Impact of oil palm plantation on household welfare in Jambi Province

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Abstract. Oil palm plantation has been taken into Indonesia agriculture business since a long time ago. It is noted that Indonesia has been the leading crude palm oil (CPO) producers since Year 2006 in the world. However, the sustainability of that business raising to be a questionable for it face slow replanting process particularly those which belongs to smallholder farmer. This study was conducted to analyse the effect of oil palm management on oil palm smallholder welfare in Jambi province. The study showed that the farming practice carried out by farmers, farmer perceptions of innovation, and work ethic have positive and significant effect on smallholder household welfare, while farmers attitudes towards RSPO and farmers' perceptions of replanting are tended to have a negative correlation on smallholder household welfare. Keywords: CPO, household, oil palm, plantation, smallholder, welfare.

1. Introduction
Palm Oil is still one of the most agriculture commodity contributors to Indonesia National Income. Palm oil industry has been significantly growing since the last forty years in Indonesia. It is noted that Indonesia has been the leading crude palm oil (CPO) producers since Year 2006 in the world. Gaining positive world market response and well natural resources support, Indonesian Government then expand the oil palm plantation area. The oil palm plantation business then developed both independently and by the efforts of the government. Good economic opportunities from the oil palm plantation business have caused the government's choice to fall into this commodity as one of the main income supporting plants of the community. It can be well traced that the Transmigration Program in the New Order Era was colored by the massive introduction of oil palm plants into the islands of Sumatra and Kalimantan and other regions. The development of the oil palm plantation business is expected to improve the welfare of the community and its development area. Supporting environmental factors as well as large economic opportunities have caused oil palm plantations to be managed by the Government, Private Large Enterprises, and Non-Governmental Organizations experiencing rapid growth in Indonesia. Statistics show that in 2014 Indonesia produced around 55.34% of the world's palm oil followed by Malaysia at 40.68%.

Business opportunity of oil palm plantations in improving the welfare of the community is even greater with the development of cultivation technology and the opening of markets for the final product of oil palm plants. Among various types of edible oils, palm oil is the most consumed and produced in the world [1]. Oil palm that generally grow in the tropics can be cultivated at a relatively easier and cheaper cost in Indonesia. Palm oil is relatively easy to produce and very stable. It can be
used for a variety of foods, cosmetics, hygiene products, as well as a source of biofuel or biodiesel. The market share of the final product of the palm oil commodity has made this plant a reliable source of income for the community and the region.

Fast growing of palm oil business in Indonesia is also well followed by the growth of the oil palm plantation business in Jambi Province. The oil palm plantation business is no longer managed only by state plantations and large private companies but has also been undertaken by the community independently. The inclusion of smallholders in the oil palm plantation business, besides strengthening competitiveness through increased production, also raises the problem of the sustainability of national oil palm production. Many of the oil palm plantations, both smallholder and former plasma farmer, have passed the optimal productive age (25 years) of oil palm plantation. Generally, oil palm smallholders are reluctant to rejuvenate their oil palm plant for a variety of reasons including the concern of losing their main source of income during the immature plant period (TBM) in addition to limited capital and less access to sources of capital. The question is whether the oil palm plantation business is not able to provide adequate welfare for independent smallholders so that their ability to rejuvenate their oil palm plantation is limited. This study was conducted to analyze the effect of oil palm plantation management on the welfare of independent palm oil farmer households.

![Figure 1. Distribution of oil palm plantation based on type of management and plant condition in Jambi Province. Year 2017.](image)

2. Methods
In this study, the influence of oil palm plantation on household welfare is approached from the aspects of oil palm cultivation technology, innovation, RSPO certification, replanting, work ethic, social status, gender, and institutionalization. Mathematically, the model of the effect of oil palm cultivation on community welfare is presented as follows:

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WFR = f(TBUD, INOV, RSPO, PRMJ, ETOS, STOS)
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RSPO = f(STOS, GDR, KLBG)
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PRMJ = f(STOS, GDR, KLBG)
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TBUD = f(STOS, KLBG)
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ETOS = f(STOS, GDR, KLBG)
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INOV = f(STOS, GDR, KLBG)
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The mathematical model of the influence of oil palm plantations on community welfare consists of six construct variables namely Welfare (WFR), Oil palm cultivation technology (TBUD), Innovations approached from the farmer mindset and government commitment (INOV), Farmer attitudes towards certification (RSPO), Farmer behavior in replanting oil palm plants (PRMJ), Farmer work ethic (ETOS), Gender (GDR), Farmer social status (STOS), and agricultural local institutional support.
The interrelationships between variables in the model under study can be presented as follows:

![Figure 2. Interrelationship pattern among variables in the model.](image)

In Figure 2 above it can be seen that each of the latent endogenous variables of Farmer’s oil palm cultivation technology, Innovation, Perception on RSPO Certification, Replanting degree, and Farmer's work ethic, are directly assumed to influence community welfare. While the three exogenous latent variables namely Gender, Social Status and Local farm institution can affect welfare through five endogenous latent variables except social status which directly or indirectly influences the welfare of oil palm farmers in Jambi Province.

Data was collected both in primary and secondary data. Primary data was collected by interviewing 640 respondents in 8 districts and 32 villages in Jambi Province. Secondary data on the other hand was collecting by visiting some related Government Offices and copying supporting data needed.

3. Results and discussion

The results of data analysis show that the model that was built, although not yet perfectly able to describe the pattern of the relationship between the level of welfare of oil palm farmers in Jambi Province with several endogenous and exogenous latent variables. The Chi-Square value obtained (6035.14) was still categorized as very large, never the less the minimum value of this indicator to be able to state that the model being built is suitable has been achieved. This is in accordance with [2] opinion which states that the high chi-square statistical value in the Structural Equation Model (SEM) analysis method can occur due to the lack of multivariate normality in the built model. In addition to the Chi-Square value which is still relatively high, the relatively low suitability of the model is also shown by the value of the Root mean square error of approximation (RMSEA) obtained which is not too good at 0.127 which means that there are still more exogenous variables need to explain the behavior of oil palm farmer welfare.

3.1. The impact of oil palm cultivation on the welfare of farmers

The results of the data analysis showed that the regression weight coefficient for cultivation practices variable toward welfare even though it was not yet close to the absolute value of one, but already significant at 0.299 as presented in Appendix 1. Cultivation practices can affect the welfare of oil palm farmers through production variables. This agrees to what [3] which said that several factors of cultivation practices that affect oil palm production could include seedlings and oil palm seedling preparations, planting and caring for plants which include: replanting, cover crop use, eradication of weeds, budding, fertilizing, castration, and controlling pests and diseases.

The effect of seedlings on farmers' production and income generated from their farm is believed to be highly significant. In some cases, the reluctance of companies to offer adequate prices to independent smallholders is due to the uncertainty of the history of oil palm seeds planted material. The palm oil mill company is highly concerning about the superiority of seeds planted material in the
form of sprouts, clone seeds and commercial oil palm seeds that are ready for planting which are cultivated by farmers. Oil palm fresh fruit bunches (FFB) derived from superior plant material produced by certified seed breeding companies are positively correlated with the quantity and quality of CPO to be produced. Superior palm planting material is the main capital to get high productivity. With superior planting material, FFB and oil production is guaranteed to be far higher than the use of seedlings from random seeds. In turn it can be predicted that with high productivity and standard prices, oil palm producer farmers will be able to obtain better income and welfare.

3.2. Impact of innovation on farmers' welfare
Another variable believed to be influential in determining the welfare of oil palm farmers is the adoption of innovations or new technologies introduced by the government or stakeholders. Innovation is introduced if it is technically applicable, economically profitable and socially acceptable. [4] in their research showed that the use of superior technology (leading technology characteristics improvement in production management, and the use of inputs as recommended) caused palm oil productivity to increase by 45.59%. From this increase, 22.62% was sourced from the difference in technology applied and 22.97% was due to differences in the use of inputs.

In this study, farmers' perceptions of innovation are measured by the mindset of farmers in oil palm farming and the quality of the availability of facilities and infrastructure in carrying out oil palm farming. [5] said that the availability of inputs locally is one of the conditions of agricultural development. However, even though the technology is available if it is not accompanied by a positive farmer mindset in doing business, the availability of the technology certainly cannot affect the welfare of farmers. The results of the data analysis show that the Innovation variable measured by the mindset indicator and production infrastructure has a significant effect on the welfare of farmers with a Regression Weights estimation coefficient of 0.429.

3.3. Impact of RSPO on farmers' welfare
The third variable that is hypothesized to influence the welfare of palm oil farmers in Jambi Province is the attitude of farmers towards RSPO certification. The results of [6] study showed that RSPO certification in several aspects can be felt to contribute to improving farmers' welfare, especially in terms of availability of production inputs in a timely manner, increased productivity, yield processing and marketing insurance, and support from CSR funds from the company. The results also showed that palm oil mill companies tended to make transactions easier for farmer groups that already offered RSPO certificates. The RSPO certification is basically expected to be positively correlated with the quality of palm oil plantations. In addition, oil palm plantations that have been managed with sustainable management criteria as required in the RSPO are expected to produce higher productivity. This will linearly increase farmers' income and lead to the improvement of farmers' welfare.

Some of certified RSPO farmers never the less still found some kind of complex effort to improve the quality of FFB produced by applying various changes in farm management that require both physical and non-physical labor as well as high costs. It needs relatively large amount of both material and non-material to be sacrificed. This also made until nowadays there only two Farmers Groups (Gapoktan) that have received RSPO certificates. Gapoktan Tanjung Sehati in Merangin District won RSPO certificate with intensive guidance from Non-Governmental Organizations (NGOs) “SETARA” with of course outpouring both human and capital resources which is certainly not small. The large amount of material and non-material costs needed to obtain RSPO certificates for a number of farmers should be followed by a significant difference in prices that can increase farmers' income and welfare.

The results of statistical analysis show that farmers' attitudes towards RSPO have no significant effect and tend to negatively affect the welfare of farmers. This is also consistent with the findings of [7] which shows that plasma farmers who have obtained RSPO and ISPO certificates are different from independent smallholders in terms of differences in access to information, inputs, and market access. The difference in price received by farmers who already held RSPO certificates is more due to differences in marketing channels. Plasma farmers are in accordance with the management status take
their FFB directly to mills after being recorded by the cooperative. On the other hand, independent smallholders generally market their FFB through village collectors, local traders or other traders who have access to factories.

3.4. The impact of replanting on the farmers’ welfare

Other endogenous latent variable used in this model which assumed to be significantly affect farmers' welfare is replanting variable. Similar to the attitude of farmers in obtaining RSPO certificates, farmers' perceptions of replanting tended to have a negative effect with the Regression Weights estimation coefficient of -0.264 on welfare. Field observations show that there is still considerable area of oil palm plantations that has exceeded the productive age, which is above 25 years. The slow process of replanting of oil palm plants in Jambi Province is also shown by a number of old and damaged oil palm plantations (112,660 Ha) and the low immature plantations (194,003 Ha) in Jambi Province which can be used as an indicator of oil palm replanting rate.

The low motivation of farmers in replanting old aged oil palm plantations could be closely related to financial factors. Data shows that 6.72% of farmers should have been replanted their oil palm. In general, farmers who are postponing replanting their old oil palm plantations were worried of losing their main source of income during the immature plant periods (TBM) which is generally could take time for four to five years. That problem should be overcome by introducing intercropping cultivation practices. During the replanting process farmers should be able to make use of the empty space between plants to cultivate seasonal plants that can provide alternative income to meet the needs of families ahead of oil palm plantations.

In addition to the fear of losing main income sources, a number of farmers were limited by limited funds to independently carry out replanting. Farmers in this group for various reasons cannot access funds from BPDPKS of IDR. 25 million per hectare. Meanwhile, if it is done in partnership, farmers generally feel reluctance to re-engage with the company with an uncertain period. Farmers’ reluctance to replanting can thus be solved by looking for replanting patterns that can provide opportunities for farmers not to lose their livelihoods during the immature plant period (TBM) and as well as finding out some corporations who are willing to become patron (avalis) by utilizing replanting funds scheme from BPDPKS.

3.5. Impact of work ethic on farmers’ welfare

The work ethic in this study was measured using three motive indicators in carrying out work on oil palm plantations owned. Three indicators used are the amount of wages for workers outside the family, the choice to hand over part of farming activities to the profit sharing system and support for the availability of labor in the family. The results of the data analysis show that there is a significant positive correlation between the work ethic and the welfare of oil palm farmers in Jambi Province. This is consistent with the results of research [8] shows that there is a positive correlation between satisfaction with salary with the work ethic of KPRI employees in the city of Semarang. The more satisfied KPRI employees are at the salary value the higher their work ethic and work performance. [9] research results also show that there is a positive correlation between work ethic and farmer productivity in oil palm plantations. [9] further said that the results of the study had implications that the work ethic, motivation, success, and innovative attitude could be used to estimate the productivity of farmers. The more positive the value of work ethic and motivation, the higher the productivity of the work and in turn will be able to increase the chances of getting better welfare. The same thing was expressed by [10] through the results of her research which showed that there was a real relationship between wages and the work ethic of harvest laborers in oil palm plantations. [10]'s research results show that the higher the wages received by farm laborers in an oil palm plantation environment, the higher the work ethic is characterized by discipline and work productivity of these workers.

The results of other studies related to the work ethic research conducted by [11] which is aimed to examine the factors that influenced women's working hours in one of the manufacturing companies in Medan, North Sumatra. One of the results of her research showed that the number of family
dependents had a positive and real effect on the flow of working hours of women who worked as employees in the manufacturing companies studied. Based on the results of the study it can be said that the work ethic is positively correlated with the welfare of oil palm farmers in Jambi Province. The higher the wage of a worker in an oil palm plantation environment the more prosperous the community (farmers) are; the smaller the proportion of work provided to others the higher the family income that can be obtained; and the greater the farmer family size, the higher the work ethic within the family. This finding was also supported by a number of literatures.

The third variable used as an indicator of work ethic indicators in this study is farmers' perceptions of the production sharing system in the management of oil palm farming. The results of the data analysis show that the higher the proportion of oil palm farming work surrendered to others, the more prosperous the producer farmers. The results of the study are in accordance with the results of a study conducted by [12] which also identifies the work ethic that can be identified from farmers' perceptions of production sharing systems in farming. [12]'s research results show that basically the implementation of production sharing agreements can improve the economy through providing opportunities to farm laborers to increase their productivity and foster solidarity in the community. Or it can be said in an explicit manner that handing over farming work or a portion of it to another party with a profit sharing system can improve the welfare of farmers, both laborers who accept work as well as farmer owner.

4. Conclusions
Based on the study conducted, it can be concluded that the farming practices carried out by farmers, perceptions of innovation, and work ethic have positive and significant effect on smallholder household welfare, while farmers’ attitudes towards RSPO and farmers' perceptions of replanting are tended to have a negative effect on smallholder household welfare.

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