Analysis of economic feasibility of assisted tractors in Banten province, Indonesia

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Abstract. The objectives of this study were: 1) Knowing the performance and efficiency of tractors using in Banten province, 2) Knowing the economic feasibility of tractors business, 3) Knowing the business problems of tractors. The sampling method uses purposive simple random sampling with 123 respondents. The method of analysis uses B/C ratio, IRR, NPV, PP, and descriptive. The results are: 1) The potential capacity of hand tractors per year is 32.6 ha while the actual capacity only 23.9 ha/year, so the efficiency is 73.3%, while the efficiency of 4-WT is 22.8%, 2) For hand tractor the value of B/C ratio based on economic price is 0.66, NPV disc factor 45% is IDR 8,953,415, and IRR is 78%, and PP is 1.73 years; for 4-WT the value of B/C ratio is 0.89, NPV disc factor is IDR. 16,693,824 and IRR is 11%, and PP is 11.7 years. 3) The problem of the tractors business, if there is an engine failure, the owner has not been able to fix it and the availability of spare parts is relatively difficult. Suggestions, the central and regional governments need to provide training to improve the 4-WT machines.

1 Introduction

Banten Province in 2018 produced rice of 1.68 million tons of unhusked rice. The results were obtained from the harvested area of 428,628 ha or productivity of 3.92 tons of unhusked rice/ha [1]. One of the government programs through Special Efforts is to distribute aid for agricultural machinery to farmers, namely hand tractors or two-wheel tractors (2-WT), four-wheel tractors (4-WT), Combine mini harvester, medium and large (SCH, MCH, and BCH), water pumps, transplanters (planting tools), corn and soybean applicator. For Banten province, the number of hand tractors that have been distributed in the 2012-2016 period is 2,734 units, consist of 4-WT is 68 units, water pumps are 1,379 units [2]. Assisted hand

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tractors, engine power varies from 8.5 PK -11 PK, but generally are 11 PK with brand Kubota, Quick, Yanmar, and Boxer.

The assistance of machine tools is expected to increase food production, especially rice with increasing in the crop index. In particular, the CH function is to speed up the harvest process and suppress yield loss. According to [3], the use of machine tools in UPJA (Business of Machine tools Service Serving) institutions is not only to improve efficiency in farming but also to the scarcity and high cost of labor, adjusting climate conditions, comfort and safety, and social prestige. According to [3] machine tools are equipment that is operated without or with a motorbike for cultivation, maintenance, harvest, and post-harvest activities, management of agricultural, livestock, and animal health products. The institutional function of the Agricultural machinery service business (BMSS) is to carry out economic activities in the form of machine tools services ranging from land management to post-harvest [4].

To determine the performance, effectiveness, economic feasibility of assisted tractors and their problems. This study is needed as input and recommendations for future assisted tractor policies.

2 Materials and methods

2.1 Data Collection Methods, Location and Time of Study

The method used in this study is the survey method, for primary data collection. Primary data collection was carried out by conducting direct interviews with respondents, the owner or manager of the tractor using a structured questionnaire. Besides the survey method literature studies were also conducted and secondary data collection from agencies such as the Banten Province Agriculture and Animal Husbandry Office, the relevant District Agricultural Service, and the Banten Province Central Bureau of Statistics were conducted.

The sampling method of primary data at the level of the respondent is done by purposive sampling because the number of respondents is limited. From Banten province, four rice producer districts were selected, namely Regency of Lebak, Pandeglang, Serang, and Tangerang. Total farmers respondents amounted to 123 respondent's farmers, consist of 29 respondent's farmers from Serang Regency, 29 respondents from Tangerang Regency, 28 respondents from Lebak regency, and 37 respondents from Pandeglang regency. The period time of this study was for a year from January 2018-December 2018.

2.2 Analysis method

The data analysis used consisted of qualitative and quantitative analysis. Qualitative analysis uses descriptive statistics (use tabulation and percentage analysis) and quantitative analysis using a project feasibility analysis. To find out the business feasibility of tractor financial analysis is carried out by calculating the value of NPV (Net Present Value), IRR (Internal Rate of Return), and PP (Payback Period). To calculate the NPV, IRR, PP values used by the Excel computer program. The above is also used to evaluate a project, especially those with a project life (economic life) of more than five years.

2.2.1 Net Present Value (NPV)

NPV is the difference between the Present Value rather than the benefit and Present Value rather than the Cost during the economic life of the project [5]. According to [6], NPV is used to find out how much the benefits and the number of costs during the economic life of the project in the future whose value is currently measured by present money value. According

to [7], NPV is the present value of the income cash flow generated by the investment.This is by using a discounting factor, as follows [5,6,7]:

$$NPV = \left[\frac{B_1}{(1+i)^1} + \frac{B2}{(1+i)^2} \ldots\ldots + \frac{B3}{(1+i)^n}\right] - \left[\frac{C_1}{(1+i)^1} + \frac{C2}{(1+i)^2} \ldots\ldots + \frac{C3}{(1+i)^n}\right] \quad (1)$$

$$NPV = \sum_{t=1}^{n} \frac{B_t}{(1+i)^t} - \sum_{t=1}^{n} \frac{C_t}{(1+i)^t} = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t} \quad (2)$$

Where:

B_t = gross benefits concerning a project in year t
C_t = Gross cost in connection with the project in year t
n = the economic life of the project
i = discounted rate
If NPV ≥ 0 a project is feasible ("go") on the contrary if NPV ≤ 0 a project should be rejected because it is not feasible.

2.2.2 Internal Rate of Return (IRR)

IRR is the discount rate i that makes the NPV of the project equal to zero [5,6]. [7] said the IRR is the maximum interest rate a project can pay for the resources used. The formula of IRR as follow [5,6,7], namely:

$$IRR = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+IRR)^t} \quad (3)$$

Where:
B_t = gross benefits related to a project in year t
C_t = Gross cost in connection with the project in year t
n = the economic life of the project
i = discount rate or interest rate

To find the ideal interest rate (discount rate) obtained by means of interpolation or extrapolation between lower interest rates that produce a positive NPV with a higher interest rate and which produces a negative NPV. Mathematically can be calculated by the formula [6, 7], as follow:

$$IRR = \left[i_p + \frac{NPV_p}{PV_p - PV_n} x(i_n - i_p)\right] \quad (4)$$

Where:
IRR = Internal Rate of Return or the rate of return on investment clean of a project.
NPV = Net Present Value rather than Present Value
PVp = a positive Present Value (PV)
PV_n = a negative Present Value (PV)

2.2.3 Payback Period (PP)

PP to calculate how many years so that the business will return on investment. According to [8] PP is used to calculate the time it takes for cash inflows to be equal to cash outflows. The formula of the *Payback Period* (PP) as follow [9]:

$$PP = PP\ initial + \frac{Io - \sum_{t=1}^{n} CF_t - 1}{CF_t} \quad (5)$$

Where, *CF* was cash flow*; Io* was initial investment/ cash outflow; *n* was period of investment; and *PP* unit is time (can be years, months, and others).

According to [10] The working capacity of a tool is defined as the work capacity of a tool (machine) to produce results (ha, kg, liter) per unit time. The efficiency of using a tractor is the ratio between the effective field capacity and the theoretical field capacity (potential) which is expressed in percent (%). The formula is [11,12].

Efficiency = Effective Field Capacity/Theoretical Field Capacity (Potential) x 100% (6)

In the tractors business analysis, to find out the benefits of each of the costs incurred, an analysis of the Benefit-Cost (B/C) ratio is used. The B/C ratio must be > 1 so that the business is profitable. The existing data is processed by computer, for tabulation analysis and B/C ratio, NPV, IRR, and PP are processed with the Excel program.

3 Results and discussions

3.1 Characteristics of Respondents

Based on the results of a survey of 123 respondents it was known that the average age of respondents was 47.3 years with a range of 25-75 years. The duration of formal education is 7.9 years with a range of 0-16 years. This means that the level of education of respondents is the average of the second-year junior high school, while the education level is lowest is 0 years. The main occupation is 123 respondents (92.6%) are farmers, 3.3% are traders, 3.3% are farm laborers who double as operators, and 0.8% are employees.

The area of land belonging to all types of land ranging from irrigated fields, rainfed, dry fields, gardens, and yards is 0.98 ha with a range of 0 - 9 ha and non-owned is 1.1 ha with a range of 0-20 ha so the total land area is 2.1 ha with a range of 0-20 ha. Specifically, the area of the irrigated rice field area is 0.35 ha with a range of 0-0.83 ha, while the unirrigated rice field area is 0.83 ha with a range of 0-20 ha. The un of irrigated rice fields 0.7 ha is cultivated through sharing (profit sharing) and 0.13 ha by renting and 0.06 ha by pawning

These machine tools hand tractors or Two Wheel Tractor (2-WT) and Four-Wheel Tractor (4-WT) is general assistance from the government. For 2-WT the ability of riel services to harvest rice is 0.5 ha/day with working hours of 10 hours/day. While 4-WT real service capability is 3 ha/day, with working hours 8-10 hours/day.

3.2 Cost-Benefit Analysis (B/C ratio)

Based on the survey results it is known that the B/C ratio of hand tractor is 1.02 in financial price, which means that this hand tractor business is financially profitable. Land processing wages (revenue) averaging IDR. 1,112,000/ha with a total cost of IDR. 533,253/ha so that an income of IDR. 566,747/ha is obtained. The cost benefits of hand tractors are detailed in Table 1.

Based on social or economic price only premium or gasoline that subsidy by the government as much as IDR 4,950/liter, while the economic price was IDR 11,500/liter. Other expenses like oil, wage, purchasing of spare parts were according to the market price. Based on social (economic) price the total cost increase to be IDR 676,171/ha while the return was fixed IDR 1,120,000/ha. The value of B/C ratio decreased to be 0.66, which means economically the hand tractor business is not profitable.

The average land management service per planting season is 12 ha from the average potential service capacity of 20 ha/planting season (PS) or 40.0 ha/year, so the effectiveness is 60.0%. Based on [13] in Nigeria, the efficiency or effectiveness for the cultivation of hand tractors is 66.63%. Thus, the hand tractor business can generate revenue of IDR 6,800,963/PS. Based on research of [14] in West Borneo, Indonesia it is found that revenue

of hand tractor business is IDR 14,400,000/ha and total cost IDR 7,128,000/ha, so the B/C ratio is 1.02.

Table 1. Analysis Benefit-Cost ratio of Hand Tractor per Ha Based on Financial and Social Price in Banten Province in 2018[a]

No.	Types of Input-Output	Volume	Price (IDR)/Unit		Value Input-Output (IDR)	
			Financial	Social	Financial	Social
1.	Wage dan Fee:					
	a. Wage of operator				230,072	230,072
	b. Service engine	0.2	198,263	198,263	39,652.6	39,652.6
	c. Donation to Village				11,111	11,111
	d. Fee to UPJA				10,833.2	10,833.2
	e. Others	0.2	54,166	54,166	54,069	54,069
2.	Fuel and Oil:					
	a. Gasoline	23.9	6,357	11,500	151,932.3	274,850
	b. Oil	0.375	48,528	48,528	18,198	18,198
	c. Spare parts	0.2	186,925	186,925	37,385	37,385
3.	Total Cost				553,253.1	676,170.8
4.	Return	1	1,120,000	1,120,000	1,120,000	1,120,000
5.	Income				566,746.9	443,829.2
6.	R/C				2.02	1.66
7.	B/C				1.02	0.66

Real hand tractor service capacity per year is 23.9 ha with a range of 0-40 ha. When compared with the results of research [15] an average of 23.13 ha with a range of 7 - 40 ha, this service area is relatively 3.3% higher. Processing land until ready for planting with a hand tractor about 2 days with working hours of 10 hours/day. The first processing is plowing which is 10 hours and intervals of 10-14 days then rakes 10 hours/day. Furthermore, leveled with human labor 6-8 working days (MDW).

Based on the study of [16] in Riau province, it was found that depth plowing rice fields as deep as 10-20 cm and working speed 0.83-1.67 m/s for the preparation of land area of 1 ha with narrow alternating patterns, the average fuel requirement is 2.066 l/ hour, the spinning around the pattern is 1,07l l/hour, and with interaction, the speed factor with the depth of tillage is 1.205-3.059 l/hour. The average work capacity is 2,492 hours/ha, the spinning around the pattern is 4,651 hours/ha, and the interactions are 0.868-1.787 l/hour. The speed and depth of the plow is directly proportional to fuel consumption and work capacity. The best soil treatment patterns in order efficient fuel consumption and maximum work capacity are the spinning around patterns.

The study by [17] in Kediri Regency, East Java province, found that the volume of additional fuel for soil treatment using tractor two wheels that is obtained the highest fuel consumption at the speed of 1.5 m/s with average fuel consumption of 2.152 l/hour. Then at a speed of 1 m/s with an average of 2.039 l/hour and the lowest is at a speed of 0.5 m/s that is 1.9 l/hour. The result obtained the highest average speed of heaver work is at the speed of 1.5 m/s where the actual working speed of 3.602 ha/hour, followed by a speed of 1 m/s that is equal to 3.051Ha/hour and the actual working capacity of the smallest is at a speed of 0.5 m/s 2.612 ha/hour. The speed of a two-wheeled tractor with the depth of plowing does not affect actual work capacity but affects fuel consumption.

The study of [18], showed the effect of wheel tractors on soil management. It was found that the paddy soil environment demonstrates very significant changes in soil properties with depth soil density, penetrometer resistance, soil structure and pore interconnectivity, water content and movement, and soil biology. This is related to the management of the soil hardpan in relation to machinery operations and machinery use.

From the survey of 4-WT, based on the results of a survey of four respondents it is known that the average age of respondents is 51.5 years with a range of 38 - 71 years. The length of formal education is 11.8 years with a range of 9 -14 years. This means that the average level of education of the respondents is equivalent to grade 12 or grade 3 of senior high school.

Table 2. Cost Analysis of the Benefits of Four-Wheel Tractors (WT-4) per ha Based on Financial and Economic Price in Banten Province in 2018[a]

No.	Types of Input-Output	Volume	Price/Unit (IDR)		Value of Input-Output (IDR)	
			Financial	Social	Financial	Social
1.	Wage dan Fee:					
	a. Wage of operator				216,666.7	216,666.7
	b. Service of engine				14,166.7	14,166.7
	c. Donation to Village				0	0
	d. Fee to UPJA				16,666.7	16,666.7
	e. Others				0	0
2.	Fuel, and Spare parts:					
	a. Gasoline	20.4	7,337	11,500	149,674.8	234,600
	b. Oil	0.45	34,363.6	34,363.6	15,463.6	15,463.6
	c. Spare parts				18,333.3	18,333.3
3.	Total Cost				43,0972	515,897.2
4.	Return	1	975,000	97,5000	975,000	975,000
5.	Income				544,028	459,102.8
6.	R/C				2.26	1.89
7.	B/C				1.26	0.89

The average land tenure is 4.25 ha with a range of 0-10 ha, of which land owned is 0.75 ha and not land owned is 3.5 ha. From the total area of land owned, an area of 0.75 ha is entirely in the form of gardens, the area of non-owned irrigated rice fields is 0, 75 ha with a range of 0-3 ha and the average area for rainfed rice is 1.33 ha with a range of 0-4 ha. Other agricultural machine tools used by farmers and generally the government assistance is Medium and Large four-wheeled tractors. This type of agricultural machine tool is used in wetland fields. The capacity (potential) of services for land management is 150 ha/PS or 300 ha/year. The real service capability is 49.5 ha in RS 2017/2018 and 18.3 ha in DS 2017 or 67.8 ha/year. So, the utilization rate is only 22.6%. This utilization can be used on dry land where the number of hand tractors is still limited.

The real ability to cultivate land until it is ready for planting (plow and rake) is 3-4 ha/day. Details of the cost-benefit analysis of the Four-Wheel Tractor (4-WT) are presented in Table 2. Based on Table 2, it is known that 4-WT business revenues amounting to IDR. 975,000/ha originated from land processing wages. Land management fee is partly 50% of IDR 700,000/ha, which is only once raking or plowing, while raking uses hand tractors. The other half (50%) wages IDR. 1,250,000/ha, namely rake/plow and rake (leveling). The total cost is relatively low at IDR 430,972/ha, this is because the operator's wages are relatively low at IDR. 216,667/ha (50.3%), so the 4-WT operating income is IDR 544,028/ha with a B/C ratio of 1.26. This means that the 4-WT business is financially profitable.

Based on study of [19] in Central Sulawesi, Indonesia about four wheel tractor business, the results show that UPJA business in farmer group level for both 85 HP and 95 HP tractor power were not financially feasible with BC ratio of 0.27 and 0.15 consecutively. Tractor 95 House Power (HP) was more efficient compared to 85 House Power in land efficiency management with values 62% and 54%. The theoretical field capacity (Kt) tractor 85 HP was the same with tractor 95 HP about 0.403 ha/hour, while the effective field capacity (Ke) of tractor 95 HP was higher compared to 85 HP.

3.3 NPV analysis, IRR, PP of Hand Tractors

Table 3. Cash Flow of Hand Tractors Business Based on Economic Prices in Banten Province 2018[a]

Description	**2015**	**2018**	**2021**	**2024**	**2027**	**NPV**	**Total of Cash**
	0	**3**	**6**	**9**	**12**		**Flow**
	(IDR)	**(IDR)**	**(IDR)**	**(IDR)**	**(IDR)**		**(IDR)**
I. Fixed Cost							
1. Investatiton:		-	-	-	-		
a. Purchasing of hand tractor	22,961,905						
II. Variable Costs							
a. Gasoline/Diesel	6,596,400	7,636,158	8,839,807	10,233,181	11,846,187		
b. Wage of Labor	5,521,728	6,392,090	7,399,644	8,566,012	9,916,230		
c. Oli	436,752	505,595	585,289	677,546	784,344		
d. Engine Service	951,672	1,101,679	1,275,331	1,476,356	1,709,066		
e. Purchasing of Spare Part	897,240	1,038,667	1,202,387	1,391,914	1,611,314		
f. Donation to farmer Group/UPJA	259,997	300,979	348,421	403,340	466,917		
g. Donation to Body of Agricul. Service	-						
h. Donation to village	266,664	308,697	357,355	413,683	478,890		
i. Others	1,297,656.00	1,502,199	1,738,983	2,013,090	2,330,404		
j. Machine tools depreciation	1,913,492.08	1,913,492	1,913,492	1,913,492	1,913,492		
III. Total Cost	41,103,506	20,699,557	23,660,710	27,088,615	31,056,844		
IV. Wage of Land Processing	1,120,000	1,296,540	1,500,907	1,737,488	2,011,359		
V. Land area that plowed	24	24	24	24	24		
VI. Volume of sales	26,880,000	31,116,960	36,021,771	41,699,702	48,272,618		
VII. Value of residual	-	-	-	-	-		
VIII. Return	26,880,000	31,116,960	36,021,771	41,699,702	48,272,618		
IX. Gross Income	(14,223,506)	10,417,403	12,361,061	14,611,087	17,215,774		
X. Tax	-	-	-	-	-		

Description	2015	2018	2021	2024	2027	NPV	Total of Cash
	0	3	6	9	12		Flow
	(IDR)	(IDR)	(IDR)	(IDR)	(IDR)		(IDR)
XI. Net Income	(14,223,506)	10,417,403	12,361,061	14,611,087	17,215,774		
Disc Factor 15%	1	0.658	0.432	0.284	0.187		
NPV15%	(14,223,506)	6,849,612	5,344,028	4,153,383	3,217,751	49,707,376	63,930,881
Disc Factor 30%	1	0.455	0.207	0.094	0.043		
NPV30	(14,223,506)	4,741,649	2,560,918	1,377,820	738,935	20,961,422	
Disc Factor 45%	1	0.328	0.108	0.035	0.012		
NPV45%	(14,223,506)	3,417,083	1,329,988	515,668	199,301	8,953,415	23,176,921
Disc factor 90%	1	0.146	0.021	0.003	0.000		
NPV90%	(14,223,506)	1,518,793	262,745	45,279	7,778	-3,201,105	11,022,400
Disc factor 25%	1	0.177	0.031	0.006	0.001		
NPV 78%	(14,223,506)	1,847,139	388,629	81,452	17,017	-1,380,260	12,843,246
IRR	0.78						
PP	1.19						

Based on the analysis of the B/C ratio compiled the calculation table of NPV and IRR values as shown in Table 3. The life cycle of the hand tractor (2-WT) is 12 years according to the highest age ever used by the respondent. The feasibility analysis of the project was carried out on a hand tractor in 2015, namely, 21 respondents with 81.0% branded Kubota 8.5-11 PK, Yanmar brand 14.3%, and Boxer 1000 at 4.7%. The area of land cultivated per year is 20 ha according to the results of enumeration and is assumed to remain for the life of the project. Assumptions are used for the types of costs and the selling price of output (wage for processing land), which increases 5% each year according to the range of inflation.

Based on Table 3 below, it is known that the Internal Rate of Return (IRR) value of the hand tractor is 0.78 or 78%, which means the Net Present Value (NPV) of the hand tractor at the same time as zero interest rate is 78%. If NPV ≥ 0, the project (in this case the hand tractor business) is feasible economically. So, until the bank interest rate is 78% (discounted rate) the tractor business is still economically feasible. NPV value at a 45% discountedrate of IDR 8,953,415, which means the net present value (profit) for the age of 12 years of business is IDR. 8,953,415 while the cumulative net valuefor the life of the business is IDR. 23,176,921.

The value of the Payback Period (PP) or how many years so that the business can return on investment can be calculated in this analysis, which is 1.73 years. The relatively short return on capital is due to the investment cost of a hand tractor of IDR 22.9 million while the annual income/profit is IDR 26.9 million. So, the hand tractor business is very feasible economically.

Based on financial price the value of IRR was 0.76 and PP was 1.13, meanwhile, the value of NPV at a 45% discounted rate was IDR 16,986,073 and the cumulative NPV for the life of the business was IDR. 47,151,383. Based on [20] in Yogyakarta, it is known that the B/C value of the hand

tractor ratio is 1.23 and the IRR value is 50.12% while the NPV value is IDR. 13,496,519, and IRR of 50.12 percent and return on investment of 4.1 years

Based on the results of research [21] regarding services fee of agriculture machine tools in Central Sulawesi Province, it is known that UPJA hand tractor with a rental value of IDR 400,000 / ha with an area of 17.5 ha/PS obtained a B/C ratio of 1.019, an IRR of 7%, and NPV IDR. 370, 425. For not-UPJA (Yanmar brand) with an area of 22.5 ha, a B/C ratio of 1.036 is obtained, an IRR value of 32%, and an NPV value of IDR. 681,562.5.

Based on the results of research by [22] it is known that the hand tractor service business in Weleri District, Kendal Regency, Central Java is known that the R/C value of 1.71 or B/C ratio of 0.71 means that the hand tractor service business is not yet financially viable. [23] in their study of the financial feasibility of two-wheeled (hand) tractors in Sambas Regency in 2015 found that in the UPJA Gunung Hijau group the NPV value was IDR. 73,953,184, the B/C ratio was 1.8 and the IRR value was 32.8 %. Then the results of the UPJA Reform study found that the NPV value was IDR. 58,205,763, the B/C ratio was 1.6 and the IRR was 27.0%.

Based on study of [24] in Gresik Regency, it is known only four districts of which can categorized is competent, that is: a). District of Cerme; BCR = 1.158; NPV = IDR 3,649,196.377; IRR = 25.620, b). District of Soothsayer; BCR = 1.079; NPV = IDR 1,822,780.828; IRR = 19.620, c) District of Sidayu; BCR = 1.078; NPV = IDR 1,777,389.728; IRR=19.500, d). District of Balongpanggang; BCR= 1.060; NPV= 1,343,907.749; IRR = 18.030. In addition, this was done with UPJA pattern with Operational Cooperation.

Based on the study of [10], it was found the hand tractor rental business is feasible because owned by a positive NPV value or greater than zero that is IDR 77,955,382; IRR is greater than the commercial interest rate (12%) ie, 12.2%; and BC ratio greater than one that is 1.18.

3.4 NPV analysis, IRR, PP of Four-Wheel Tractor

Based on B/C ratio analysis, NPV and IRR analysis of the 4-WT business is compiled. The assumptions used are relatively the same as hand tractors, such as the increase in costs and output prices, which is 5% per year. Based on calculations on economic price the IRR value is 0.15 or 15% means that up to the interest rate of 15% the 4-WT business is still profitable economically. The NPV value at the 10% interest rate is IDR 16,693,824 with a net value over the life of the business that is 15 years at IDR 369,566,640.

The value of the Payback Period (PP) or how many years so that the business will return on capital is 11.72 years. The value of 4-WT income is IDR 11.5 million in the first year with an investment cost of IDR 360.5 million. This relatively long return on capital is due to an investment cost of IDR 360.5 million, so capital will return within 11.72 years.

While based on financial price, the value of the B/C ratio is 1.02, the IRR value is 0.25 or 25% means that up to the interest rate of 25% the WT-4 business is still profitable financially. The NPV value at the 25% interest rate is IDR 169,461,856 with a net value overthe life of the business that is 15 years at IDR 516,767,079. The value of the Payback Period(PP) or how many years so that the business will return on capital is 5.3 years. The value of WT-4 income is IDR 66.1 million per year with an investment cost of IDR 360.5 million. This relatively short return on capital is due to an investment cost of IDR 360.5 million, so capital will return within 5.3 years. So, the Four-Wheel Tractor business is financially feasible. The detailed of cash flow of 4-WT was presented in Table 4 below.

Table 4. Cash Flow Four Wheel Tractors Based on Economic Price per Planted Season in Banten Province in 2018[a]

Description	**2017**	**2021**	**2025**	**2029**	**2032**	**NPV**	**Total of Cash**
	0	**4**	**8**	**12**	**15**		**Flow**
	(IDR)	**(IDR)**	**(IDR)**	**(IDR)**	**(IDR)**	**(IDR)**	**(IDR)**
I. Fixed Cost							
1.Investatiton:		-	-	-	-		
a. Purchasing of Four-wheel tractor	352,500,000						
b. Warehouse	8,000,000						
II. Variable Costs							
a.Gasoline/Diesel	15,905,880	19,333,697	23,500,229	28,564,675	33,067,182		
b. Wage of Labor	14,690,002	17,855,790	21,703,824	26,381,133	30,539,460		
c. Oli	1,048,432	1,274,376	1,549,012	1,882,833	2,179,615		
d. Engine Service	960,502	1,167,497	1,419,099	1,724,924	1,996,815		
e. Purchasing of Spare part	1,242,998	1,510,872	1,836,474	2,232,245	2,584,103		
f. Donation to farmer group/UPJA	1,130,002	1,373,525	1,669,528	2,029,322	2,349,194		
g. Donation to Body of Agricul. Service	-						
h. Donation to village	-	-	-	-	-		
i. Machine tools depreciation	23,500,000	23,500,000	23,500,000	23,500,000	23,500,000		
III. Total Cost	418,977,817	66,015,755	75,178,166	86,315,133	96,216,369		
IV. Wage of Land Processing	975,000	1,185,119	1,440,519	1,750,960	2,026,955		
V. Land area that plowed	68	82	100	122	141		
VI. Volume of sales	66,105,000	97,667,192	144,298,925	213,195,232	285,702,001		
VII. Value of residual	-	-	-	-	-		
VIII. Return	66,105,000	97,667,192	144,298,925	213,195,232	285,702,001		
IX. Gross Income	(352,872,817)	31,651,437	69,120,759	126,880,099	189,485,632		
X. Tax	0	0	0	0	0		
XI. Net Income	(352,872,817)	31,651,437	69,120,759	126,880,099	189,485,632		
Disc Factor 10%	1	0.683	0.467	0.187	0.123		
NPV10%	(352,872,817)	21,618,358	32,245,344	23,714,798	23,286,739	16,693,824	369,566,640
Disc Factor 20%	1	0.482	0.233	0.112	0.065		
NPV20%	(352,872,817)	15,264,003	16,075,279	14,230,447	12,298,654	-136,743,893	216,128,924
Dis Factor 25%	1	0.410	0.168	0.069	0.035	5	4
NPV 25%	(352,872,817)	12,964,429	11,596,539	8,719,134	6,666,933	-194,796,415	158,076,401
IRR	**0.11**						
PP	**11.72**						

Four-wheel tractor is also useful in accelerating planting time and increasing the area of cultivation. Most respondents namely 50% use it both for plow and rake and for plow only. Based on interviews, the potential service capacity is 150 ha/Planted Season (PS), and the actual capacity in RS 2017/2018 is 49.5 ha/PS and in DS-I 2017 is 18.3 ha/PS. The results of the [25] in Ghana, found that rice farming with high mechanization intensity produces higher productivity compared to farms with lower mechanization intensity.

Based on the study of [26] in South Sulawesi province, it is showed that the performance of the tractor of Effective Field Capacity (EFC) obtained 0.138 ha/hour and theoretical field capacity (TFC) 0.191 km/hour with work efficiency is 68%. The cost analysis said that the operational costs that expenses are IDR 31,458,125/year and IDR. 5,493,450/ha for variable costs.

Ranjbarian *et al.* in their study (2015) [27] in Iran with used 4-WT tractor type MF 285 in clay soil, it was found that fuel consumption decreased by the increase of velocity from 1.5 km/h to 3 km/h but increased by an increase of velocity from 3 km/h to 4 km/h.

Altintas & Ozcelic also made a study [28] in Turkey, it was found that a four-wheel tractor used for four farms and the peak months for tractor using was April, October, and September. It was also found, when compared ownership with rental in terms of costs, having a tractor generally seems advantageous.

The problem with the tractor management business is that if there is a broken machine, especially in a four-wheeled tractor, the tractor owner or manager is not able to repair it, and the spare parts are not available in the nearest city and must be purchased to Jakarta.

4 Conclusions and suggestions

The utilization rate of new hand tractors is 73.3% of its potential capacity or efficiency relatively, and four-wheel tractors are relatively small at 22.6% or not efficient relatively. The average ownership of hand tractors per farmer group is 1.8 units. Tractors have no direct impact on increasing rice production and can directly increase the planting area from an average of 121.1 ha per village/PS and increase to 125.6 ha per village/PS (an increase of 3.7%). Based on economic prices, the B/C value hand tractor ratio is 0.66. NPV at discounted factor 45% is IDR 8,953,415, and IRR is 78%, and PP is 1.73 years. The B/C ratio of a four-wheel tractor is 0.89, the IRR value of 0.11 or 11 %, the NPV value at the discount factor 10% is IDR 16,693,824 with an NPV cumulative over the life of the business that is15 years at IDR 369,566,640, meanwhile, the value of the Payback Period (PP) is 11.7years. The problem with the tractor management business is that if there is a broken machine,especially in a four-wheeled tractor, the tractor owner or manager is not able to repair it, and the spare parts are not available in the nearest city and must be purchased in Jakarta.

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