usage of rice transplanter is sensitive to the decline in selling prices by 18% and decrease in production by 15%.

**Keywords:** rice transplanter, cost, financial analysis

### INTRODUCTION

For reaching the aim of a food self sufficiency of rice production which is one of the primary foodstuffs need to be increased in Indonesia. Agricultural laborer is one of the matters that cut off the enhancement of rice production. Dearth of agricultural laborer repeatedly can affect a reverse schedule of planting and it is not simultaneous so as to be affected against index of rice planting especially for labor of rice planting organism disorders which agitate a plant (OPT) eventually affected against the rice production. So, rice transplanter is one of agricultural machineries usage that can surmount the matters in dearth of agricultural laborer.

Rice transplanter is a rice planting machine that used to plant the rice seedlings which have been sown over specific area (by using tray) in a certain age or height, on the farmland ready for planting. The usage of rice transplanter in a rice farming is able to solve the problem of agricultural laborer deficiency and increase farming income as well [1]. Innovation and technology usage of rice

transplanter are possible accelerating a time in planting of rice seedlings and overcome the scarcity of agricultural laborer as well.

In the farming activity is necessarily studied regarding to the financial feasibility. Financial analysis is a part of farming arrangement which intends to discover whether it is feasible to be continued or not. The feasibility of farming activity can be determined by scoring net present value (NPV), internal rate of return (IRR), net benefit cost ratio (Net B/C Ratio), and payback period (PBP).

In the first financial analysis is necessarily committed an investigation as to basic costs which consists of a fixed cost and variable cost. Fixed costs are an expense or cost that do not change, despite amount of cost driver change into relevant range and involve many indirect costs [2]. At the same time, variable costs are expense or cost pulled out for meeting variable inputs in the short-term production process. One of the

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variable costs are direct labor cost, material cost and others [3].

So that required a good management in order to farming activity runs prettily. There is an equation between functions that reflect to the function management itself, those are planning, organizing, staffing, directing, controlling [4].

In sort of research that committed regarding to economy technology of rice transplanter, determining the basic costs in the machine usage is one of factors need to be considered for discovering the expense which should be pulled out. On the other hand, in another research studying about financial feasibility of rice transplanter service need to be analyzed further as to net present value (NPV), internal rate of return (IRR), net benefit cost ratio (Net B/C Ratio), and payback period (PBB) for discovering whether the project is possible to be committed or not.

The district of Junrejo in Batu City is one of the rice fields areas covering an area of 698 ha, reaching a productivity by 6.1 tons/ha and production by 4.331 tons. The rice transplanter usage of farming activity is still not optimal and not review further yet, based on the financial feasibility at the district of Junrejo in Batu City.

Therefore, in this research will be committed financial analysis of rice transplanter based on basic costs, net present value (NPV), internal rate of return (IRR), net benefit cost ratio (Net B/C Ratio), and payback period (PBP) in farming activity at the district of Junrejo in Batu City. The aim of this research reviews the feasibility of rice transplanter usage in farming activity whether it is possible to be committed or not

## MATERIAL AND METHOD

### Data Collection

The data in this research are primary and secondary data. Primary data is obtained from an examination of machine in the rice field, directly depth interview as well as using questionnaire, and discussing with a fellow member of farmer group. Secondary data is obtained from related institution and scientific publication.

### Operating Cost of Rice Transplanter

Operating cost of rice transplanter usage consist of fixed costs and variable costs. Fixed cost involves depreciation expense and capital interest. While, variable cost involve maintenance cost, operator wages, fuel and oil.

#### Fixed Costs

Fixed cost is costs that remain constant, not affected by changes in the volume of activities or

activities. [5]. Fixed cost for using a rice transplanter are obtained using the formula:

$$BT = D + I$$

Explanation:

BT = Fixed Cost (Rp/year)

D = Depreciation Cost (Rp/year)

I = Capital Interest (Rp/year)

#### Variable Cost

Variable cost is also called operating costs. These operating costs vary according to the use of tools or machines and are also influenced by the usage hours in the fields. Variable costs in rice transplanter consist maintenance costs, operator wages, fuel and lubricant [5]. The variable costs for using a rice transplanter are obtained using the formula:

$$BTT = PP + Bo + BB + OL$$

Explanation:

BTT = Variable Cost

Br = Maintenance Costs (Rp/hour)

Bo = Operator Wages (Rp/hour)

Bb = Fuel Costs (Rp/hour)

Bp = Lubricant Costs (Rp/hour)

#### Basic Cost

The basic cost is the cost needed by a tool to produce a unit of output. The basic cost of a rice transplanter is influenced by the machine's working capacity and engine working hours [5]. The basic costs for using a rice transplanter are obtained using the formula:

$$BP = \frac{\frac{BT}{x} + BTT}{KP}$$

Explanation:

BP = Basic Cost

K = Work Capacity

BT = Fixed Cost

BTT = Variable cost

x = Working Hours per Day

### Financial Analysis

To determine the extent of using a rice transplanter for farming feasibility, the parameters used include net present value (NPV), internal rate of return (IRR), net benefit cost ratio analysis (Net B/C ratio), and payback period (PBP).

#### NPV

The NPV is the present net value which is the sum of all future cash flows to determine the

present value where cash flows include discounted inflows and outflows at certain rates consistent with project risk [6]. NPV is said to be feasible if it is positive [7]. To find out the NPV value, the formula can be used as follows:

$$NPV = \sum_{t=1}^n \frac{Bt}{(1+i)^t} - \sum_{t=1}^n \frac{Ct}{(1+i)^t} = \sum_{t=1}^n \frac{Bt - Ct}{(1+i)^t}$$

Explanation:

NPV = Current Value (Rp)

Bt = Profit in year-t (Rp)

Ct = Cost in year-t (Rp)

i = Rate of Interest (%)

n = Project life (year)

t = year

### IRR

The internal rate of return is a method for calculating interest rates that can equalize the present value of all cash inflows with outflows of cash from a project investment [8]. IRR is said to be feasible if the value is greater than the cost of the source [9]. To find out the IRR value, the formula can be used as follows:

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} \times (i_2 - i_1)$$

Explanation:

IRR = Internal Level of Result

NPV<sub>1</sub> = Current Value is Positive

NPV<sub>2</sub> = Current Value is Negative

i<sub>1</sub> = Interest Rates from Positive NPV Results

i<sub>2</sub> = Interest Rates from Negative NPV Results

### Net B/C Ratio

B/C ratio is a fundamental analysis method for a project. In this method, all cost estimates are converted to general equivalent monetary units with certain interest rates. If the value of B/C ratio is  $\geq 1$ , then the project can be economically acceptable for the estimates and interest rates applied [10]. To find out the Net B/C ratio value, the formula can be used as follows:

$$Net\ B/C = \frac{\sum_{t=1}^n \frac{Bt - Ct}{(1+i)^t}}{\sum_{t=1}^n \frac{Bt - Ct}{(1+i)^t}} \dots \begin{matrix} (for\ Bt - Ct > 0) \\ (for\ Bt - Ct < 0) \end{matrix}$$

Explanation:

Bt = total income in year -t

Ct = total cost in year -t

i = Rate interest

n = Project economical life

### Payback period

Payback Period is a technique of evaluating the period (period) of return on investment in a project or the business can return [11]. The payback period on the project can be said to be feasible if the value is shorter than the economic life span of the project [9]. To find out the value of the payback period, the formula can be used as follows:

$$Payback\ Period = \frac{I}{Ab}$$

Explanation:

I = Expenditure of Investing cost

Ab = Profit every years

### Sensitivity Analysis

Sensitivity analysis is an analysis carried out to see the sensitivity of the project to be carried out on changes that may occur during the course of investment time [12]. This analysis calculates the sensitivity of financial analysis (NPV, IRR, Net B / C ratio, PBP) to changes that occur at factor prices and production prices. Some of the assumptions used in the sensitivity analysis in this study are:

- Sensitivity analysis when there is a change in the selling price decrease of 12%.
- Sensitivity analysis when there is an increase in production costs of 7%.
- Sensitivity analysis when there is a decrease in production of 20%.

## RESULT AND DISCUSSION

### Financial Analysis

Financial analysis Direct interviews and questionnaires were conducted on farmers to find out the cost components which were then carried out financial analysis. Questions presented include consumable costs such as the use of seeds, fertilizers, pesticides. And also, the cost of machine tools at the same time along with the labor costs incurred in one activity starting from land processing activities to harvest.

### Costs Requirement for Rice Transplanter

Cost Requirement of Rice Transplanter. The type of rice transplanter used to manage rice seeds is the Yanmar brand AP4 type rice transplanter. The following is a component of costs incurred for using a rice transplanter.

**Table 1.** Need of Cost for Rice Transplanter

Description	Unit	Value
Initial Price	Rp	64400000
Final Price	Rp	64400000
Economy Age	year	7
Bank Interest Rates	%/year	12%
Labor Wages	Rp/day	80000
Working hour/day	hour/day	7
Debit BB	liter/hour	1.388
Cost BB	Rp/liter	7800
Oil Volume	Liter	2.8
Oil Prices	Rp/liter	35000

### Operating Cost of Rice Transplanter

Basic costs for two-wheeled rice transplants cover fixed costs and variable costs. The fixed costs parameters cover depreciation and capital interest, while the variable costs cover maintenance and repairs, operator wages, fuel and oil. So the results can be seen in **Table 2**.

**Table 2.** Basic Cost Alaysis

Costs	Description	Unit	Price
Basic Cost (BT)	Depreciation	Rp/year	8280000
	Capital Interest	Rp/year	4250400
<b>Total of Fixed Cost</b>			<b>12530400</b>
Variable cost (BTT)	Maintenance	Rp/hour	11592
	Operator wage	Rp/hour	11428.571
	Fuel	Rp/hour	10826.4
	Oli	Rp/hour	3010
<b>Total of Variable Cost</b>			<b>36856.971</b>
<b>Basic Cost</b>			<b>290693.762</b>

Based on the obtained data, it is identified that fixed costs is Rp 12,530,400,-/year and non-fixed costs is Rp 36,856,971,-/hour. So it can be concluded that basic cost is Rp. 290,693,762,-/ha or Rp. 290,700,-/ha.

Similar research has been conducted on the techno-economic study of rice transplanter indo jarwo type in dharamsraya district, West Sumatra. The results from the basic costs of using a rice transplanter was Rp. 322,716,-/ha [5]. Whereas in other similar studies regarding techno-economics of agricultural machine tools (rice transplants) in Ilocos, Philippines the results of the basic costs of using a rice transplanter were ₱ 7,050.42,-/ha or equivalent to Rp. 1.946.197.94,- /ha [13].

### Cash Flow in 1 ha

Cash flow showed the amount of money that went into the business and the types of money inflows and also from the amount of money spent and the types of costs incurred [7]. The following are the average costs incurred and the profit obtained from a farmer. Where the results are assumed to be in the area of paddy rice fields of 1 ha.

**Table 3.** Farmer Profit

Description	Needs	Cost (Rp)
Seed	46 kg	575000
Fertilizer	Urea	181 kg 362000
	SP-36	58 kg 145000
	KCL	24 kg 148800
	NPK/ponska	134 kg 335000
	ZA	84 kg 168000
	Manure	153 kg 122400
	Other	120 kg 156000
Pesticide	8 bottles	607200
Machine	Tractor	285700
	Rice Transplanter	290700
	Transport	50000
Labor	Mopok (Cleaning)	1 ha 1090000
	Planting	1 ha -
	Weeding	1 ha 971300
	Spraying	1 ha 545000
	Fertilizing	1 ha 410400
	Harvest	1 ha 2540500
	Others	1 ha 1315500
Irrigation	1 ha	587500
Land rent	1 ha	8333300
Land tax	1 ha	240000
<b>Total Spending</b>		<b>10043500</b>
Production	GK Filed	7.16 ton 33652000
	GK Grind	0 ton 0
	Rice	0 ton 0
<b>Total Income</b>		<b>33652000</b>
<b>Profit</b>		<b>14447700</b>

The costs spenden by farmers are costs for purchasing seeds, fertilizers, pesticides, and the use of machine tools along with operators requiring a total expenditure of Rp. 10,043,500,-/ha. While the income earned by farmers based on rice production from the sale of Grain (Raw) was

Rp. 32,506,400,-/ha. So the profits obtained by a farmer for every 1 ha is Rp. 14,447,700,-.

#### Farming Feasibility

Based on the value of costs that have been previously known, then the financial analysis is carried out to find out whether the farm is feasible to continue or not. So the value of financial feasibility is obtained as follows.

**Table 4.** Financial Feasibility

Parameter	Value	Information
NPV	Rp 65,797,914	Feasible
IRR	45.29 %	Feasible
Net B/C	2.02	Feasible
PBP	2.22 year	Feasible

The NPV value was 65,797,914 which means that the value is  $> 0$ , so it can be said feasible. Next, for the IRR value was 45.29% or more than the bank interest rate (MARR) previously set at 12%, so that it can be said to be feasible. Furthermore, for the value of the Net B/C was 2.02 or every investment of 1 rupiah will produce 2.02 rupiah. Because the value is more than 1 so, it can be said to be feasible. The value of the Payback period was 2.22 years, it means that the return period of investment is faster than the economic life that has been previously set, a time period of 7 years. Based on these criteria, it can be said that the use of rice transplanter machines for planting rice seedlings in rice farming in Junrejo district, Batu city is feasible and can be continued.

Similar research conducted on the financial feasibility of rice transplanter services in Sragen Regency shows feasible result to run with NPV Rp. 22,391,888,-, B/C ratio 1.26, IRR 59.59% and PBP 2.42 years. In this study financial feasibility was assessed based on the same criteria, namely NPV, B/C ratio, IRR and PBP. [1].

Whereas in other similar studies on techno-economics agricultural machinery (rice transplanter) in Ilocos, Philippines was feasible to run with a B/C ratio of 1.13, PBP 7.76 years and BEP 31.43 ha. In this study financial feasibility was only assessed based on criteria, B/C ratio, PBP and BEP (Break Even Point) [13].

#### Sensitivity Analysis

From the calculations that have been done, it can be seen that the use of Rice Transplanter in Junrejo district, Batu City is sensitive to the decline in selling prices by 18% and decrease in production by 15%. This is because the financial feasibility criteria for NPV, IRR, net B/C, and PBP are not feasible at the time of the changes where

NPV $< 0$ , IRR $< 12\%$ , net B / C ratio $< 1$  and PBP $> 7$  years.

#### CONCLUSION

1. The use of *Rice Transplanter* in Junrejo district, Batu City is feasible to run based on financial feasibility.
2. The use of *rice transplanter* in Junrejo district, Batu city sensitive to the decline in selling prices by 18% and decrease in production by 15%.
3. This research can be applied to further research with other types of agricultural machinery and in other regions.

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