

The Impact Of Covid-19 Pandemic On The Economic Of Oil Palm Smallholders Household Income In Muaro Jambi District

Edison

University of Jambi, Indonesia

*Corresponding Author:

Email: ediedison950@yahoo.co.id

Abstract.

In a two years ago, Covid-19 pandemic has caused major problems for smallholder oil palm, with an impact on the smallholder household income and biodiversity as well. Research objective is to evaluate Covid-19 pandemic impact on the smallholder's household income of oil palm that include both on-farm and off-farm sources. Research was done in the Muaro Jambi district in the beginning of 2022 and uses cross-sectional data from 120 respondents. The analytical models used in this study are qualitative and quantitative methods. The sample of pre-Covid-19 pandemic data differs from what was seen at the study site during Covid-19 pandemic, and people due to technical constraints at the study site. The important contribution of research is supporting empirical meaning of how come Covid-19 influence economic behaviour of many variable entities in Muaro Jambi smallholder farmer household income and strategic information on the impact of Covid-19 pandemic on the economy of oil palm smallholder's household income. The research result showed that there was significantly difference between average smallholder household income before Covid-19 pandemic and during Covid-19 pandemic, there was significantly differ between the average cost of smallholder household needs before Covid-19 and during Covid-19 pandemic and also there was significantly differ between the rate of smallholder household income capability. Before the Covid-19 pandemic, the income rate of smallholder households that were able to finance their consumption was about 61.67% higher than during the Covid-19 pandemic, which was around 51.34%.

Keywords: Oil Palm; Covid-19 pandemic; smallholders; and household income.

I. INTRODUCTION

The great oil palm plantation expansion has already been a big driver of biodiversity loss in the regions of tropics. Its phenomenon is mainly evident in Indonesia, where the majority region of oil palm is cultivated. In Jambi province, oil palm acreage has also been constantly increasing, especially in regions such as Muaro Jambi, the largest producer so far. The planted area of oil palm in Jambi province has increased year by year, from 689.046 hectares in 2016 to 898,476 hectares in 2020, with an average annual increase of 4.67% in the land area. The total output increased from 1,857,261 tons in 2016 to 2,348,222 tons in 2020, with an average annual output growth of 4.18%. The maximization of smallholder oil palm acreage appears to continue over the next year [1]. Muaro Jambi district is a fast growing area of oil palm plantations on Jambi province. Data of oil palm plantation acreage and production in Jambi province from 2016 to 2020 is presented in the following table.

Table 1. Acreage and Production of Oil Palm Plantation Jambi Province 2016 - 2020

Year	Acreage (ha)			Production (ton)		
	PR	PN	PS	PR	PN	PS
2016	425.564	26.919	236.327	1.028.008	86.063	743.190
2017	450.075	23.758	240.566	998.243	84.713	711.919
2018	457.321	23.991	254.783	1.013.114	90.699	806.216
2019	463.952	24.276	267.293	1.044.724	95.242	938.497
2020	586.940	21.679	289.857	1.375.617	88.241	884.365
Total	2.791.113	146.804	1.513.313	6.422.997	529.248	4.786.223

Source: Jambi in Number, year of 2021

In Muaro Jambi, it has the largest acreage of oil palm plantations in Jambi province, which is 97,831.92 hectares, and production in 2020 was 189,663.45 tons. Smallholder's oil palm plantation has been operating since 1980s. Hence, the majority of the smallholders' oil palm trees are now in the position of final stages of production cycle, so it is suggested to do replanting activities [2]. Table 1 shows that smallholder oil palm plantations (PR) are much larger than the other two plantation types. However, the main problem that got was the lower productivity of smallholders' oil palm plantations to compete with state and private

plantations. This fact happens due to various factors both internal and external problems to the management agent, in this case the farmer or grower.

Table 2. Land Acreage and Production of Smallholders Oil Palm in Jambi Province Year of 2020

District	Land Acreage (ha)			Total (ha)	Production (ton)
	TBM	TM	TTM/TT		
Batanghari	10.629	41.494	228	52.351	140.905
Muaro Jambi	12.375	73.665	6.508	97.831	189.663
Bungo	21.929	46.715	621	69.265	115.222
Tebo	14.113	45.275	740	60.128	129.185
Merangin	11.443	53.198	1.376	66.017	210.336
Sarolangun	9.253	35.336	931	45.520	59.918
Tanjab Barat	29.162	61.439	783	91.384	249.033
Tanjab Timur	9.072	93.450	850	33.872	47.806
Kerinci	70	19	5	94	10
Total	118.046	456.374	12.042	586.940	1.142.078

Source: Jambi in Number, year of 2021

Table 2 shows that the Muaro Jambi region has the largest smallholder oil palm area or is listed as the largest old mill compared to other regions. This factThis shows that the Muaro Jambi region has the largest area of small oil palm plantations and a higher area of non-productive land (6.508 hectares) compared to other regions. As a result, this area has become an important picture for small farmers.

Table 3. Land Acreage of Smallholders Oil Palm based on Sub-district in Muaro Jambi District, Year of 2020

District	Land Acreage (ha)			Total (ha)	Production (ton)
	TBM	TM	TTM/TT		
Jaluko	553	4.363	0	4.916	16.360
Sekernan	3.477	14.130	49	17.656	37.604
Kumpeh Ilir	376	12.001	22	12.399	24.679
Muaro Sebo	3.502	6.301	0	9.803	15.235
Taman Rajo	865	379	0	1.244	970
Mestong	235	3.209	0	3.444	6.689
Kumpeh Ulu	1.769	13.147	0	14.916	39.737
Sungai Bahar	903	14.670	7.173	22.746	33.689
Bahar Selatan	254	2.382	2.943	5.579	6.525
Bahar Utara	82	2.361	1.561	4.004	6.225
Sungai gelam	359	722	43	1.124	1.950
Total	12.375	73.665	11.791	97.831	189.663

Source: Muaro Jambi in Number, year of 2021

In 2019, there was a Covid-19 pandemic in Indonesia, especially in the Muaro Jambi district. The Covid-19 virus outbreak had a negative impact on the business sector from all sectors, including the plantation commodity business. Considering that most of Muaro Jambi's Crude Palm Oil (CPO) is exported to various countries, due to the impact of Covid-19, the volume of CPO exports has decreased. One example of a CPO export destination country is China. In December 2021, Jambi exported 121,519 tons of CPO when compared to the same period in 2019, reaching 219,894 tons [1]. The impact of the Covid-19 pandemic has shown that the oil palm industry is not meeting targets and is on a downward trend [3]. (Ceballos et al. 2020). Muaro Jambi district is the district with the highest implementation of the Covid-19 pandemic target, but the pre-pandemic implementation rate reached 29.31%, while the 2021 target of 5.65 hectares has not been achieved. This scenario shows the impact on smallholder oil palm production and income from 2019 to 2021 [2]. Muaro Jambi becomes one of the areas based on the agricultural sector. The agricultural sector has been contributing significantly to the Gross Regional Product Bruto (GRPB), labor and food production, and raw materials for industry. Oil palm (*Elaeis guineensis* Jacq.) Due to its diversity, the plantation has become one of the economically important oil crops in the Jambi region. Oil palm is used in a variety of products for instance, food products (edible oil, margarine, confectionery), industrial goods (cosmetics, soap, candles), and also as one of the alternative energy sources (biodiesel) [4-5].

Oil palm plantations start producing FFB within 3 years of planting and continue to produce for about 25 years [1]. Therefore, an oil palm plantation investment is similar to a capital asset investment in that an oil palm plantation, like any other capital asset, generates ongoing earnings and returns. Its output begins to increase in the third year, and then keeps stable in the eighth to tenth year, and maintains a certain amount of output change for a long time, but most of them show a more or less rapid decline in the 20th year [6-7]. Due to the growing importance of oil palm to the Jambi economy, its acreage is increasing. It has generated incomes. On the other hand, it has been criticized as a cause of environmental consequences such as biodiversity problem. Increased areas for oil palm plantation has been linked to converting/clearing/destruction of primary forests, natural rainforest, peat swamp forest and encroachment of plantation into national parks or public lands, resulting in biodiversity losses, forest fire and greenhouse gas emissions [8]. Oil palm is one of the plantation crops that has a very high economic value. Muaro Jambi district is now one of the largest palm oil producers in Jambi province. In Muaro Jambi district, the area of oil palm plantations in 2020 will reach 144,243 ha, of which 92,548 ha are smallholder plantations. The area of oil palm plantations in Muaro Jambi district has increased from year to year. In 2016, the area of oil palm plantations reached 57,467 ha with a total production of 105,328 tons. In 2020, the area of oil palm plantations increased to 92,548 ha, with a total production of 189.663 tons [2].

During vegetative period, the farmer's income will decrease or even not exist at all when there find a specific problem such as Covid-19 pandemic. In addition, another problem is often that farmers do not know the most efficient and efficient production methods, labour, time, etc. in the context of the Covid-19 pandemic. This question is the background of this study to assess the impact of the Covid-19 pandemic on smallholder oil palm programs and alternative models in the Jambi region of Jambi [4];[8]. Production is the process of converting inputs into outputs (products). Amongst other things, at a given input and output price, the amount of output can be seen as a signal and measure of the level of income or profit of a producer [9]. According to [4], agricultural activities aim to produce an optimal quantity of agricultural products to provide the greatest monetary profit or the difference between total revenue and total cost. Research on the impact of Covid-19 needs to be explored if there is any urgency to assess the benefits and economic stability of smallholder oil palm businesses [10]. Economic studies help to theoretically and analytically determine on a long-term basis and have financial implications for the oil palm business [8]. Some phenomena can be seen from the above information as follows: (a). Does before Covid-19 pandemic and last pandemic have significant impact in smallholders' oil palm income in Muaro Jambi district Jambi province ? (b). It was better before the Covid-19 pandemic than compared to the last pandemic of smallholder oil palm income.

II. METHODS

By considering Muaro Jambi district is one of the large acreage oil palm plantations in Jambi province, research area will be identified purposively in Muaro Jambi district Jambi province. The study sample was determined by cluster random sampling method. Taking into account the simple interest in oil palm plantations with different replanting schemes, the total sample is 120 households. The study will take place in 2022. The empirical approach is to determine the impact of the Covid-19 pandemic on the oil palm smallholders' income, which includes both on-farm and off-farm resources. The flow of research problem and solution can be seen in the following figure

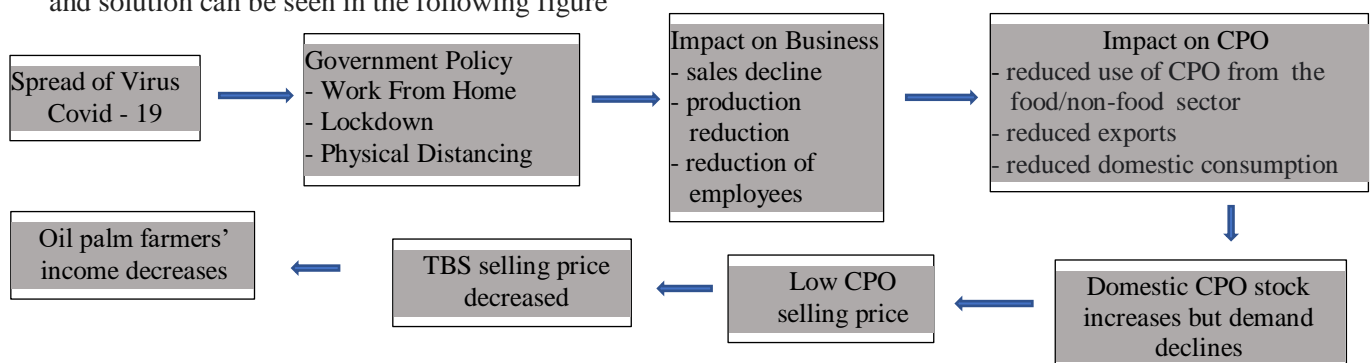


Fig 1. Oil Palm Research Framework

Research main issue applied analysis statistics descriptive by describing research performance of respondent in Sungai Bahar Sub-district and measure farm income calculation. Research method for measuring oil palm farming income can be seen as follows [4]:

Oil palm plantation income = profit - fixed costs (interest, wages, rent)

Profit = Sales - Variable costs (harvest costs, fees, etc.)

Data was analyzed using descriptive statistics and quantitative statistics. In applying descriptive statistics, some data analysis used including the method of calculating average, and t-test was used to explain the characteristics of socio-economical respondent and how Covid-19 crisis has influenced its generating activities of income, food, consumption need framework, and also other strategies applied.

Quantitative data collected research surveys was processed and calculated applying standard mathematical formulas to calculate cost, revenue, and profit, as can be seen below. Profit = TR - TC = (P x Q) - (TFC+TVC) where : TR = total revenue of oil palm plantations (IDR/ha/year); TC = total production cost (IDR/ha/year); P= FFB price (IDR/kg); Q = FFB production (kg/ha/year); TFC = total fixed cost (IDR/ha/year); TVC = total variable cost (IDR/ha/year) [11].

$$t = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

where: X_1 is the average smallholder income respondent before COVID-19 pandemic; X_2 = the average smallholder income respondent during COVID-19 pandemic; S_1^2 = variance of smallholder oil palm respondent before COVID-19 pandemic; S_2^2 = variance of smallholder oil palm respondent during COVID-19 pandemic; n_1 = number of smallholder oil palm respondent before COVID-19 pandemic; and n_2 = number of smallholder oil palm respondent during COVID-19 pandemic. An important contribution of the study is to provide empirical and theoretical understanding of how the COVID-19 pandemic affects the economic behavior of large and vulnerable entities (e.g. oil palm smallholders) in the Muaro Jambi oil palm agro-industry. This research would also provide strategic information about the impact COVID-19 pandemic on the economy of oil palm smallholders in household income.

III. RESULTS AND DISCUSSION

3.1. Socio-economic characteristics of respondent and biodiversity problems

Studies have shown that statistics describe the socioeconomic characteristics of respondents. In that research area, around 87% of respondents was male. Almost all respondents had lower education levels. Almost all respondents were heads of households, with an average household of about two to four members. Respondent household age was on average of 47.6 years, total household members of 3 - 4 persons, oil palm cultivation experience of 22.8 years, and household land ownership of 4.6 ha. Most of the farmers adopt oil palm cultivation based on recommended technology. Respondent had replanting investment of IDR. 26.269.666 or 61.02%. Seedlings' expenditure was 48.98%, 91.49% off family labor expenditure, 29.58% for oil palm maintenance. And IDR's farmers revive cost before Covid-19 IDR. 16.783.222, 39.98% during Covid-19. Seedling expenditure was 51.02%, labor expenditure on family was 4.51%, and maintenance expenditure was 70.42%. On the other hand, information on the biological significance of the conversion of highlands to oil palm in this region is rather unknown. Here, the knowledge information on the impact of oil palm on Jambi biodiversity is reviewed, which is still scarce. It was reviewed that the conservation strategies that have been implemented in the region, and proposed the study that it was needed to develop best management practices.

A great deal of study has focused on biotechnology, soils, biological pest control, carbon stock and reduction of greenhouse gases emission, but research on biodiversity is very scarce. Meanwhile, best investment and study impact oil palm and biodiversity is being developed. The most problem ecosystems are the forestry condition in the Muaro Jambi subdistrict, in which most of the development is considered. The green markets needs are slowly encouraging oil palm plantations to mitigate their 'biological concern'.

Meanwhile, appropriate studies on the impacts of oil palm on biodiversity are seemingly needed to support conservation efforts in the oil-palm plantations of Muaro Jambi, supporting with good commitments by the government and companies to adopt the final best recommendations.

3.2. Effect of Covid-19 on income-generating activities

Respondents will be interviewed if the Covid-19 crisis has affected their source of income. Around 70% of respondents responded that Covid-19 crisis had affected their regular income source, and ranged between 66% and 73% in research areas. This fact is in line with prevailing perceptions about the negative impact of the Covid-19 crisis on earnings. Even more than that, respondents were interviewed about how Covid-19 has impacted their main source of income. In the field of research, almost all impacts of the Covid-19 crisis have been associated with a reduction or cessation of business activity due to movement restrictions. Analogous impacts of the Covid-19 crisis on income sources were reported by respondents from the study area, but only a few notable cases (in terms of the number of respondents). For example, proportionally more respondents cited job losses loss, and the inability to recover as an economic impact of the crisis. On the contrary, decreasing or delay in cash payment (like wages, rental fees, or salaries) became usual. These issues may be due to the varying degrees of responses of respondents to the Covid-19 crisis; for example, government bans on travel, which may affect event business, and the ability of business owners to pay wages on time [12].

(a). Household Income. Smallholders' households earn income from oil palm plantations, other farm income and off-farm income. Data informs about smallholders' household income from the sources of oil palm income, other farming and off farming can be seen in the following table 4. Table 4 shows that the average income of smallholder households is about IDR. 42,733,930 a year before Covid-19 around IDR. 47,006,248 a year during Covid-19 around IDR 38,461,612,2,, the majority of household income is obtained from oil palm farming, before Covid-19 around 92.30% and during Covid-19 around 91.81%. Based on statistical analysis of the tests of mean value of significance at 95% confidence level. This fact meant that smallholders' household income was significantly different from household income. Before the Covid-19 pandemic, the average household income of smallholder farmers was 110.00% higher than the average household income during the Covid-19 pandemic.

Table 4. Smallholders Household Income of Oil Palm

No	Income Source	Before Covid-19 Pandemic		During Covid-19 Pandemic	
		Amount (IDR)	%	Amount (IDR)	%
1	Oil Palm Farming	43,385,603	92.30	35,312,602	91.81
2	Other Farming	714,372	1.15	692,083	1.80
3	Off Farming	2,906,273	6.55	2,456,927	6.39
Total		47,006,248	100	38,461,612	100

(b). Expenditure of Farmers Household Needs. Smallholders household needs expenditure consists of food consumption cost and other consumption costs. Expenditure on food consumption need covers purchasing rice, salt, side dishes, cooking oil, sugar, coffee/tea, fruit and kerosene expenditure. The other needs expenditure cover health, children's education fees, clothing, soap /toothpaste, home improvement, household furniture expenditure, recreation, social/religious activities and housing taxes. The composition of the average household needs expenditure on oil palm farmers before Covid-19 and during Covid-19 could be seen table 5. Table 5 shows the average household needs of smallholders before Covid-19 is around IDR 41.232.405 each year, of which food consumption (40.00%) and non-food consumption demand account for 60.00%. The average household demand during Covid-19 is around IDR. 35.039.191 each year with the composition for the cost of food consumption (42.19%) and other necessities (57.81%). The result of statistical analysis of the mean value test is significant at 95% confidence level. This fact means that the average household needs of smallholders before Covid-19 is significantly different from the average household needs during Covid-19. The average cost of household needs before Covid-19 is 109% above the average cost of household needs during Covid-19. According to [13] Household consumption, especially food consumption, will continue to increase food consumption as income increases, but to a certain extent, the increase in income no longer leads to an increase in food consumption. If the quantity of needs has already been met, then people usually focus on quality or turn to meeting non-food needs.

Table 5. Oil Palm Households Expenditure

No	Revenue Source	Before Covid-19 Pandemic		During Covid-19 Pandemic	
		Amount	%	Amount	%
1	Food Consumption Needs	16.492.723	40.00	14.783.164	42.19
2	Non-food Consumption Needs	24.739.682	60.00	20.256.027	57.81
Total		41.232.405	100	35.039.191	100

(c). Ability of Household Income. The smallholder's household income capacity is the rate of farmers' household income capacity to finance their household consumption needs. Table 4 shows the level of income capability of households to meet household needs. Table 4 shows that, pre-Covid-19, small farmers needed to finance around 20% of their household earning capacity, compared to 0% for those who could afford it, or about 10% of total household income. Statistical analysis results from the median test mean at the 95% confidence level. It meant that smallholders' household income capability rates is significantly different from households' income capacity before Covid-19, or household income capacity during Covid-19 to finance their household consumption needs is relatively higher than household income capacity during Covid-19 ability rate. On the other hand, in terms of the impact on income, respondents described other social issues arising from the COVID-19 pandemic, such as movement restrictions, work interruption schedules, health concerns, and isolation issues. Movement mobility is also associated with feelings of fear, risk, and stress from not having access to social needs. Worker wages seem to explain social effects better than other categories.

Dependency improvements have been released, which has increased the strain on family resources. In the lack of the structured system on social protection, most focussed households based on their family and friends. Informant said that it was supported to the external family in food providing, remittance, buying masks, sanitizers, and also medicines. Research shows that it determines whether respondents' regular sources of income have changed as a result of the Covid-19 crisis. The findings found that male respondents were 23% more likely than female respondents to announce that their sources of income had changed as a result of the Covid-19 crisis. The reality appears to be that a large proportion of male respondents are involved in many income-generating activities, which lead to several Covid-19 income shock triggers. The findings agree with [14] that the impact of the published market labor force on the Covid-19 crisis is not disproportionately greater among men than women. This reflects the already available capacity to borrow to spend and thus be better able to cope during periods of income shocks. In contrast, regional social protection framework activities did not differ significantly in terms of revenue sources before the Covid-19 pandemic [15]. This means that in the field of research it seems that the legality framework leading to regional social security only allows real access to retirement funds, or in the case of disability or death.

According to [16], it also reports the adverse welfare impact of the blockade due to changes in the social protection mix of poor jobs and little coverage. A desire to increase social security coverage for populations that do not appear to be eligible for cash transfers has been advocated, and are instead currently impoverished by the Covid-19 crisis [17]. In terms of income sources, research results found that farmers compared to other rate salary for workers was around 33% lower than farmers with high experience on their income source. Instead, worker wages depend on wage payment shifts, as their main source of income appears to be 16% to 17% lower compared to other sources of income, which would seem to explain the impact of the Covid-19 pandemic on their income streams. Then, smallholders' household respondent before Covid-19 was seemingly, Their sources of income have been affected by the Covid-19 crisis [18]. Overall, the findings suggest that despite the dramatic impact of the Covid-19 pandemic on many economic sectors, farmers' wages and wages have arguably suffered an income shock. Another piece of information included farmers struggling to find their farms, access resources or find their produce for the market due to the Covid-19-induced lockdown. Rule of restricted social distancing was also creating limit market activities at the time and reduced operating hours on food markets [19-20].

Table 6. Rate Smallholders Household Income Capability

No	Rate Household Income Capability	Before Covid-19 Pandemic		During Covid-19 Pandemic	
		Amount	%	Amount	%
1	Capable of Kr \geq 1	74	61.67	62	51.34
2	Capable of Kr $<$ 1	26	38.33	58	48.64
Total		120	100	120	100

where:

$$K = (Y_t / KB) \times 100\%$$

K = Rate payment of consumption needs capability (%)

Y = Household income (IDR/year)

KB = Household consumption need expenditure (IDR/year)

In terms of the income capacity of small farmers, the farmers who could not afford the consumption needs of households before Covid-19 during Covid-19 were about 38.33% and 48.64% respectively. On average, 14.3% of rural households are unable to afford household consumption needs. Farmers who do not purchase household consumption needs are those crops that have no income, and their income from intercropping and multiple cropping and the income of non-agricultural households seem to be insufficient. Hence, there was not seemingly to meet consumption need for family. Low smallholders' household income in purchase household consumption needs from last year saving or borrow money from families, local oil palm creditor and also another farmer that can be paid from outside working in farming or after the beginning of oil palm production.

Conversely, on [21], the rate of smallholders' household income capacity that can be used by households is around 61.67% before Covid-19, while the rate of smallholders' income capacity is not yet big enough, which can be used the household consumption needs of around 51.34% during Covid-19 or the average rate of smallholders' household income capability is around 56.51%. Shown are the results of a statistical analysis of the mean for a 95% confidence level test of the mean. This meant that the rate of income of farm household income before Covid-19 differed significantly from rate income ability of smallholder household during Covid-19, or rate income ability of smallholders household in purchasing consumption needs before Covid-19 was relatively bigger than rate income capability of smallholders household during Covid-19.

IV. CONCLUSIONS

From research findings showed the conclusion to describe incomes condition, household condition on food and livelihood recovery before and during Covid-19 crisis: First, impact of Covid-19 crisis on economic smallholders household income of oil palm showed that it differed significantly between income and household consumption need expenditure before Covid-19 and during Covid-19 crisis. Finally, the income capacity of smallholder households that can purchase household consumption needs was 61.67% before Covid-19 and 51.34% during Covid-19.

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