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# Analysis of Optimal Policy Option for Sustainable Palm Oil Plantation Development

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**Abstract**

West Kotawaringin Regency, Central Kalimantan Province, Indonesia as a development center of palm oil plantations requires policies that support sustainability. Thus, the aim of this research is to determine the optimal policy option that supports business management of sustainable palm oil plantations. This research uses Mixed Multiplier analysis that derived from Social Accounting Matrix (SAM) model which is combined with Analytic Hierarchy Process (AHP). This result indicates that optimal option for sustainable palm oil plantation management is to prioritize the environmental management program, and social responsibility that is supported by fund allocation of 1% tax addition on palm oil plantation sub-sector.

**Keywords**: mixed multiplier, social accounting matrix, analytic hierarchy process, policy option

## 1. Introduction

Development of palm oil plantations in West Kotawaringin Regency can cause problems depletion and environmental degradation. Anwar & Rustiadi (2000) stated that in current and foreseeable future, the problems of natural resource management becomes highly important in economic development. While it has many natural resources damages suffered, hence the ways of exploitation (short-sighted) in achieving the goals of business and economics. Based on United Nations report in early 2000 for example, it has identified five types of ecosystems damage (coastal areas and marine resources, agricultural areas, fresh water, grassland, and forest ecosystems) threatened reached its limit. Natural resource damages in these ecosystems occur mainly due to the major changes, which leads to the economic development which not sustainable due to error in management. Error in management leads to depletion and degradation, whereas this resource is a major supporter for human life, and therefore it becomes terribly important to economic activity and community life. This trend both in terms of quality and quantity, and occurs in almost all regions (both poor countries, developing, and developed countries).

Dozens of laws and other regulations issued to address the problems of natural resource management in Indonesia, particularly in relation to the development of sustainable palm oil plantations, but not at all of them effectively. Trisna (2012) conducts the research on policy analysis, and compared the government's policy on palm oil industry to the four ministries, namely the Ministry of Agriculture, Ministry of Forestry, Ministry of Environment, and the Ministry of Trade and formulate the policy strategy or recommendation to further optimize the implementation of these policies. From the total of 21 policies are discussed, There are 14 supportive policies, six policies that inhibit and one policy has no effect on the increase of the national economy.

Given this broad autonomy, it is clear that the success of sustainable palm oil development is also highly dependent on the Local Government Policy. Comprehensively, Central Kalimantan Province Regulation No. 5 in 2011 on the Sustainable Plantation Management regulates how to increase the economy which equitable and still preserve the environment. Noting these problems, the aim of this research is to determine the optimal policy option to support the management of sustainable palm oil plantation. From the results of this research are expected to provide useful information for local government to produce an optimal policy for the economy and environment, and also gives benefit for private and public to reorganize the management of their palm oil plantations in order to better reduce the possibility of depletion and environmental degradation.

## 2. Literature Review

There are two interests that not always in the direction of the society needs interest for economic development on the one hand, and the interests of law enforcement for the environment preservation on the other hand; it is

 

necessary policy option that gives optimal role in resolving conflict which intended.

Sadeghi & Ameli (2012) was conducted Analytic Hierarchy Process (AHP) model for decision making of optimal allocation on energy subsidy for some sectors of Iran economy that is represented on Social Accounting Matrix (SAM) model. Based on this model, the first priority for energy subsidy allocation is the commercial sector and the last priority is related to the transport sector. The impact investigation of changes in priorities of criteria for the overall results showed that the rank of socio-economic sub-sectors in receiving the subsidy has small sensitivity to changing the priorities of subsidy criteria.

Demir et al. (2013) in his research used possibility frequency ratio model and Analytic Hierarchy Process (AHP) to produce susceptibility landslide map. Susceptibility landslide map will help decision makers in the selection and planning processes. While, Srdjevic (2013) in his research proposed an approach of two stages group decision making for management and urban landscape planning which supported by Analytic Hierarchy Process (AHP).

Álvarez et al. (2013) in his research used Analytic Hierarchy Process (AHP) model for CSR decision support in large infrastructure projects. This model was chosen because it can be a preference of decision makers, and the solutions are more innovative with the significant shared value. The reasons that similar or its expansion also disclosed by several other researchers to support the decision-making regarding land reallocation (Cay & Uyan, 2013), priority forming in green concept implementation on supply chain management (Govindan, 2014), and improve the forecast accuracy in the supply chain management (Ramanathan, 2013).

## 3. Conceptual Framework

Prior to conducting the survey is determined in advance of some economic policy option that based on Social Accounting Matrix (SAM) Table of West Kotawaringin Regency in 2011. Economic policy option is based on the role of palm oil plantation towards the economy and income disparity, thus the simulation conducted using Multiplier Mixed with the following formula:

$$MM = \begin{bmatrix} I_1 - C_{nc} & O_1 \\ -R & -I_2 \end{bmatrix}^{-1} \begin{bmatrix} I_1 & Q \\ O_2 & -(I_2 - C_c) \end{bmatrix} \quad (1)$$

Where:

$I_1$ and $I_2$ = identity matrix
$O_1$ and $O_2$= zero matrix
$C_c$ and $C_{nc}$= the propensity of marginal expenditure among the factors, institutions, and sectors with the supply which restricted and not restricted
Q= marginal expenditure sectors with limited supply factors, institutions, and sectors with the supply which not restricted
R= the propensity of marginal expenditure factors, institutions, and sectors with the supply which not restricted on sectors with limited supply

The use of these Mixed Multiplier as done by Fatah (2008), Pyatt and Round (1985), Stone (1985), Lewis and Thorbecke (1992), and Rich et al. (1997). Based on calculation and simulation results, it performed four policy option that most likely to be selected by stakeholders are (1) the addition of 1% tax on palm oil plantation sub-sector, (2) the addition of 1% tax on non oil and gas industry, (3) the addition of 1% tax on the transport and communication sectors, and (4) government expenditure. These three selected economic sectors are the sectors that are relatively greatest contribution to the economy and it has linkages from each other that relatively greatest. The addition option of government expenditure proposed because it does not have negative impact on the economy of region.

To determine the priority scale of several economic policies (taxes or government expenditure) that effectively supports the local regulation of sustainable plantation management in Central Kalimantan, especially palm oil plantation in West Kotawaringin Regency will be used Analytic Hierarchy Process (AHP) model as following.

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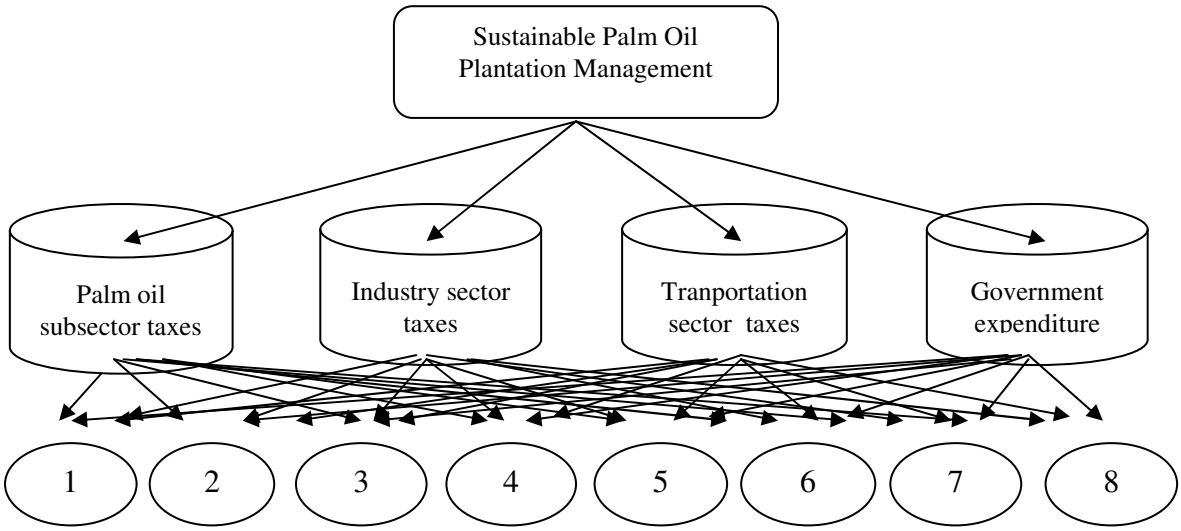


Description:

1 = Plantation Development Planning
2 = Land Use for Plantation Business
3 = Management of Plantation Business
4 = Plantation Agribusiness Development
5 = Environmental Management and Social Responsibility
6 = Forum of Plantation Business Communication and Conflict Handling
7 = Plant Pest Organisms, Distribution of Pesticides, Fertilizers and Fire Land
8 = Other settings about (a) development, monitoring, evaluation, and reporting, (b) investigation provision, (c) criminal provision, and (d) administrative sanction

Figure 1. Scheme of Analytic Hierarchy Process (AHP) for Sustainable Development Policy Option of Palm Oil Plantation

## 4. Research Methods

This research was conducted in the West Kotawaringin Regency. Depth interview conducted by researcher to six selection experts who understand the contents of Central Kalimantan Province Regulation No. 5 in 2011. Sixth selected respondents consisted of: representatives of employers of Indonesian Palm Oil Association, World Wildlife Fund (WWF) experts (foresters), certified Environment Impact Assessmen experts (ground skills), and certified Environment Impact Assessmen experts (fishery/water quality skills), Plantation Office planning staff of West Kotawaringin Regency, and local National Outstanding Farmers and Fishermen Association, for each one person.

The results of the survey respondents toward sustainable plantation business management programs were analyzed using the Analytic Hierarchy Process (AHP) which introduced by Saaty (1990,1994[a], 1994[b], and 2005). Data analysis was performed with AHP method gradually. The first step is scoring (weighting) on economic policy (taxes and government expenditure). The second step is scoring (weighting) to the priority of sustainable plantation business management program prepared by the respondent. The third step is ranking forming and the determination of policy options and the optimal management program for sustainable management of plantation business. Economic policy option and optimal management program are analyzed descriptively.

After the table is filled with the evaluation result will be found two matrices (policy option, and management program option) on each respondent. In each of the same matrix is conducted calculation of average in every cell, using a average geometric formula as follows:

 

$$t_{ij} = \sqrt[n]{\prod_{k=1}^{n} a_{ij(k)}} \quad (2)$$

Where:

$t_{ij}$ = Combined average value in cell ij from matrix

n = Number of respondents

$a_{ij(k)}$ = Cells of weighting results from respondents evaluation

Then, the priority vector is calculated by the formula:

$$\text{Priority Vector (PV)} = EV \Big/ \sqrt[n]{\prod_{i=1}^{n} a_{ij}} \quad (3)$$

Where:

EV = Eigen Vector

$a_{ij}$ = Matrix cell of row i and column j

n = Number of comparative

Furthermore, conducting the calculation for consistency test of Consistency Index (CI) and Consistency Ratio (CR) with the following formula:

$$CI = \frac{\lambda_{max} - n}{n - i} \quad (4)$$

Where:

CI = Consistency Index

$\lambda_{max}$ = Maximum Eigen Vector

n = The total n that comparable

Then,

$$CR = CI / RI \quad (5)$$

Where:

RI is standard value of Oak Ridge Laboratory, where for n = 4 the value is 0.90, and for n = 8, the value is 1.41.

## 5. Results and Discussions

### *5.1. Sustainable Development Policy Option of Oil Palm Plantation*

The survey results revealed that in order to support the sustainable development of palm oil plantations, the priority policy option is taxes addition of palm oil plantations. Then tax addition on both the main supporter of palm oil plantation sectors, that is non oil and gas industry (downstream industry of palm oil is dominated), and transport (land, sea/river, and air) and communication sectors. The allocation of government fund is the last prioritized, although it is not impact on economic growth reduce. Details of the policy option vector value can be seen in the following table.

 

Table 1. Ranking and Vector Value of Economic Policy Option to Support Sustainable Plantation Development

| Ranking | Policy Option | Serial Number | Vector Value |
|---|---|---|---|
| I | Taxes addition of palm oil plantation | 1 | 0.364 |
| II | Taxes addition of non oil and gas industry | 2 | 0.347 |
| III | Taxes addition of transportation and communication sectors | 3 | 0.189 |
| IV | Allocation of government fund | 4 | 0.100 |

Source: The results of calculations using AHP, 2013

The results of calculations show that the Maximum value of Principal Eigen ($\lambda_{max}$) of the above vector = 4.60, Consistency Index (CI) = 0.20, and Consistency Ratio (CR) = 1.24, meaning sufficiently consistent.

Based on the calculation results of tax addition impact of palm oil plantation is discovered that this option considered to be the most important priority to support the Program of Environmental Management and Social Responsibility, and others, as shown in the following table.

Table 2. Ranking and Vector Value of Sustainable Plantation Development Program from Addition Tax of Palm Oil Plantation

| Ranking | Management Program | Serial Number | Vector Value |
|---|---|---|---|
| I | Environmental Management and Social Responsibility | 5 | 0.218 |
| II | Other settings about (a) development, monitoring, evaluation, and reporting, (b) investigation provision, (c) criminal provision, and (d) administrative sanction | 8 | 0.181 |
| III | Forum of Plantation Business Communication and Conflict Handling | 6 | 0.144 |
| IV | Plant Pest Organisms, Distribution of Pesticides, Fertilizers and Fire Land | 7 | 0.142 |
| V | Management of Plantation Business | 3 | 0.094 |
| V | Plantation Agribusiness Development | 4 | 0.094 |
| VI | Plantation Development Planning | 1 | 0.064 |
| VI | Land Use for Plantation Business | 2 | 0.064 |

Source: The results of calculations using AHP, 2013

The results of calculations indicate that Maximum Value of Principal Eigen ($\lambda_{max}$) vector = 8.58, Consistency Index (CI) = 0.08, and Consistency Ratio (CR) = 0.067, meaning sufficiently consistent.

The impact of the tax addition of industrial sector is also calculated, so that it is known that the priority of sustainable plantation development program of these options can be seen in the following table.

 

Table 3. Ranking and Vector Value of Sustainable Plantation Development Program from Taxes Addition of Industrial Sector

| Ranking | Management Program | Serial Number | Vector Value |
|---|---|---|---|
| I | Environmental Management and Social Responsibility | 5 | 0.213 |
| II | Plantation Agribusiness Development | 4 | 0.181 |
| III | Plantation Development Planning | 1 | 0.164 |
| IV | Plant Pest Organisms, Distribution of Pesticides, Fertilizers and Fire Land | 7 | 0.117 |
| V | Management of Plantation Business | 3 | 0.110 |
| VI | Forum of Plantation Business Communication and Conflict Handling | 6 | 0.081 |
| VII | Land Use for Plantation Business | 2 | 0.074 |
| VIII | Other settings about (a) development, monitoring, evaluation, and reporting, (b) investigation provision, (c) criminal provision, and (d) administrative sanction | 8 | 0.060 |

Source: The results of calculations using AHP, 2013

Environmental Management and Social Responsibility Programs are also the top priority, followed by development programs and other management. The results of the above calculations, shows the maximum value of Principal Eigen ($\lambda_{max}$) vector = 8.65, Consistency Index (CI) = 0.09, and the consistency ratio (CR) = 0.075, meaning sufficiently consistent.

If the policy option that will be done is the addition of the transport and communication sectors, (after calculated) then the priority program can be seen in the following table.

Table 4. Ranking and Vector Value of Sustainable Plantation Development Program from Taxes Addition of Transportation and Communication Sectors

| Ranking | Management Program | Serial Number | Vector Value |
|---|---|---|---|
| I | Environmental Management and Social Responsibility | 5 | 0.219 |
| II | Management of Plantation Business | 3 | 0.170 |
| II | Plantation Agribusiness Development | 4 | 0.170 |
| III | Plant Pest Organisms, Distribution of Pesticides, Fertilizers and Fire Land | 7 | 0.125 |
| IV | Plantation Development Planning | 1 | 0.102 |
| V | Forum of Plantation Business Communication and Conflict Handling | 6 | 0.077 |
| VI | Other settings about (a) development, monitoring, evaluation, and reporting, (b) investigation provision, (c) criminal provision, and (d) administrative sanction | 8 | 0.077 |
| VII | Land Use for Plantation Business | 2 | 0.058 |

Source: The results of calculations using AHP, 2013

 

Environmental Management and Social Responsibility Programs are also considered the most important choices that will be done with the tax addition policy of transport and communication sectors, followed by the other program. The results of calculations indicate that Maximum Value of Principal Eigen ($\lambda_{max}$) vector = 8.44, Consistency Index (CI) = 0.06, and Consistency Ratio (CR) = 0.051, meaning sufficiently consistent.

If there is allocation policy option of the government expenditure, thus development planning program that takes precedence, followed by the other program, as can be seen from the following table.

Table 5. Ranking and Vectors Value of Sustainable Plantation Development Program from the Allocation of Government Fund

| Ranking | Management Program | Serial Number | Vector Value |
|---|---|---|---|
| I | Plantation Development Planning | 1 | 0.202 |
| I | Land Use for Plantation Business | 2 | 0.202 |
| II | Forum of Plantation Business Communication and Conflict Handling | 6 | 0.152 |
| III | Plant Pest Organisms, Distribution of Pesticides, Fertilizers and Fire Land | 7 | 0.112 |
| IV | Environmental Management and Social | 5 | 0.108 |
| VI | Management of Plantation Business | 3 | 0.064 |
| VI | Plantation Agribusiness Development | 4 | 0.064 |

Source: The results of calculations using AHP, 2013

The results of the above calculations, shows that the Maximum Value of Principal Eigen ($\lambda_{max}$) of the above vector = 8.70, Consistency Index (CI) = 0.10, and the consistency ratio (CR) = 0.081, meaning sufficiently consistent.

Based on the above data and from advanced calculations using the Analytic Hierarchy Process, it can be prepared a whole priority list, as following.

I. Environmental Management and Social Responsibility
II. Plantation Agribusiness Development
III. Plantation Development Planning
IV. Plant Pest Organisms, Distribution of Pesticides, Fertilizers and Fire Land
V. Other settings about (a) development, monitoring, evaluation, and reporting, (b) investigation provision, (c) criminal provision, and (d) administrative sanction
VI. Management of Plantation Business
VII. Forum of Plantation Business Communication and Conflict Handling
VIII. Land Use for Plantation Business

*5.2. Optimal Policy Option Analysis*

Based on the result of Analytic Hierarchy Process (AHP) towards the management program of sustainable palm oil plantation discovered that most program that prioritized are environmental management program and social responsibility. Regulation of Central Kalimantan Province No. 5 in 2011 stated that Sustainable Plantation Management mentioned that both the programs is directed that the real primarily responsible is plantation firm itself.

If the simulation is conducted using SAM Table and Mixed Multiplier, it is known that the supporting policy of the tax addition of 1% on palm oil plantation sub-sector as described below. This tax increase will cause a multiplier effect on the components of balance sheet from total revenue of economics, thus the value of total revenue of the economy will change, as can be seen in the following table.

 

Table 6. Estimation of Total Revenue of Economics Before and After the Existence of 1% Tax Additional Policy on Palm Oil Plantation Sub-sector

| Description | Revenue (IDR Billion) | | Change | |
|---|---|---|---|---|
| Endogenous Account | First | Last | (IDR Billion) | (%) |
| a. Household Income | 2394.636 | 2391.845 | -2.791 | -0.12 |
| b. Revenue of Firm | 2507.435 | 2491.429 | -16.006 | -0.64 |
| c. Value of Production Sector | 9864.329 | 9835.614 | -28.715 | -0.29 |
| d. Revenue of Government | 716.222 | 716.222 | - | - |
| Exogenous Account | | | | |
| a. Capital Account | 591.910 | 591.910 | - | - |
| b. Indirect Taxes | 105.174 | 109.224 | 4.050 | 3.85 |
| c. Outer Region | 3518.414 | 3518.414 | - | - |
| Total Revenue | 19698.120 | 19654.658 | -43.462 | -0.22 |

Source: Table of SAM West Kotawaringin Regency, in 2011, 2013

The tax addition policy of 1% on palm oil plantation sub-sector estimated have direct impact on the increasing income of indirect tax of IDR 4.050 Billion (3.85%), the income of indirect tax amounted to IDR 105.174 Billion initially increased to IDR 109.224 Billion. However, this policy will reduce the total revenue of economics amounted to IDR 43.462 Billion (0.22%), the total revenue amounted to IDR 19698.120 Billion initially reduced to IDR 19654.658 Billion. The reduction of total revenue is derived from reduction in household income of IDR 2.791 Billion, the revenue of firm of IDR 16.006 Billion, and the value of production sector of IDR 28.715 Billion.

The tax increase is also give rise to multiplier effect on the total of revenue value from labor and capital, thus the value of Gross Domestic Product (GDP) will undergo a change, as can be seen in the following table.

Table 7. The Comparison of GDP Values Before and After the Presence of Additional Tax Policy of 1% on Palm Oil Plantation Sub-sector

| GDP Components | Gross Domestic Product (GDP) (IDR Billion) | | | |
|---|---|---|---|---|
| | First | MM Value | Change | Last |
| Labor | 1713.566 | 0.002186 | 3.746 | 1709.820 |
| Capital | 3080.707 | 0.008410 | 25.910 | 3054.797 |
| Capital Account | 591.910 | - | - | 591.910 |
| Indirect Tax | 105.174 | 0.038511 | 4.050 | 109.224 |
| Total | 5491.357 | | | 5465.751 |
| Last GDP – First GDP (IDR Billion) (%) | | | | -25.606 (-0.47) |

Source: Table of SAM West Kotawaringin Regency, in 2011, 2013

The policy of tax addition of 1% on palm oil plantation sub-sector is estimated to increase the total indirect taxes to IDR 4.050 Billion. However, by this tax addition gives impact on the decrease of total GDP value of IDR 25.606 Billion (0.47%). GDP which originally amounted to IDR 5491.357 Billion fell to IDR 5465.751 Billion. The decline in GDP is significantly reduced capital value of IDR 25.910 Billion, and decrease the labor value of IDR 3.746 Billion.

The decline in the value of GDP will have an impact on the decline in household income. The amount of the reduction value in income for each household group is accordance with the value of Mixed Multiplier each household group. The estimation of household income redistribution before and after this policy can be seen in the following table.

 

Table 8. The Estimation of Household Income Redistribution Before and After The Presence of 1% Tax Additional Policy in Palm Oil Plantation Sub-sector

| Household Group | Income Redistribution | | | |
|---|---|---|---|---|
| | First (IDR Billion) | % Changes | Change Value (IDR) | Last (IDR Billion) |
| Private-owned Plantation Center | | | | |
| a. Palm oil plantation | 29.308 | 0.0001 | 1556440 | 29.306 |
| b. Employee/labor of palm oil | 10.138 | 0.0000 | 220330 | 10.138 |
| c. Other farmers | 155.159 | 0.0003 | 40972025 | 155.118 |
| d. Non Farmers | 165.973 | 0.0004 | 58599176 | 165.915 |
| Smallholder Plantation of Palm Oil Center | | | | |
| a. Palm oil farmers | 128.785 | 0.0002 | 26087945 | 128.759 |
| b. Employee/labor of palm oil | 22.524 | 0.0000 | 988560 | 22.523 |
| c. Other farmers | 61.498 | 0.0001 | 6682545 | 61.491 |
| d. Non Farmers | 418.363 | 0.0006 | 261186147 | 418.102 |
| Urban Areas | | | | |
| a. Palm oil farmers | 18.872 | 0.0000 | 713780 | 18.871 |
| b. Employee/labor of palm oil | 46.532 | 0.0001 | 4803932 | 46.527 |
| c. Other farmers | 128.684 | 0.0002 | 31562480 | 128.652 |
| d. Non Farmers | 1208.800 | 0.0020 | 2357174714 | 1206.442 |

Source: Table of SAM West Kotawaringin Regency, in 2011, 2013

The income decline magnitude of household group in private-owned plantation center is ranging between IDR 220330 to IDR 58599176. The income decline magnitude of household group in smallholder plantation of palm oil center ranged from IDR 988560 to IDR 261186147. The most substantial decrease in the range of income level is household group in urban areas that range from IDR 713780 to IDR 2357174714.

If the rate of decline in household income group is divided by the number of households in each center area, thus it found the decrease of average household income of each center, details of which can be seen in the following table.

Table 9. The Estimation of Average Household Income Before and After the Presence of 1% Additional Tax Policy on Palm Oil Plantation Sub-sector

| Household Group | Average Income (IDR) | | Decreasing (IDR) | Procentage (%) |
|---|---|---|---|---|
| | First | Last | | |
| Private-owned Plantation Center | | | | |
| a. Palm oil plantation | 129679882 | 129672995 | 6887 | 0.005 |
| b. Employee/labor of palm oil | 32598968 | 32598260 | 708 | 0.002 |
| c. Other farmers | 18189758 | 18184955 | 4803 | 0.026 |
| d. Non Farmers | 32340840 | 32329422 | 11418 | 0.035 |
| Smallholder Plantation of Palm Oil Center | | | | |
| a. Palm oil farmers | 40460300 | 40452104 | 8196 | 0.020 |
| b. Employee/labor of palm oil | 15861682 | 15860985 | 696 | 0.004 |
| c. Other farmers | 17016612 | 17014763 | 1849 | 0.011 |
| d. Non Farmers | 90496094 | 90439597 | 56497 | 0,062 |
| Urban Areas | | | | |
| a. Palm oil farmers | 51005798 | 51003869 | 1929 | 0.004 |
| b. Employee/labor of palm oil | 41361731 | 41357461 | 4270 | 0.010 |
| c. Other farmers | 15485441 | 15481643 | 3798 | 0.025 |
| d. Non Farmers | 42250948 | 42168558 | 82390 | 0.195 |

Source: Table of SAM West Kotawaringin Regency, in 2011, 2013

The result of this estimation is known that the decrease of average income per household in private-owned plantation center ranging from IDR 708 to IDR 11418. The decrease of the average income per household in the

 

smallholder plantation of palm oil center ranged between IDR 696 to IDR 56497. Whereas, the most large range of decrease in the average income per household in urban areas between of IDR 1929 to IDR 82390.

## 6. Conclusion and Suggestion

### *6.1. Conclusion*

Based on the obove informations, it can be concluded that the optimal option of palm oil plantation management is conducting environmental management program, and social responsibility that supported by the fund allocation from 1% tax addition on palm oil sub-sector.

When the simulation is done using SAM Table and Mixed Multiplier, thus it is known that the most prioritized of policy support is 1% tax addition on palm oil sub-sector. This policy is estimated to increase the amount of indirect taxes in the amount of IDR 4.05 Billion. However, this policy would reduce the total revenue of economy in the amount of IDR 43.462 Billion (0.22 %). Reduction of total revenue is derived from reduction in household income of IDR 2.791 Billion, firm revenue IDR 16.006 Billion, and the value of production sector of IDR 28.715 Billion. The result of this estimation is known that the decrease in average income per household in the central area of private-owned plantation is approximately from IDR 708 to IDR 11418. The decrease in average income per household in the central area of smallholder's palm oil plantation ranged between IDR 696 to IDR 56497. While the largest range of decrease in the average income per household in urban areas is between IDR 1929 to IDR 82390.

Based on the above results, it should not raises misinterpretation that this policy means that all responsibilities program for environmental management and corporate social responsibility be burden entirely by the government. Although payment of the additional tax charged directly to the palm oil firms, but the fact that this is a burden on the whole economy, including the local community households.

### *6.2. Suggestion*

Therefore it recommended to: (1) the employer of palm oil plantation in order to carry out the activities that are not conducted as a corporate social responsibility to the environment (CSR), liability partnership (plasma, and others), and the obligations under the Environmental Impact Assessment recommendation (to reduce the depletion and degradation). (2) The local government in order to hold the policy option chosen based on the results of the Analytic Hierarchy Process (AHP) research.

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