TECHNICAL FORMULATION

by Ardi Novra

Submission date: 24-Jun-2023 08:36PM (UTC+0700)
Submission ID: 2121849305
File name: Ardi21130.pdf (724K)
Word count: 5219
Character count: 27570

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 5
May 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Afr. J. Food Agric. Nutr. Dev. 2023; 23(5): 23389-23405 https://doi.org/10.18697/ajfand.120.21130

TECHNICAL FORMULATION FOR ESTIMATING THE ECONOMIC LOSS IMPACT OF THE SMALLHOLDER OIL PALM REPLANTING PROGRAM IN INDONESIA

Novra A[1]*, Fatati[1], Novianti S[1], Andayani J[1] and T Novita[2]

Ardi Novra

*Corresponding author email: ardinovra@unja.ac.id

[1]Faculty of Animal Science, Jambi University, Indonesia

[2]Faculty of Agriculture, Jambi University, Indonesia

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 5 May 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

ABSTRACT

In Indonesia, the smallholder oil palm plantations constitute 42% of the national oil palm plantation area. Therefore, the success of increasing the productivity of smallholder palm oil will have a major impact on the sustainability of the national palm oil industry. Replanting aging oil palm trees is a priority in Indonesia. Old trees become less productive, and to maintain or even increase yields to meet the demand for palm oil without increasing land used, replanting is necessary. For large agribusinesses, replanting is done regularly, however, for smallholders, this can be a challenge for various reasons mainly related to loss of income, lack of labor, and uncertainty about the process. It is important to determine the impact of the smallholder palm oil replanting program (SPR Program) in stages as a material for consideration in formulating more anticipatory and responsive policies so that they are right on target.The indicator of temporary loss of income is generated through a gradual calculation at three economic levels, namely household (micro), sectoral (agriculture) and regional (macro) economy. The calculated indicator value is in the form of a relative value that can be used as a reference in decision making, using the approach of the proportion of affected households and the level of temporary income loss, but in general the two approaches have a unidirectional relationship. The method developed in stages in this paper is recommended to be used in making decisions in government intervention policies in the context of handling the negative impact of the SPR Program as well as programming and community empowerment activities. A priority policy to prepare households and regions to face temporary loss of income sources due to the SPR. Empowerment policies that contain a priority scale both from the target group, implementation time, and period as well as the form of activities and programs according to their potential and needs.

Key words: palm oil, replanting, temporary loss of income, empowerment, policy

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

INTRODUCTION

The area of Indonesian oil palm plantations during the 2017-2021 period will increase by 1.5% to 15.08 million hectares. The majority of plantation land ownership is owned by large private companies, namely 8.42 million ha (55.8%), followed by smallholders with 6.08 million hectares (40.34%), and state plantations with 579.6 thousand hectares (3. 84%) [1]. The sustainability of the national palm oil industry depends on smallholder oil palm plantations because it is estimated that by 2030, the share will be 60% of the total area of Indonesian oil palm plantations. However, there are two main challenges for smallholder oil palm plantations, namely how to increase productivity and manage oil palm plantations sustainably [2]. The replanting policy of Indonesian also plays a role in strengthening Indonesia's palm oil industry in the achievement of the Sustainable Development Goals, which include the economic field (8 SDGs), social (6 SDGs), and the environment (3 SDGs) [3]. Replanting old oil palms is a priority in Indonesia to maintain or even increase yields to meet the demand for oil palms without increasing land use. For large agribusiness replanting is done regularly, however, for the smallholder, this can be a challenge for various reasons mainly related to loss of income, lack of labor, and uncertainty about the process [4].

The smallholder oil palm plantations constitute the national oil palm plantation area so the success of increasing the productivity of smallholder palm oil will have a major impact on the sustainability of the national palm oil industry [5]. Acceleration of smallholder plantation development in the plantation sector revitalization program is carried out by expanding, replanting, and rehabilitating plantation crops with the aim of increasing competitiveness, productivity, and development of the downstream industry. Oil palm trees that are more than 25 years old are characterized by a decline in productivity with a production rate of only 12 tons/ha. Thus, it needs to be replanted in order to return to normal production. The Indonesian government started the SPR Program since 2017, through the Directorate General of Plantations, Ministry of Agriculture with funding support from the Ministry of Finance through the Palm Oil Plantation Fund Management Agency (PFMA). The program that was launched directly by President Jokowi in Banyuasin (South Sumatra) was intended to increase the productivity of people's palm oil, which is still low. According to data from the Indonesian Ministry of Agriculture, the realization of palm oil replanting in 2017-2018 has only reached 4,223 hectares, which is still far from the technical recommendations for oil palm replanting as a condition for obtaining PFMA Palm Oil funding of 14,792 hectares. In fact, the realization of the SPR program from 2017-2020 was only 228,800 hectares even though there was an increase in trend from 2017-2018 but only 13,000 hectares. In

https://doi.org/10.18697/ajfand.120.21130

2019 there was an increasing trend of 91,000 hectares but did not yet reach the target figure per year at 185,000 hectares. The realization of the PSR program in 2018 is still far from the set target of 185,000 hectares, so it is necessary to identify the inhibiting factors [6], and one of them is the economic uncertainty of the oil palm smallholder household due to loss of the main source of income.

The impact of replanting, among others, is a period of non-productive crops that causes plantations to be cut off, factory continuity cannot be maintained due to reduced supply of Fresh Fruit Bunches (FFB), and even opportunities for the plundering of land are quite vulnerable [6]. The impact in the form of cut-off plantation income has been less of a focus of attention from the government and other related parties even though it has had a broad impact on the success and sustainability of the smallholder palm oil replanting (SPR) program. The SPR Program will cause a loss of the source of income for farm households (FHH), which depends on the productivity of the plant prior to the replanting process. The loss of income for FHHs who have assets and other sources of income is unlikely and does not have much effect on the household economy. So far, due to the large economic value of oil palm plantations and being able to make a large contribution to FHH, it has encouraged a greater proportion of monoculture households whose main source of income is only from oil palm plantations. This can be seen when there was a drop in the price of FFB during the global economic crisis in 2008 and the negative impact of land and forest fires in 2015 in the form of a drop-in palm oil production, and prices that did not improve [7]. The external influence that has caused economic shocks to the household of oil palm farmers is very much felt, especially in oil palm monoculture farmers.

The unpreparedness of households to face temporary loss of income is one of the inhibiting factors in accelerating the SPR Program launched by the Indonesian government. Uncertainty about the source of income during the SPR Program is a rational reason that causes some smallholder oil palm farmer households to delay participating in this program. Disruption to the household economy during the SPR Program has the potential for further negative impacts such as the failure of the target to achieve replanted oil palm productivity due to the lack of intensive plant care. The intensity of plant care is reduced as a result of households focusing on finding other sources of income to meet basic needs and maintenance costs for oil palm replanting, especially fertilizer costs. For oil palm farmer households who are already accustomed to a land-based household economic system, the search for alternative sources of income will encourage the opening of new lands, including the occupation of forest areas. Limited capital will encourage cheap land clearing

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

methods, one of which is through the burning process and has the potential to be one of the causes of land and forest fires.

The direct and indirect negative impacts of the SPR Program have so far received less attention from policymakers in Indonesia and they focus more on administrative issues in determining whether or not a household is eligible to participate in the SPR Program. Efforts to convince policymakers that the SPR Program does not only have a positive impact but also has a negative impact have been ignored. The SPR Program is not only related to increasing crop productivity but also maintaining the economic stability of smallholder oil palm farmers' households. Empirical evidence is needed to convince policymakers that the phenomenon as described above is not only related to the level of participation of smallholder oil palm farmers' households but also to the success of achieving the target of the SPR Program itself. So far, there is no standard technique for estimating the magnitude of the impact of the SPR Program on household, on sectoral and regional economies. Based on this, research was conducted to design a technical formula for determining the magnitude of the impact of lost income due to the SPR PROGRAM on the household economy, the agricultural sector and the region. The results of calculations using this technical formulation are expected to be an important instrument for policymakers in determining priority empowerment programs in order to increase the readiness of oil palm farmer households in embracing the SPR Program.

METHOD

The study used a survey method with the unit of analysis being households in 3 smallholder oil palm plantation centers in 3 of the 9 oil palm producing districts in Jambi Province. The primary data collected was cross-sectional data taken at simple random using a questionnaire as a field instrument. The research was carried out in stages as shown in Figure 1.

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

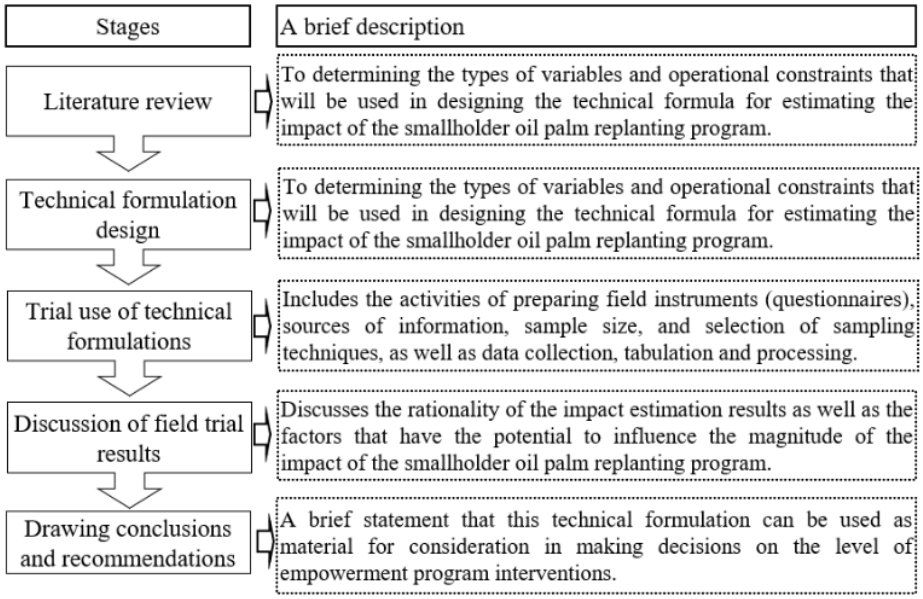

Figure 1: Stages of Research Implementation

RESULTS AND DISCUSSION

Technical Formulation and Stages in Estimating the Impact of the SPR Program

A household is defined by the U.S. Census Bureau as all the people who occupy a single housing unit, regardless of their relationship to one another [8]. The household, rather than the individual, is commonly adopted as the basic unit of analysis when considering the economic situation of society (though data for individuals may be collected separately). The household is recommended by the Canberra Group of experts for use in studying income distributions and is the basic unit in household budget surveys, the main purpose of which is to assist in the creation of retail price indices (cost-of-living indices). In an agricultural context, it is adopted by the FAO as the foundation for its System of Economic Accounts for Food and Agriculture (SEAFA), intended for use by countries at all levels of economic development [9]. Within the EU, Eurostat measures the total income of agricultural households. In the United States, incomes for farm occupier households are calculated by the United States Department of Agriculture's Agriculture Resources Management Survey (ARMS) (the forerunner of which was the Farm Costs and Returns Survey).

For the purpose of the System, a household may be defined as a small group of persons who share the same living accommodation, who pool some, or all, of their

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

income and wealth, and who consume certain types of goods and services collectively, mainly housing and food [10]. A central feature of the household is that there is a high degree of pooling of income and expenditure. This means that assessment at the level of the household is more meaningful in representing the potential command over goods and services than would be the case if the incomes of the individual members were treated separately. This is not to deny that, for example, farmers' wives may have some source of income that they regard as their own (such as from providing bed-and-breakfast accommodation in the farmhouse), or that the pocket money which a farmer spends is the result of a collective decision and is approved as a necessary line of expenditure by the household. In many countries spouses work off the farm operation at a wide variety of occupations. When asked, they commonly report that their earnings go to increase the overall household income [11].

In developing countries the concept of the household can be rather different from that applicable among Organisation for Economic Co-operation and Development (OECD) Members. This is reflected in the UN in its guidelines for population and housing censuses, taken over into the draft methodological recommendations for the World Programme of Agricultural Censuses, which was done in 2010. These describe a household as follows: "The concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either (a) a one-person household, that is to say, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household, or (b) a multi-person household, that is to say, a group of two or more persons living together who make common provision for food or other essentials for living [12]. The persons in the group may pool their incomes and may, to a greater or lesser extent, have a common budget; they may be related or unrelated persons or constitute a combination of persons both related and unrelated" [13].

Household income is any money or cash flow that comes into the home on a consistent basis, either through work or investments [9]. Household income is the combined gross income of all members of a household who are 15 years or older, and a single person occupying a dwelling by himself is also considered a household [14]. Individuals do not have to be related in any way to be considered members of the same household. The most common procedure when selecting which variable to use is to turn to those variables that represent an individual's income or expenditure. Both income and expenditure demonstrate advantages and disadvantages in measuring poverty [15]. Gross National Product (GNP) and

https://doi.org/10.18697/ajfand.120.21130

household incomes are initially calculated in national currencies and then converted by purchasing power parities (PPPs) which take into account different price levels [16]. In many countries, household income statistics are based on sample data, and to assess the accuracy of the result, estimates to aggregate income are often compared to the external sources [17].

A household is considered to be an agricultural household when at least one member of the household is operating a holding (farming household) or when the household head, reference person, or main income earner is economically active in agriculture [15]. There are three main sources of household income: earned income, investment income and government assistance [12]. In developing countries, where farming plays a crucial role in the economy, the nonfarm economy plays a significant role in the household agricultural income system based on the returns (farm returns vs. nonfarm returns). Farms refer to the sum of crops, livestock, and other farm-related goods and services [18]. Smallholder farming is the primary source of income and employment in rural areas, but households tend to diversify their sources because of the need to manage risks, secure a smooth flow of income, allocate surplus labor, respond to various kinds of market failures, and apply coping strategies [19]. Daily changes of income source of rural households, and many studies show that non-agricultural income is the main source of rural income [20] but households in Africa are still in transition to non-agricultural based income strategies [21].

Based on the description of the framework above, the estimation of the amount of temporary loss of income and the impact of the replanting program on the economy can be summarized as in Table 1.

Application of SPR Program

Income originating from old oil palm plantations (prospective replanting) is assumed to be a loss of income if oil palm replanting is carried out at the time of data collection. The grouping of oil palm plants into 4 age groups, namely young plants (3 - 8 years), adolescents (9 - 13 years), adults (14 - 20 years) and old (> 20 years) are related, among others, to oil yield, production, comparison, male and female flowers [20]. Oil palm plants with native seeds reach a maximum production rate (> 30 tons/ha/year) at the planting age of 7-12 years, and after that, they begin to decline until they reach a production level of < 20 tons/ ha/year at the planting age of 20 years [5]. The conditions are different from smallholder oil palm plantations which partly use fake seeds where the maximum production is only ± 15 tones/ha/year and at the planting age of 20 years, it is only able to produce below 10 tones/ha/year. The productivity of oil palm plantations will increase after

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

reaching the age of 9 years, then until the age of 13 years, it will stabilize, and begin to decline after the age of 14 until the non-productive period. (25 years). This pattern of productivity movement is apparently not directly followed by the income pattern of oil palm households because of the price factor [23].

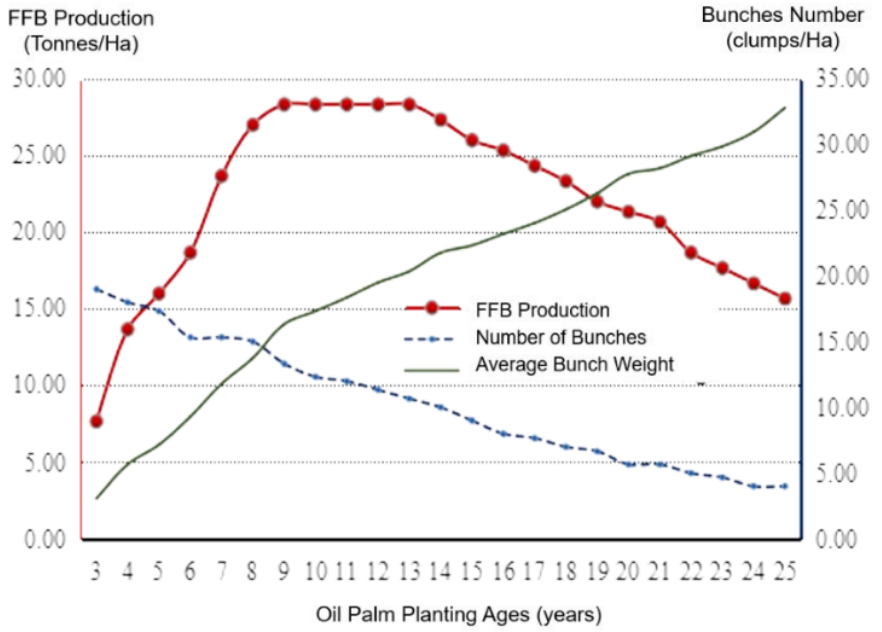

Figure 2: Relationship between age and productivity of oil palm plants

Temporary loss of income due to the cessation of fresh fruit bunch production is one of the negative impacts of the smallholder oil palm replanting program. The consequence of the cessation of production is that oil palm farmer households will lose their source of income until the replanted plants reproduce in about 3-4 years [24, 25].

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 5
May 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

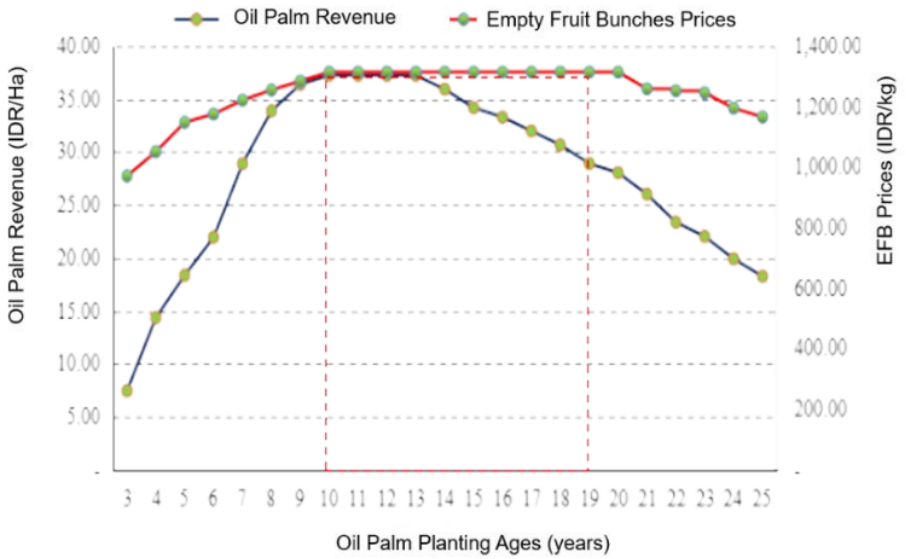

Figure 3: Relationship between Age, Productivity, Price and Household Income

Furthermore, to determine the criteria for the magnitude or level of impact and the level of need for the community empowerment program, the following indicators are using survey data on three smallholder plantation centers and formulation using a step-by-step approach, the results are shown in Table 3. The main indicators to determine whether or not an empowerment policy or program is needed are based on the magnitude of the impact of the SPR.We can estimate the economic impact of the replanting program at the micro and macro levels. At the micro level, namely the magnitude of the impact on the households of oil palm itself, the proportion of which is relatively large in monoculture households compared to diversified households (various sources of income) and the proportion of area of oil palm that is replanted. At the macro level, the impact of the replanting program can be estimated sectorally and regionally. Furthermore, at the sectoral level, namely the impact of the SPR Program on the agricultural sector, the value of which will depend heavily on the variety of agricultural commodities carried out in an area and the role of oil palm in the lives of rural communities. Finally, on the regional economy, namely the impact of the SPR PROGRAM on the regional economy, the value of which is very dependent on the regional economic structure and the status of the area whether it is a center of cultivation or not.Referring to Table 2, the decision-making for empowerment policies is briefly presented in Table 4.

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Based on the classification of the magnitude of the impact (Table 2), the impact on the household economy in the research area (Table 4), namely 53.21%, is classified as medium and requires an empowerment program. The empowerment program developed is limited to the household group of the oil palm replanting program because based on indicators the magnitude of the impact on the agricultural sector and regional economy is classified as low and very low. In principle, empowerment policies to prepare households to face a temporary loss of income sources are urgently needed. Policy makers can use the formula to estimate the impact of the SPR Program and classify the magnitude of the impact to determine the priority scale of the empowerment program.Empowerment policies that contain a priority scale both from the target group, implementation time and period as well as the form of activities and programs according to their potential and needs. Maintaining household economic sustainability is a determining factor in household motivation in participating in the SPR Program, and conversely, household economic uncertainty will reduce participation and households tend to delay replanting their oil palm.

CONCLUSION

It is important to determine the impact of the SPR Program in stages as a tool for consideration in formulating more anticipatory and responsive policies so that they are right on target. The indicator of temporary loss of income is generated through a gradual calculation at three economic levels, namely household (micro), sectoral (agriculture), and regional (macro) economy. The calculated indicator value is in the form of a relative value that can be used as a reference in decision making, using the approach of the proportion of affected households and the level of temporary income loss, but in general, the two approaches have a unidirectional relationship. Estimation results using this formula will be exact or close to real results if they meet the following requirements: 1) every household in the central area of smallholder oil palm plantations has the same opportunity to be selected as a sample (probability sampling), 2) it is assumed that all regional economic actors are on-farm, in-farm and non-farm households, and 3) the question items on the questionnaire fulfill the required supply of data and information. The results of the right estimation will provide recommendations for intervention policies that are in accordance with the needs of empowerment. The method developed in stages in this paper is recommended to be used in making decisions in government intervention policies in the context of handling the negative impact of the SPR Program as well as programming and community empowerment activities.

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 1: Summary of steps in estimating the temporary loss of income and the impact of the replanting program on the local economy

No	Variable	Code	Formulation
1	Number of household	RH	
2	Households average income	AI	
3	The region income	RTI	RTI = RH x AI
4	The number of agricultural households	AH	
5	Average of agricultural households income	AHI	
6	Agricultural income (IDR)	TAG	TAG = AH x AHI
7	Share of agriculture sector		
	Number of household (%)	AGH	AGH = (AH/H) x 100%
	Income (%)	AGI	AGI = (AHI/AI) x 100%
8	Number of oil palm households	OPH	
9	Average of oil palm income (IDR)	OPI	
10	Share of oil palm commodity		
	Magnitude or value (IDR)	OPC	OPC = OPH x OPI
	Share to agricultural sector (%)	OPA	OPA = (OPC/TAG) x 100%
	Share to regional economic (%)	OPR	OPR = (OPC/RTI) x 100%
11	Temporary loss income estimate		
	a. Number of oil palm replanting	RPH	
	b. Total land area to replanting (Ha)	OLA	
	c. Old oil palm productivity (ton/Ha)	OPP	
	d. FF Price (IDR/kg)	PFP	
	e. Old oil palm income (IDR)	OPI	TLI = OLA x OPP x PFP
12	Proportion of households affected (%)		
	a. Oil palm households	HOP	HOP = (RPH /OPH) x 100%
	b. Agriculture households	HAG	HAG= (RPH /AH) x 100%
	c. Regional households	HRG	HRG= (RPH /RG) x 100%
13	Temporary loss income (million IDR)	TLI	TLI = OPI
14	Economic impact of TLI on the		
	a. Oil palm households (%)	EIHO	$EIHO = \frac{TLI}{OPH} x100$
	b. Agricultural sector (%)	EIAS	$EIAS = \frac{(\%HOPxTLI)}{TAG} x100$
	c. Regional economic (%)	EIRG	$EIAS = \frac{(\%HOPxTLI)}{RTI} x100$

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 2: The magnitude and impact criteria of the SPR PROGRAM and the level of empowerment needs

No	The impact magnitude	Criteria	Level of need for empowerment
1	< 20 %	Very low	Don't really need empowerment
2	20.00 - 40.00%	Low	Need limited empowerment
3	40.00 - 61.00%	Medium	Need programmed empowerment
4	60.00 - 80.00%	High	Empowerment is urgently needed
5	80.00 - 100 %	Very high	Empowerment must be done

https://doi.org/10.18697/ajfand.120.21130

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 5 May 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 3: Formulation and steps for calculating the amount of temporary income loss and the impact of the SPR PROGRAM on the regional economy

No	Variable	Code	Value
1	Number of households	RH	152.00
2	Household average income (million IDR)	AI	2.98
3	The region's income (million IDR)	RTI	452.70
4	The number of agricultural households	AH	64.00
5	Average of agricultural income (million IDR)	AHI	3.17
6	Agricultural income (million IDR)	TAG	203.00
7	Share of agriculture sector		
	a. Number of households (%)	AGH	42.11
	b. Income (%)	AGI	44.84
8	Number of oil palm households	OPH	59.00
9	Average oil palm household income	OPI	2.56
10	Share of oil palm commodity		
	a. Magnitude or value ((million IDR)	OPC	151.09
	b. Share to the agricultural sector (%)	OPA	74.43
	c. Share to regional economic (%)	OPR	33.38
11	Temporary loss income estimate		
	a. Number of oil palm replanting	RPH	34.00
	b. Total land area to replanting (Ha)	OLA	2.24
	c. Old oil palm productivity (ton/Ha)	OPP	1.41
	d. FF Price (IDR/kg)	PFP	1,127.40
	e. Old oil palm income ((million IDR)	TLI	2.36
12	Proportion of households affected (%)		
	a. Oil palm households	HOP	57.63
	b. Agriculture households	HAG	53.13
	c. Regional households	HRG	22.37
13	Total temporary loss income (million IDR)	HLI	80.40
14	Economic impact of TLI on the		
	a. Oil palm households (%)	TLI	53.21
	b. Agricultural sector (%)	EIAS	39.60
	c. Regional economic (%)	EIRG	17.76

Sources: Households survey data processing (2020)

Table 4: Decision-making needs for empowerment programs based on the level of temporary loss of income

No	The impact level	%TLI	Criteria	Level of need for empowerment
1	Oil palm households	53.21	Medium	Need programmed empowerment
2	Agricultural sector	39.60	Low	Need limited empowerment
3	Regional economic	17.76	Very low	Don't really need empowerment

https://doi.org/10.18697/ajfand.120.21130

REFERENCES

1. **Rizaty MA** Luas Areal Perkebunan Kelapa Sawit (Minyak Sawit) di Indonesia (2017-2021). Ministry of Agriculture Republic of Indonesia. https://databoks.katadata.co.id/datapublish/2022/01/31/luas-perkebunan-minyak-kelapa-sawit-nasional-capai-1508-juta-ha-pada-2021 *Accessed July 2022.*

2. **Purba JHV and T Sipayung** Perkebunan kelapa sawit Indonesia dalam perspektif pembangunan berkelanjutan. Article on Academic Forum on Sustainability I, organized by the Regional Resource Research Centre (P2SDR) of the Indonesian Institute of Sciences, the Indonesian Inspiration Foundation, and the Centre for Inclusive and Sustainable Development (CISDEV) Prasetiya Mulya University, Jakarta, 2017.

3. **Purba JHV** Replanting policy of Indonesian palm oil plantation in strengthening the implementation of sustainable development goals. *IOP Conference Series: Earth and Environmental Science Proceeding* 2019; **336:**1-10.

4. **GAR (Golden Agri Resources).** Smallholders: Replanting a more productive future. 2020.Reily M Program peremajaan sawit rakyat tersendat. Katadata.co.id. Article. 2018. *Accessed February 2021.*

5. **Nazam Z** Peremajaan (replanting) kelapa sawit: Teknologi tepat guna dan tantangannya. 2014.

6. **PFMA (Palm Oil Fund Management Agency**). Percepatan program peremajaan sawit rakyat melalui kemitraan. https://www.bpdp.or.id/percepatan-program-peremajaan-sawit-rakyat-melalui-kemitraan. *Accessed November 2021.*

7. **Novra A, Suparjo, Latief A and S Syarif** Pemulihan Ekonomi Rumah Tangga Perkebunan Sawit Rakyat Terkena Dampak Kebakaran Lahan dan Hutan. *Jurnal Abdimas Mahakam*, 2020; **4(1):**1-7. https://doi.org/10.24903/jam.v4i1.511

8. **Jacobsen LA** What is household: Children and Families U.S. Census and American Community Survey. 2020.

9. **Hurst P** Agricultural Workers and Their Contribution to Sustainable Agriculture and Rural Development. Food and Agriculture Organization of the United Nations; International Labour Office; International Union of Food and Allied Workers' Associations (FAO-ILO-IUF) - Geneva: ILO, 2007.

10. **FAO (Food and Agriculture Organization).**The agricultural household– concepts and definitions: Handbook on Rural Households' Livelihood and Well-Being. 2007.

11. **WGH (The Wye Group Handbook).** Livelihood and well-Being Statistics on rural development and agriculture household income, United Nations Economic Commission for Europe (UNECE) and Food and Agriculture Organization of the United Nations (FAO) Organisation for Economic Co-operation and Development (OECD) The World Bank Statistical Office of the European Communities (Eurostat). 2007.

12. **Thompson L** Sources of household income. Pocketsence article on managing your money, https:// pocketsense.com/sources-household-income-7313.html *Accessed March 2018.*

13. **Kagan J and TJ Catalano** Household iIncome. Investopia family finances: https://www.investopedia.com /terms/h/household_income.asp *Accessed September 2020.*

14. **Ali AFM** Difference between income and expenditure method in measuring poverty in Kelantan, Malaysia. *International Journal of Economics, Management and Accounting*. 2019; **27(1):**1-40.

15. **Eurostat.** Archive: GDP and household accounts at regional level. *Eurostat Statistical Explained.* 2012. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:GDP_and_household_accounts_at_regional_level *Accessed September 2020.*

16. **Kavonius IK and VM Tormaletho** Household income aggregates in micro and macro statistics. Statistical *Journal of the United Nations Economic Commission for Europe,* 2003; **20(1):**9 - 25.

17. **OECD (Organization for Economic Co-Operation and Development).** Social and welfare statistics. Handbook of Household Surveys, Revised Edition, Studies in Methods, Series F, No. 31, United Nations, New York, 1984, para. 13.15. Last updated on October 31th, 2001.

18. **Rashidin MS, Javed S, Liu B and W Jian** Ramifications of households' Nonfarm income on agricultural productivity: Evidence from a rural area of Pakistan. *SAGE Open*: Original Research, 2020. January-March: 1-13.

19. **Chikobola MM and M Sibusenga** Employment and income sources: Key determinants of off-Farm activity participation among rural households in Northern Zambia. *International Journal of Agricultural Economics,* 2016; **1(3):** 91-98.

20. **Abdallah AH, Ayamga M and JA Awuni** Impact of agricultural credit on farm income under the Savanna and Transitional zones of Ghana. *Agricultural Finance Review,* 2019; **79(1):** 60–84.

21. **Davisa BS, DiGiuseppeb and A Zazzac** Are African households (not) leaving agriculture? Patterns of households' income sources in rural sub-Saharan Africa, *Food Policy.* 2017; **67:**153-174.

22. **Nasihin Y** Techniques for increasing production of Chrysanthemum seeds using Goat fertilizer. Ornamental Plants Research Institute. *Agriculture Technical Bulletin,* 2012; **17(1):** 74-79.

23. **Novra A and Suparjo** Collective action model: Facing temporary loss income while the rubber replanting program. *IOP Conf. Series: Earth and Environmental Science,* 2020. **518(2020):** 012059. https://doi.org/10.1088/1755-1315/518/1/012059

24. **Novra A, Adriani, Suparjo, Novianti S and N Nelson** Strengthening the business of farmer groups engaged in waste-based oil palm-cattle integration in Mestong District. *Riau Journal of Empowerment,* 2019; **2(2):** 43-54. https://doi.org/10.31258/raje.2.2.43-54

25. **Novra A, Suparjo, Latief A and S Syarif** Economic recovery for smallholder oil palm plantations affected by land and forest fires. *Abdimas Mahakam Journal,* 2020; **4(1):** 1-7.

TECHNICAL FORMULATION

ORIGINALITY REPORT

19%	13%	10%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	D Mukhopadhyay, D Das. "Impact of climate change on rice production in African countries: A panel data analysis", African Journal of Food, Agriculture, Nutrition and Development, 2023 Publication	2%
2	goldenagri.com.sg Internet Source	2%
3	jsju.org Internet Source	2%
4	journals.sagepub.com Internet Source	1%
5	Jan Horas Veryady Purba. "Replanting policy of Indonesian palm oil plantation in strengthening the implementation of sustainable development goals", IOP Conference Series: Earth and Environmental Science, 2019 Publication	1%
6	www.armstat.am Internet Source	1%

7	Submitted to University of Nairobi Student Paper	1 %
8	www.investopedia.com Internet Source	1 %
9	fr.scribd.com Internet Source	1 %
10	article.sciencepublishinggroup.com Internet Source	1 %
11	A Novra, F Fatati, D Devitriano, S Syarif. "Compost fertilizer business supply chain management strategy for stability of potential added value of waste raw materials in Jambi province, Indonesia", African Journal of Food, Agriculture, Nutrition and Development, 2023 Publication	1 %
12	H D Ernawati, A Saputra, Z Alamsyah, D M T Napitupulu, M Yanita, G Fauzia. "Analysis of independent oil palm farming income after replanting in Muaro Jambi District", IOP Conference Series: Earth and Environmental Science, 2021 Publication	1 %
13	Submitted to Rheinische Friedrich-Wilhelms-Universitat Bonn Student Paper	1 %

14	Ketut Sukiyono, Muhammad Mustopa Romdhon, Gita Mulyasari, M. Zulkarnain Yuliarso et al. "The Contribution of Oil Palm Smallholders Farms to the Implementation of the Sustainable Development Goals-Measurement Attempt", Sustainability, 2022 Publication	1 %
15	www.idsemergencymanagement.com Internet Source	1 %
16	Ilja Kristian Kavonius, Veli-Matti Törmälehto. "Household income aggregates in micro and macro statistics", Statistical Journal of the United Nations Economic Commission for Europe, 2003 Publication	1 %
17	Submitted to Cisco Junior College Student Paper	<1 %
18	FTA. "Evaluation Report. Oil Palm Portfolio. An Outcome Evaluation of FTA's Research Portfolio on Oil Palm", Center for International Forestry Research (CIFOR) and World Agroforestry Centre (ICRAF), 2021 Publication	<1 %

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		

TECHNICAL FORMULATION

GRADEMARK REPORT

FINAL GRADE

/1000

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17