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Financial feasibility study of smallholder oil palm in Muaro Jambi District, Jambi

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Abstract. Research objectives were to explain smallholder oil palm production expenditure, to explain annual rate of their profit, to explain feasibility smallholder oil palm farming financially in Muaro Jambi District, Jambi. Study was conducted in in 2017. 86 samples were selected by sampling method purposively. Primary and secondary data was needed in this research. Research operated the calculation of TC = FC + VC to explain first objective. While I = TR – TC method was operated to explain second objective. In order to analyze last objective, some methods were operated. Research found that rate of its expenditure was in average level. Its cost included operation cost, labor cost and other cost. Rate of its profit each hectare was IDR 19.118.532.- while its rate per household was IDR 25.412.602.- Therefore, it can be said that smallholder oil palm farming was feasible.

Keywords: Oil Palm Farming ; Expenditure; Profit; Feasibility Study

1. Introduction

Oil palm in Indonesia occupied one third of its world acreage, meanwhile, it was the second in production. Its production in 2009-2015 was 75.54 million FFB approaching half of world level. Almost half century, its acreage has developed quickly 11.12% annually. From economic point of view, annual growth each year was 11.83% for Smallholder and the rest for other [1].

Sector in agriculture is main sources to push Jambi economic development. Some economic indicators were used to check Jambi development. Specifically, indicators in agriculture has played one third of Jambi GDP and used about one third of labour sector from a half of labor indicator [2]. Therefore, agriculture sector especially, oil palm farming has become important sectors in Jambi economics.

The main commodity that played importantly in Muaro Jambi District was oil palm. It becomes leading sector to increase regional income after other best sectors such as gas. And Muaro Jambi is the majority area to be oil palm producer and exporter in Jambi [3].

In order to increase development in Muaro Jambi, the contribution of oil palm sector has become main player. Since it can be a trigger of economic indicator of development and profit especially. So, from economic and development point of view, the rule of oil palm in Muaro Jambi has played leading sector and become priority to explored more in many aspects [4].

Oil palm sector is strategic sector for Jambi farmers because its contribution can still be increased using many implementation such as replanting for old plant, applying new technology and other activities. Since its impact is high enough to improve economic sector, many farmers involve in this farming.

District of Muaro Jambi has largest area of this farming in Jambi. It covers almost 100 hectare or one fifth of oil palm acreage in Jambi. Then, its production contribute almost 200 hundred tons or almost one fifth, its productivity was 2.6 ton each hectare. However, comparing to Jambi indicator, oil palm production and productivity in Muaro Jambi was rather small. Some factors that become it low was most area containing of damaget plant covering of 81.37% of Jambi area. From this point, it can

give negative impact for developing oil palm in 2016.

One of oil palm area that has largest portion is Sungai Bahar Sub-District. It cover 32.312 hectare or 33.09% areal and also give 46.414 ton production for Muaro Jambi. However, its productivity rate was still small because most of oil palm plant has a problem in its condition. Many possibility are still available to improve this condition. Replanting program can be used to solve this problem, because oil palm may give economic contribution more than 25 year. Replanting program finally, become the strategic solution to see how this sector can play an important role in order to increase farmers social life [5].

Smallholder oil palm, when from acreage point of view of in Muaro Jambi, its portion is still high covering of 63 percentage [3]. Eventhough the area of smallholder oil palm is high, comparing to private or state oil palm, its production is still low in portion. The middle point, its productivity is around 10 ton each hectare each year [3]. So it has point that it just give less than 1 ton each hectare each month. Moreover, rendement level of FFB was still small on majority farmers. Many factors can be used to see this problem such as using unhybrid seed, bad management, and others. Finally, the problem of price become very important point because farmers are only price receiver [6]. So that smallholder oil palm condition is not really good enough.

In order to evaluate feasibility point of view, some indicators are used such as profit aspect, economic point, and other indicator [7]. This point of view is to be able to explain everything in increasing and developing financial sector in long time. This approach can explain oil palm in terms of business, improvement plan, and other future planning in practicable position [8]. Finally, reviewing with financial feasibility approach will help to solve the crucial point of smallholder oil pam.

Research objective is to explain benefit and expenditure to maintaining oil palm. From using applicable methods, research may help to see how to operate and cultivate with best management. The main aims that may solve oil palm problems are explaining oil palm from economic indicator, and to explore deeply how its oil palm do operate best with bases of feasibility.

2. Methodology

Study was located in Muaro Jambi district and choosed purposively as research area. Muaro Jambi is centra of smallholder oil palm farming which has the highest area of oil palm plantation. And Sungai Bahar as one of widest area that can be used for research study, also becomes centra and best place for oil palm production in Muaro Jambi District. Majority of its farmers have an activity as oil palm farming.

In order to evaluate oil palm plantation in terms of using investation, it is needed to study deeply benefit cost analysis including cash-flow, method of project evaluation, and other parts. Evaluation project method is used to know and analyze how oil palm plantation manages and operates in financial approach, so from this methods, it can be evaluate whether plantation works on fesible or not. There are some methods that can be used to evaluate oil palm financially. These methods includes net present value (NPV), B/C Ratio, and Internal Rate of Return (IRR). In order applying those methods, some assumptions for operating financial problems are used and be concern to evaluation project indicators and pay attention to disturb agent

In order to find the right indicator or agent of evaluation, purposive method was used. With the right proportion and getting right sample, the number of samples must be determined on the right track. As it is known that oil palm plantation can be grown until 25 year of age. Finally, considering to find right samples to answer its objective, this research used 86 households, and research was done in 2017.

Study used primary and secondary data. To find those data, methods of interviews and list of questionnaires are used. Considering research objective dan evaluation criteria, 86 households was collected from many oil palm group. Beside primary data, many sources of data such as Statistics Board, and other sources and institutions was also collected. Evaluation project methods used was NPV, IRR, and B/C [9] for analyze and evaluate it.

Project evaluation method was applied systematically. Many considerations and assumption were used in order to find the right result based on their objectives. Criteria of evaluating such as cash flow, benefit sector, cost sector, income statement and other was chosen appropriately in order to get good

way on evaluating finacial fisibility.

As mentioned above, there are evaluation project method used to decide whether project is feasible or not. Those methods can be seen as follows:

(a). Net Present Value (NPV)
This method can be expressed as follows:

$$NPV = \Sigma^n_{t=0} \, (B_t - C_t) \, / \, (1+i)^t \tag{1}$$

note:
B_t = profit in year t,
C_t = expenditure in year t,
t   = year (t = 0, 1, 2, 3,.....,n), and
i   = interest rate (%).

Project was stated accepted if NPV is more or equal to 0 (NPV $\geq$ 0). It can state that project or make profit. Otherwise, project has NPVs less from 0 (NPV < 0) then project is not accepted to operate.

(b). Benefit-Cost Ratio
Project may be declared to be accepted if B / C is bigger than one (Net B / C > 1) and stated not accepted if Net B / C smaller than of one (Net B / C < 1). Furthermore, it may be stated as follows:

$$\text{Net B/C} = \frac{\Sigma \, B \, (1/(1+i)^n}{\Sigma \, C \, (1/(1+i)^n}$$

note:
B_t = profit in year t,
C_t = expenditure in year t,
t   = year (t = 0, 1, 2, 3,.....,n), and
i   = interest rate (%).

2.1 Internal Rate of Return (IRR)
To evaluate project using IRR methods, it used interest rate for calculating it. The number differenciated on this evaluation is in percentage (%). It can be seen as follows:

$$I = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} \, (i_2 - i_1)$$

note:
i_1 = discount rate for NPV_1,
i_2 = discount rate for NPV_2,
NPV_1 = value NPV_1, and
NPV_2 = value NPV_2.

Project was stated accepted when IRR is more than interest rate. It may say project provide benefits. When project has IRR less than interest rate so project is not accepted to be operated.

3. Results
3.1 Short Background of Oil Palm
Oil palm plantation basically comes from West Africa. It grows massively since this planting is suitable in Indonesia condition. It grows in many types of land. Since it can produce easily and massively, so it can be strategic commodity and contribute in large portion of Indonesia GDP. This commodity can be expanded from primary to secondary or even tertiary commodity. In recent year, it has been major source of human need such as vegetable oil, biofuel, and other. Oil palm can produce FFB in large portion, so it may contribute majority of farming life. Furthermore, oil palm besides it can grow easily in Indonesian land type such low land, middle land and high land. Therefore, oil palm grow rapidly in many area in Indonesia, including in Jambi Province.

Seemingly, oil palm has high potential and prospect to be source of farming income, it needs

sensitively in maintaining it. This plant needs full attention in managing it such as the availability of fertilizer, pesticide, and others. And also total oil palm production depends on these attention. Economically, when its productivity rate is high, its profit also increases finally. In other words, it can say that the better oil palm plantation is managed, the higher value of profit will be found, and it can be stated that financially, oil palm, is very high potential commodity, can make high profit.

From research study, it found that oil palm productivity was varied because effect of climate change, genetic terms, and linkage among these two conditions in applying new technology. Tree that has many benefit is oil palm plantation. In recent year, oil palm is strategic commodity. So this plant grow rapidly and become one of land conversion commodity, favorite commodity, prospective, few operation labor, rather immune from herb and pest, useless technology, and few labor intensive [10]. Therefore, oil palm becomes primadona commodity.

Most of oil palm farmers are small scale farmers in research area, and they are about one third of total area of oil palm in 2016. So this condition can be found in most of research area, and some of them operated using sustainable oil palm operation. Furthermore, from research result found that from economic and financial point of views, oil palm has become main commodity. Economically, it supported Muaro Jambi GDP, and financially, it contribute high enough of farmers life condition.

Results showed that total production of oil palm account for 1,500 ton from research samples collected from 86 respondents during research period in 2017 consisting of the biggest production 39.9 thousand kg, of the smallest production about 5.4 thousand kg with production of about 16.6 thousand kg. Then based on research data, distribution of oil palm production is described in the following table.

Table 1. Distribution Oil Palm Production

Production (ton)	HH	Percentage (%)
5.350 – 10.297	10	11.63
10.298 – 15.240	29	33.72
15.241 – 20.183	27	31.40
20.184 – 25.126	12	13.95
25.127 – 30.069	5	5.82
30.070 – 35.012	2	2,32
35.013 – 39.955	1	1.16
Total	**86**	**100**

Result found that farmers did not work in optimum level, this is because some part of oil palm plant was not in good condition. By considering planting age, most of its plant in bad condition in which majority of plant was in old age. Therefore, it couldn't find in best condition, and it can't produce in optimum rate. Based on best cultivation of oil palm guidance, when plant is mostly in the year of old, it is not be able to produce in optimum level. Reality, the age of oil palm in the field was almost old condition and needed to be replanted.

In order to determine FFB price, each burden of FFB in field is evaluated and used to measure price of it, so price of FFB is calculated in farmers level. Based on oil palm price in national and international level fluctuated in every moment, it is also the price of FFB in field area. Because changing of price everyday and even in each moment, it can cause farmers income varied. However, to determine price level, it used average price level along research time. Based on field study, mean oil palm price was IDR 1,053. Meanwhile, farmers deserved to get price in IDR 1,500 each kilogram FFB. Therefore, their income that they expected was getting lower than they deserved.

3.2 Smallholder Financial Feasibility of Oil Palm Analysis
In order to calculate expenditure of oil palm activity, all of expenditure must be included, that consisted of both individual expenditure and other cost for plant operation. So it consist of expenditure of place and management. Expenditure method in this operation is including expenditure of distribution and managerial. Therefore, all expenditure in determining financial aspect has to joint all expenditure to derive financial calculation consisting expenditure of material and non material.

Sum of expenditure includes both variable and fixed expenditure that involves to get total product in period of time [11]. Then, total expenditure covers all expenditure for production. Besides operation and labor expenditure, it also include expenditure for exhausted tool. From table 2, it

showed that mean of oil palm expenditure covers all expenditure used for producing oil palm each plant per year [8].

Based on study finding, value of expenditure varied followed age of oil palm plant. In the beginning, the higher age plant will be increasing of its expenditure. For instance, expenditure for plant on the age of 0 was lower than the age of 1 year. The diversity of expenditure is caused by planting in the beginning is getting increase and also calculating its expenditure.

In 2 year old plants, spending for production activity decrease comparing to 1 year expenditure. It is because many activity such as nurseries, land cultivation and seedling need less expenditure. When plants is in 3-4 year age, expenditure need is getting high and in the age of 5 year, mean production expenditure again increase compared to plant in year of 4. Based on input used such as fertilizer, which is needed more than before, the expenditure spent was bigger. Similarly, the mean expenditure of oil palm production that was in the age from 5 to 21 year old was also increased.

Between plant of 22 and 25 year, the mean expenditure production was getting small finally, if it is compared to the year plant age before. The decreasing of this expenditure is because it was considered working in un-appropriately. By considering total expenditure is getting increase in plant of 25 year above and total income is getting decrease, it is better off when replanting is operated.

According research data, oil palm plants produce FFB at the age of 4 year. The number of oil palm project to grow 1 hectare consisting 136 oil palm seedlings start from opening into maintain of FFB for three years was needed about IDR 18.7 million and caring plant expenditure (TM) per year was around IDR. 1.6 million. However, the expenditure of oil palm seedlings start from opening up to three year old plant maintenance expenditure was required about IDR 17 million. It seems producing expenditure was rather low compare to the expenditure generally. It may be caused by some sample farmers using any seed or bad seeds so the price affects the total expenditure for TBM. While expenditure of TM treatment is far higher the number written by [1] in his oil palm study.

The expenditure of production project is affected by the amount of input production used and the price of input production existing. The following showed the mean expenditure of oil palm production per hectare per year

Table 2 Mean of Oil Palm Expenditure per hectare per year

No	Item	IDR
1	Operation Expenditure	5.488.163
2	Labor Expenditure	4.316.511
3	Depreciation	156.911
Total		9.961.585

Based on expenditure point of view, mean of total expenditure covers operation, labor and depreciation expenditure. Table 2 also drew total mean of oil palm expenditure while operation includes fertilizer and pesticide expenditure, and labor includes inside and outside households, it can be seen that the largest production expenditure was operation activity about IDR 5.5 million each hectare each year or equal to 55,1% from total production expenditure. Labor expenditure were about IDR 4.3 million per hectare per year or 43.33% of annual production expenditure per hectare. While the depreciation expenditure was only about IDR 157 thousand per hectare per year or 1.57% of production expenditure per hectare per year.

After knowing expenditure condition, it needs to know and calculate production with its price. Revenue is called in which its value derived from the results multiplication of all production with the selling price of production. Field activity is one component that determines the level of income. Revenue is obtained through calculating of total production and selling price per unit of production. The highest revenue received among the respondents is around IDR 28.9 million per hectare per year, while the lowest acceptance is around IDR. 1.3 million,- per hectare per year meanwhile the average revenue is around IDR 19 million per hectare per year.

Concerning to profit of oil palm means the difference from the total farm revenue with the total expenditure occured in the production activity which including in the production expenditure was the sum of seed expenditure, fertilizer expenditure, pesticide expenditure, labor expenditure, and depreciation expenditure. The following table showed the mean profit per hectare per year.

Table 3 The Mean of Revenue, Mean of Production Expenditure, and Mean of Profit

Item	Value
Mean of Revenue(IDR/ha/year)	19,118,532
Mean of Production Expenditure (IDR/ha/year)	9,961,585
Mean of Profit (IDR/ha/year)	9,118,262
Mean of Profit (IDR/Farmer/year)	25,412,602

Research result found mean revenue, mean production expenditure, mean profit on hectare basis and mean profit on farmer basis. Value of those item can be seen in Table 3. Since value of revenue is higher than expenditure, profit was found both in hectare basis and farmer basis. It seems that its profit per ha each year sample farmer was still low, compare to national rate. However for the mean of profit of sample farmer found the profit of each sample farmer was about IDR 25.4 million. Profit per farmer got high enough from 2.5 hectare.

Based on many condition, it determined that rate of price of IDR 1,053,- can be impact on Financial Feasibility rate on Smallholder Oil Palm in Sungai Bahar Sub-district. By using interest rate of 12.75%, and based on many conditions that the calculated IRR which is 19.893% was greater than this rate. Finally, it can be concluded that it was acceptable to manage oil palm project.

Research result found that mean of revenue is higher than expenditure, while net profit is reasonable for expanding oil palm project. Table 3 showed that considering each farmer has 2.5 hectare oil palm planting, value of mean profit is high enough for expanding oil palm project. The income per farmer in the research area was IDR 25.4 million. The income per farmer was obtained from the multiplication of the average value of income with the average land area owned by the sample farmers.

Table 4. Value of NPV, IRR, and B/C

Item	Value
NPV (IDR)	21,313,250
IRR	19.893%
B/C	2,24

According to project evaluation methods using investment point of view, firstly, by applying method of NPV, it was more than zero that has meaning of good management. Based on research results, the NPV was positive (NPV> 0) with a number of IDR 21.3 million, -. It may be said that investment on oil palm plantation project was acceptable to be operated and found income of IDR 21.3 million. Then, it found IRR of 19.893% which indicated that the project is able to accept because of up to IRR rate of 19.893%. Or in other words, this project has a breakeven point at the interest rate of 19.893%. The value of IRR obtained by 19.893% > 12.75% (bank interest applicable) means that oil palm project was accepted to be manage.

Finally, from research resulted that it got B/C ratio of 2,24. It means that when B/C ratio greater than 0 means that it is acceptable for smallholder oil palm plantation to be grown. In terms of economics point of view, if B/C ratio of 2.24 meant that each IDR 1 expenditure spent, it can get profit of IDR 2.24. Considering to all methods, project of oil palm is very benefit and will increase economic financial for oil palm farming.

4. Conclusion

Based on information and result above, there are some points can be found. Firstly, the operation expenditure needed about IDR 5,5 thousand per hectare per year. Secondly, it needed about IDR 4.3 thousand per hectare per year for labour force. And for tool expenditure needed about IDR 157 thousand per hectare per year. From economic calculation, it found about IDR 9.1 million per hectare per year for its profit, and considering based on per household per year, its profit is about IDR 25.4 million. Finally, based on financial point, smallholder oil palm commodity was found to be accepted to grow.

Acknowledgments

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