

A Poverty Causal Model of Cocoa Smallholders in Indonesia : Some Initial Findings from South Sulawesi

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Key words : Poverty Causal Model, Cocoa Smallholders, Indonesia

Abstract

Poverty reduction in Indonesia is very important serious problem for society development in which cocoa smallholders are no exception. Why the cocoa smallholders are still poor at the present in the country and what then we should consider for them. This article records some initial findings on cocoa smallholders-poverty linkages from South Sulawesi Province and visualizes a Poverty Causal Model of Cocoa Smallholders in order to answer these questions. To end up, we employed (1) Factor Analysis for constructing representative factor for the dimension, and (2) Path Analysis for extracting the Direct Impact of independent variable on "Household Income" as Poverty proxy in the model specified. Some important initial findings ; (1) there are six crucial dimensions in explaining smallholders-poverty linkages i.e. Household Human Resource, Agricultural Asset, Access to Social Facility, Access to Information, Agricultural Economic Activity, and Non-Agricultural Economic Activity ; (2) based on the Standardized Path Coefficient (β Weights), increasing cocoa production ($\beta = .557$) is considerable important in improving household income meaning alleviate poverty of smallholders ; (3) the next important element should be considered in reducing poverty of cocoa smallholder is expanding clove area as well as improving farm equipment ($\beta = .469$) ; (4) besides, developing orange and coffee productions ($\beta = .377$) and increasing the family transfer-source income like remittance ($\beta = .258$) could be also the next routes in finding solution for poverty of smallholders directly. In terms of social services, providing public health centers ($\beta = -.206$) as accessible as for smallholders could also help poverty reduction effort in the country.

1. Current Issue and Specific Objective

Cocoa smallholders successfully made Indonesia the third largest cocoa producer in the world after Ivory Coast and the Ghana. However, a simple but very crucial question is

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why the cocoa smallholders are still poor at the present in the country. No single answer can be provided for the question. This became a principal reason to clearly understand the complex linkages between cocoa smallholders and poverty or smallholders-poverty linkages itself. Cocoa is very strongly considered as an essential commodity which plays, at least, two strategic roles in Indonesian economy. Firstly, cocoa provides foreign export earnings as one of the important components in economic structure. Statistics of Estate Crops data clearly show that in national level, the average growth of Indonesian primary export commodity was 18.97% during 2001-2006. Then, the total export value of the commodity reached by 12,044 US\$ millions in 2006. From this figure, cocoa was the third largest contributor (7.09% of total export earnings) or around US\$ 855 millions after rubber and crude palm oil (CPO). An interesting point is the average growth of export volume in which cocoa growth was larger of 3.09% than rubber, although still smaller of 10.12% than CPO. Secondly, it consistently gives a source of employment for around 400,000 rural smallholder households in the country.

However, poverty of cocoa smallholders in Indonesia is very important serious problem. Despite the rapid expansion of Indonesian cocoa which has been phenomenal with smallholder as the main contributor, some remaining crucial issues which are strongly connecting with the poverty reduction for cocoa smallholders stay behind. They are (1) the improvement of income for smallholders becomes the classical problem-new challenges in the country ; (2) the uncertainty of land ownership system or land use policies for cocoa smallholders ; (3) the highest proportion of cocoa smallholders whose income below poverty line from the two mainly ways. Firstly, cocoa smallholders are original poor. Secondly, the smallholders were moving out poverty, then falling into poverty again ; (4) the low effort to increase their purchasing power ; (5) cocoa smallholders suffer from non-availability of a farm credit scheme for their farming, as a result they have no chooses to finance their production, daily life desires except for lending capital input (money) from the brokers which most of them are as 'tengkulak'.³⁾ Then the tengkulak's money will be paid back by the smallholders in terms of cocoa products ; (6) the difficult access to social facility such as education and public health services causing the low quality of their human resources in terms of education attainment and health quality. Van de Walle (1992) identified that access to and utilization of public services has been a long standing issue in many

3) In many parts of rural Indonesia it is easily to find out the tengkulak offers their capital to the smallholders on condition smallholders has to sale their product to the tengkulak. It is true that smallholders get the capital input easily, but it is also true that smallholder has no chooses and they are 'choked' by the tengkulak in terms of price discrimination. This phenomenon, however affects smallholders' income and it exacerbates the poor situation of cocoa smallholders.

developing countries, and Indonesia is no exception. Here too, the dimension along which one is concerned about utilization and access are between “poor” and “non-poor”, but also along characteristics such as whether one lives in a rural or urban area, in Java or the Outer Islands, and gender.

In addition, the poor situation of cocoa smallholders is also exacerbated by; the lack of access to market price information for both farm input and output, high yielding clone (agricultural extension) and non-agricultural business opportunity. Similarly, the government policies -including monetary policy such as highest interest rates- were and still are, not suitable for the cocoa smallholder in Indonesia. One of the immediate consequences of these aspects is that smallholders are not able to expand their plantation area as well as improve their income causing poverty situation. Therefore, a linkage between poverty and smallholders can not be neglected in the country. Given these current issues, it is really needed to break down a nature of the linkage itself so that enables us to clarify the important dimensions deals with poverty situation and to visualize smallholders-poverty linkage by constructing a Poverty Causal Model of Cocoa Smallholders in general and identifying the stronger impact of causing factors in particular on the poverty as a specific research objective in this paper.

2. Previous Studies and Hypothetical Model : A Justification

Poverty is multidimensional ; it encompasses not only what is called income poverty, i.e. deprivation of income/consumption such as the satisfaction of minimum level of food and other basic needs, but also limited access to health, nutrition, and education services, which aggravates the impact of income poverty, resulting in child mortality, short life expectancy, and illiteracy. In addition, the poor are vulnerable to shocks and risks and lack ability to cope with or overcome shocks. These individuals suffer not merely from transient decline in income consumption and well-being but also sink into deeper long-term endemic poverty. Different aspects of poverty reinforce one another. In a wider sense, poverty basically connotes a lack of choice and opportunities on the part of individuals to achieve an optimum exploitation or use of their potentials or capabilities ; it implies lack of empowerment on their part to participate in or influence the decision-making process affecting their livelihoods and well-being (Islam, 2006). These indicates that poverty is a complex social phenomenon that can not be seen by one view point meaning many factors associated with poverty itself, not only internal factor such as household human resource and production factors ownership (say agricultural land for the poor smallholders for inst-

ance), but also more importantly the impact of external factors such as access to social services and information availability in the community across developing countries in which Indonesia is also no exception.

For the distribution of the benefits from social services in Indonesia, Van de Walle (1992) in her study for the World Bank found that given existing patterns of use, education spending is more efficient at directly reaching the poor than is health spending. In the education sector, subsidies to primary and to a lesser extent lower secondary education are most likely to reach poorer households and raise their living standards. Education is potentially important conduit for reaching relatively isolated rural households. Walle also gave a justification that education subsidies effectively reach the poor for two reasons; poor families have more children, and richer families self-select their children into private school. Meanwhile in the health sector, subsidies to basic primary health care provide the best avenue for reaching the poor, but they are far from ideal as an instrument for doing so.

The next important factor in identifying causality of poverty is access to information for the poor. It should be noted here that we faced the more difficult aspect in looking for the previous studies focused on access to information deals with poverty of cocoa smallholders. So far, the study on Smallholders Tree Crops Production and Poverty Alleviation which was conducted by the CRIEC-World Bank in Indonesia (2002) reveals the importance of information availability. It was found that 30% of the households surveyed receives income just sufficient for food requirement about Rp. 222,000 per month [1 US\$ = Rp. 10,247 in 2002]. The poor usually come from farmers who having lack of asset both land and equipment as well as information (market, technology, capital and business opportunity). They then classified that the main factors determine the gap between the poor and the rich are access to information. Therefore, they suggest to the local government to generate programs related to the access to information needed by the farmers including a broad casting specific program (technology, market, job or business information). This is one finding. Another interesting finding is coming from Kawamura's study (2002) on poverty causal factor in South Sulawesi, Indonesia by using an index "Transportation and Communication". He next found that "Radio Communication Access" shows no statistically significant path coefficient (β weight) in relation to the "Lowest Income Level" as a poverty proxy in his study meaning no direct impact on poverty. However, "Radio Communication Access" shows statistically significant β weight in relation to the "Dependency on Agriculture" as one of the intermediate variables in his work. Thus, "Radio Communication Access" will eventually have indirect impact on "Lowest Income Level" or

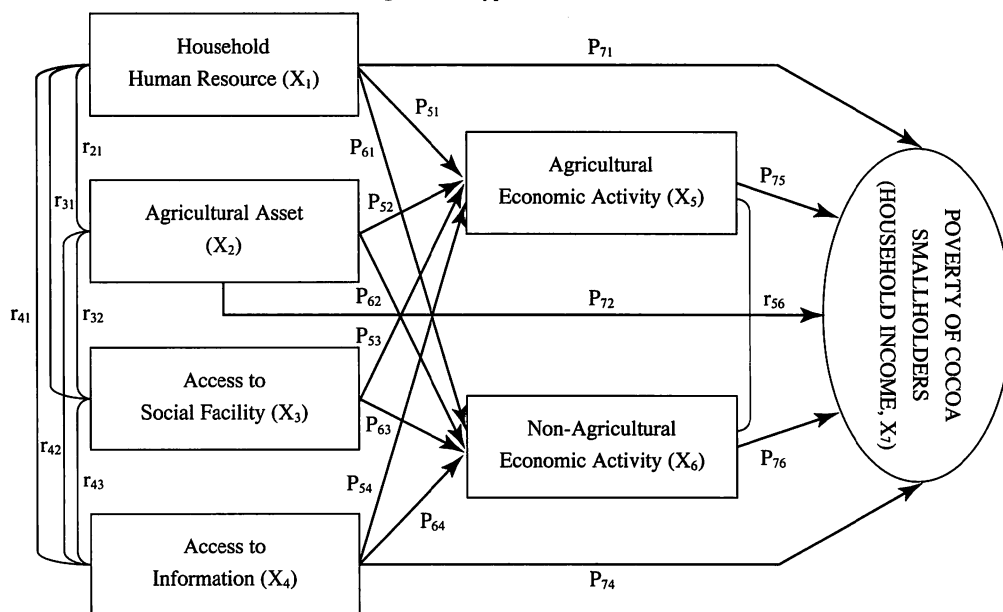
poverty through the variable “Dependency on Agriculture”. Two studies above lead us to clearly say how importance the information accessibility is in identifying poverty causal factor.

Another crucial dimension associated with poverty in developing countries like Indonesia is both the role of agriculture and non-agriculture sectors in alleviating poverty. This is not without clearly arguments. A number of important studies support this aspect centers around a conclusion that the role of the sectors in general and their linkage in particular are extremely important in reducing poverty. To briefly justify this view point, some important studies can be found in Kawamura (2002), Sumarto & Suryahadi (2003), Said & Sallatu (2004), Salam (2006), and Tambunan (2007). Kawamura in his estimation used the “Dependency on Agriculture” as one of the important poverty causal factors in terms of “Lowest Income Level”. He persuasively resulted a positive β value on this particular factor meaning the more the households at lowest income level are in village, the higher the dependency on agriculture is in the economic activity at village level. This indicates what Salam found that the agriculture sector (rice field production, cocoa production, on-farm labor and cocoa plantation area) is one of the most important sectors in dealing with the poverty in the forest community. Similarly, Said & Sallatu also highlighted that the sector is one of the possible important factors to help poverty reduction in Sulawesi Region. These findings lead us reasonable to accept Sumarto & Suryahadi’s findings that indeed agricultural growth has been the most important factor contributing to rapid poverty reduction experienced by Indonesia during the high growth pre-crisis period. In terms of poverty headcount, agricultural growth accounts for 66% of total poverty reduction, 55% of urban poverty reduction, and 74% of rural poverty reduction. In terms of poverty gap, agricultural growth accounts for 51.36, and 57% respectively of total, urban, and rural poverty gap reduction. Meanwhile, for poverty severity only the reduction in rural areas is calculated as only for these areas the coefficient is statistically significant. It appears that 49% of reduction in poverty severity in rural areas is due to agricultural growth.

In terms of producer compositions, smallholder indeed plays an important role. For instance, the Indonesian Statistics for Estate Crop and Estate Development Strategic Plan clearly show that the total production of cocoa at the national level reached 536,804 ton in 2001 and 748,828 ton in 2005. Within this period, the average growth of production in Indonesia around 10.49% per year, a substantial growth for cocoa production with the highest growth (21.55%) was achieved in 2001. An interesting point is most of this production (90.83% per year during 2001-2005) was produced by the Smallholders Estate (SE). The contribution of smallholders to the total production reached of 88.85% or around 476,924

ton in 2001 with growth by 23.76%, a substantial contribution for Indonesian cocoa production. Meanwhile the remaining shares, 6.32% or around 33,905 ton (with negative growth by 2.61%) and 4.83% or around 25,975 ton (with growth by 12.52%) are Government Estate (GE) and Private Estate (PE), respectively. Up to 2005, these three categories of producer had a fluctuated growth, especially GE declined of 24.17% in 2004 and PE of 9.53% in the same year. Fortunately, Smallholder Estate persisted on its production growth by 11.69% per year during 2001-2005, while the GE had a negative growth (-6.77%), although the PE also still had a positive one (4.62%) per year. The turmoil situation above reminds that smallholders plays a strategic role in Indonesian cocoa production (growth by 11.69% per year), and it was also higher than a national average of 10.49% a year. This clearly conveys a message that the rapid expansion of Indonesian cocoa production can not be separated from smallholders. Another ways, without having the comparative advantage of cocoa smallholders, we may say that the Indonesian cocoa production growth can not be expected to let Indonesia the third cocoa producer in the world. This implies that poverty of smallholders in particular could become crucial issues for Indonesian agriculture.

Meanwhile Tambunan's study decomposes the percentage changes in poverty into three big sectors in terms of their shares in total employment, namely industry (I), agriculture (A) and services (S). The result shows that among these three sectors, the output growth in agriculture appears to have the strongest impact ($-10.04dY_A$) on the change in poverty than those in the other two sectors ($-2.56dY_I$ and $-1.82dY_S$). However, he emphasized that the result does not mean that the other two sectors are not important for the poverty reduction. Especially industry, it has already been demonstrated elsewhere that it was the rapid output growth in industry, resulting a similarly rapid growth in the demand for relatively unskilled labor (which is generally recognized as crucial for poverty reduction), that resulted in a tendency for labor to move out of agriculture and into industry, while labor earnings in the latter sector increased. However, the employment share of agriculture is much larger than that of industry, and this gap does make a significant difference in sectoral growth impacts on poverty reduction. Through the two surveys of agricultural households incomes (1983 & 1993 Agricultural Censuses) Booth (2004) identified that total incomes from all sources are broken down into agricultural wages, other income from agricultural activities, non agricultural wages, and various types of self-employment activities in manufacturing and services. In addition, many households receive income from remittances, pensions etc. In 1993, wages and salary earnings were the largest single source off-farm earnings and non-agricultural wage earnings were greater than those from

Figure 1. Hypothetical Model

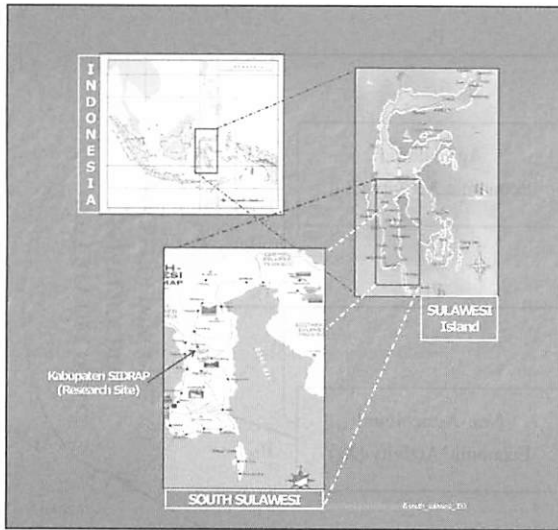
agriculture. There is evidence of an inverted “U” relationship, in that both agricultural and non-agricultural wages account for a higher proportion of total agricultural household incomes for the middle income groups. All these justifications above leads us to hypothesize that the Dimension of Household Human Resource, Agricultural Asset, Access to Social Facility, Access to Information, Agricultural Economic Activity and Non-Agricultural Economic Activity affect poverty of cocoa smallholders as shown in **Figure 1**.

3. Methodology

3.1. Research Setting and Data Collection

(i) South Sulawesi Province

South Sulawesi Province is located in the center part of Indonesian Islands (see the map below). The capital city of the province is Makassar which is stretched out between zero and $12^{\circ} - 8^{\circ}$ South Latitude, and $116^{\circ}48'$ up to $122^{\circ}36'$ East Longitude. The province is bounded by the West Sulawesi Province and Bone Gulf in the north and Southeast Sulawesi Province in the east. On the western and eastern boundaries are Makassar Strait and Flores Sea. The area of the province was $45,519.24 \text{ km}^2$ which is consist of 20 regencies and three cities. Luwu Utara is the widest regency about $7,502.68 \text{ km}^2$ (or around 16.48% of the province area). In the province, there are 65 rivers, 25 of them flows in Luwu Regency. The longest river is Saddang River, whose length is about 150 km. Sad-

Figure 2. Map of Research Site

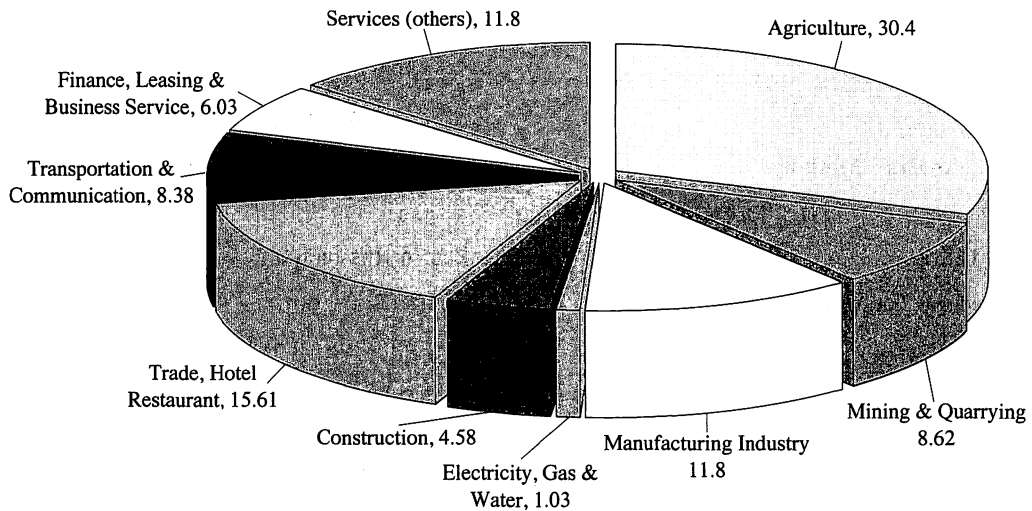
dang River flows through Tana Toraja, Enrekang and Pinrang Regencies. The province also has four lakes i.e. Tempe and Sidenreng Lakes in Wajo Regency, Matana and Towuti Lakes in Luwu Regency. Besides, the province has seven mountains. Rantemario Mountain is the highest one (3,470 m in height). The data from Climatological Station shows that the average temperature in Makassar and its surrounding was recorded around 27.0 °C during 2006, with the mini-

mum and maximum were 22.8 °C and 34.7 °C, respectively (BPS, 2007). The SUSENAS (National Socio-economic Survey) data shows that the population of South Sulawesi Province in 2002 was 7,082,807 and it reached 7,625,952 in 2006, with the average of population growth of 1.79% (around 108,000 populations) a year during this period. Population density in the province recorded 168 per km² on average (23 districts), with Makassar was the highest (6,961 per km²), while the smallest one was Luwu Timur (32 per km²).

In 2006, economic growth of South Sulawesi Province was 6.72% which higher than national average one (5.48%). However, this figure (6.72%) still smaller than growth rate in 1996 (just before economic crisis). Economic structure of the province has been dominated by the agriculture sector (30.4% in 2006) as shown in **Figure 3**. The sector plays an important role in South Sulawesi Province economy. During the 2002-2006, the average contribution of the sector was recorded around 32.59% to the total economic structure (Gross Regional Domestic Product, GRDP) of the province, while another sector was ranging only 1.03%-15.61%. In the same period, these contributions created the average economic growth of 5.51%.⁴⁾

If we look at the agriculture composition in term of land utilization for estate crop, the cocoa sub-sector was very impressed. Regionally, in 2005 the cocoa area expansion in Indonesia mainly occurred in Sulawesi Island reached 63.98% with the biggest composition in South Sulawesi Province of 19.26%. Then, the total area of estate crop in the province was recorded 632,977.55 Hectare in 2006. About 38.67% (highest one) of the total estate crop area in the province was utilized by the cocoa estate, followed by coconut of 18.06%,

4) The figures were taken and calculated from BPS (2007a ; 2007b).

Figure 3. Economic Structure of South Sulawesi Province by Sector, 2006 (%)

coffee (10.68%), cashew nut (10.45%) and clove (6.47%). The remaining shares are another estate crops. In term of labor force, cocoa estate crop absorbed about 262,541 smallholders households (also the highest one), followed by the coconut of 191,075 smallholders.⁵⁾ It is obviously that the cocoa estate crop still plays a crucial role in the province economy, not only in contributing to economic growth, but also creating employment or labor force absorption.⁶⁾

(ii) Sidrap District

Sidrap District is one of the districts in South Sulawesi Province. The capital city of the district is Pangkajene. The district is located in the northern part of the province, about 183 km from Makassar, it takes four hours by bus. The total area of Sidrap District in 2006 was 1,883.25 km² with 246,879 populations (62,921 households). The district has 11 sub-districts, namely Watangpulu, Maritengngae, Tellulimpoe, Pancalautang, Pancarijang, Kulo, Baranti, Sidenreng, Pituriawa, Duapitue and Pituriase. Each sub-district has 8-12 villages, and total villages in the district was recorded 105. Sidrap District is bounded by Pinrang & Enrekang Districts in the north, Luwu & Wajo Districts in the east, Barru & Soppeng Districts in the south and Pinrang District & Parepare Cities in the west. The distribution of the population in the sub-district was ranging between 10,423-25,979 people. The smallest was Kulo Sub-district, while Baranti Sub-district was the largest one.⁷⁾ Ad-

5) The figures were taken and calculated from "Basis Data Pertanian" and "Data Rekapitulasi Areal, Produksi dan Petani Perkebunan Rakyat Sulawesi Selatan" (2006).

6) See for example Arsyad & Yusuf (2008) ; Arsyad et al (2007) ; Arsyad, Sanim & Sinaga (2004).

7) The figures were taken from BPS data (2007c).

ministratively, we conducted the research in ‘Desa’ Compong (Compong Village), Pituriase Sub-district. The data was collected by the household survey (150 households randomly interviewed) by using the questionnaire.

3.2. Analysis Methods

(i) Factor Analysis for Index Construction

There are three subsequent steps are undertaken in this factor analysis. They are ; (1) Extracting Factor. The main purpose of this step is to meet an initial solution or initial decision regarding the number of inputted factors underlying a set of measured variables in each of the dimension studied. In doing this step, Principal Component Analysis (PCA) was employed as an extraction method (unrotated solution);⁸⁾ (2) the second step was Rotating Factor by using Varimax Method, the most common rotation method. The goal of this step is to create the results which are expected more interpretable or meaningful as a final solution or decision. The consideration is that unrotated solution has unclearly meaning, while the rotated factor matrix provides the clear cluster of variables in the dimension constructed ; (3) the third step in factor analysis was Constructing Factor Matrix. This step enables us to calculate so called an “Index” as a new set of variables (besides existing variables) in this paper.

The procedure for index construction has three sub-steps : the first is the extraction of important factors based on the factor matrix, the second is a classification of representative variables in each of the extracted important factors, and the third is a calculation of an index for each one of these factors. Then, an index was computed by using their factor-score coefficients as weight (Kawamura, 1978 : 227) below :⁹⁾

$$\text{Index} = \sum_{j=1}^m fsc_j \cdot z_j$$

where :

fsc_j = A factor-score coefficient of the j^{th} variable

Z_j = A standardized variable of the j^{th} variable

(ii) Multiple Regression as Path Analysis

Path Analysis basically is standardized General Multiple Regression Analysis

8) PCA assumes that the scores on measured variables have perfect reliability. Of course, scores are never perfectly reliable. Furthermore, the analysis attempts to reproduce the variance or information in the *sample* data, rather than the population. If the sample is reasonably representative of the population data, the sample factors should tend to match the population factors (Thompson, 2004 : 36-37).

9) For this purpose, we used SPSS Software to create factor score for all indices as a new set of independent variables and ready to be regressed.

(GMRA). A multiple regression equation is a linear model constructed by a dependent variable and a set of independent or explanatory variables (Kawamura, 1978 : 228) to represent reality or phenomenon which can be formulated based on both theoretical framework and empirical evidence. The fundamental difference between Path Analysis and GMRA is only the nature of data. The data used in Path Analysis is standardized.¹⁰⁾ Therefore, the assumption used in Path Analysis principally is the same as GMRA assumption. The general model of Path Analysis as follows ;

$$Y_t = \beta_1 X_{1t} + \beta_2 X_{2t} + \dots + \beta_k X_{kt} + E_t, \quad \text{for } Y_t, X_{it}$$

are standardized and $t=1, 2, \dots, n$ yields the following form :

$$Y_t = \left(\sum_{q=1}^K \beta_q X_{qt} \right) + E_t$$

The direct impact of the independent variables on each of its respective dependent variable can be estimated by path equation model as follows :

$$X_1 = E_1 \quad (\text{Path Equation 1})$$

$$X_2 = E_2 \quad (\text{Path Equation 2})$$

$$X_3 = E_3 \quad (\text{Path Equation 3})$$

$$X_4 = E_4 \quad (\text{Path Equation 4})$$

$$X_5 = P_{51}X_1 + P_{52}X_2 + P_{53}X_3 + P_{54}X_4 + E_5 \quad (\text{Path Equation 5})$$

$$X_6 = P_{61}X_1 + P_{62}X_2 + P_{63}X_3 + E_6 \quad (\text{Path Equation 6})$$

$$X_7 = P_{71}X_1 + P_{72}X_2 + P_{74}X_4 + P_{76}X_6 + P_{75}X_5 + E_7 \quad (\text{Path Equation 7})$$

The above equations yield a general form as follows :

$$X_j = \left(\sum_{q=1}^K p_{jq} X_q \right) + E_j \quad \text{for } (k < j)$$

where p_{jq} is path coefficient of the independent variables and E_j is error terms. The esti-

10) The formula for variables standardization (named Z-score transformation) is shown as follows. This yields zero mean with a standard deviation of 1.0. This value transformation does not affect a correlation coefficient (Kawamura, 1978 : 220) which is given by :

$Zscore = (X_i - \bar{X}) / SD$, where, X_i is an observation of the i^{th} case in a variable X , $\bar{X}$ is a mean of variable X , and SD is a standard deviation of a variable X . The use of standardized coefficients has the advantage of simplicity of exposition that ensues when one can ignore the units of measurement (or rather, when the units of measurement are all expressed in terms of the sample standard deviations). There are two circumstances in which β are particularly useful to index the magnitude of causal effects [or impacts in this paper]. The first of these is when the scales on which we measure variables are arbitrary or unfamiliar. The second circumstance for preferring β to B is when we wish to compare the magnitude of effects of different causes. Because unstandardized effects are generally in different units one cannot directly compare them. When standardized they are all in standard deviation units and therefore, in at least that sense, comparable (Cohen et al., 2003 : 464) or $Zscore$ has an advantage in transforming all scores from variables with different metrics into the same scale (often called data normalization) so that it enables us to make comparison across the variables.

mated values in each one of the above path equations can be obtained (from **Path Equation 5 to 7**) as follows :

$$\bar{X}_j = \sum_{q=1}^K \bar{p}_{jq} X_q, \quad (k < j)$$

where a hat (^) indicates an estimated value. Thus, a path coefficient p_{jq} is a standardized regression coefficient, which is $b_{jq}^* (S_{xj}/S_{xq})$. In this case, b_{jq} is an unstandardized regression coefficient, while S_{xj} and S_{xq} are, respectively, the standard deviation of X_j and of X_q . This solution above leads us to test the Null Hypothesis (**H₀**) which could be stated that “there is no significant impact of independent variables on dependent variable”, meanwhile the Alternative (**H_a**) could be that one or more independent variables have significant effect to the dependent ones.

(iii) Test for Goodness of Fit and Significance of the Path Coefficient

The first stage in testing Poverty Causal Model is the overall test for goodness of fit. The rationale for launching this test relies on the following arguments. First (Andersen, 2008 : 1), when properly fitted, regression estimates provide a powerful and elegant summary of relationship in the data. On the other hand, if conducted blindly and mechanically, regression analysis can lead to erroneous conclusions. Second, a good regression equation is one which helps explain a large proportion of the variance of Y . Large residuals imply a poor fit, while small residuals imply a good fit (Pindyck & Rubinfeld, 1998 : 70). This underscores the importance of detecting and properly handling outliers in regression analysis (Andersen, 2008 : 1). In this research, we used the advantage of SPSS Program in calculating the observed F -value and R^2 . We set a role that the higher R^2 , the better estimates meaning the model is fit. From this perspective, R^2 heavily depends on the ability of model (re)specification in explaining the reality or socio-economic phenomenon. If the observed F -value exceeds the criterion F -value, we reject the null hypothesis that there is no significant impact of independent variables on dependent ones through the model (re)specified.

The second stage in testing the Poverty Causal Model is the test for significance of a specific path coefficient, or to test whether the observed path coefficients differed statistically from zero. For this, we employed the t -ratio. In obtaining the t -value, we estimate the standard error of the path coefficient (S_{bi}) a long with the path coefficient (p_{jq}) for each variable. If the ratio of the stand error over the path coefficient (p_{jq}/S_{bi}) exceed the t -distribution at the significance level ($\alpha=.10$), we conclude that the path coefficient statistically significant from zero. Throughout the above two major stages (goodness of fit and significance test), it is possible to clearly identify the relationship among variables in the

structural path equation model as “Poverty Causal Model” which can be expected to explain poverty phenomenon of cocoa smallholders in Indonesia.

4. Results and Discussion

4.1. Factor Analysis for Index Construction

The primary purpose of use Factor Analysis in this paper is to construct representative factor for each of the six dimensions which then enable us to construct an index to be regressed. Through the Factor Analysis, it was found that each of the six dimensions has at least two representative factors and at least one of the variables strongly loaded on each representative factor. After naming each of the twenty-one factors, finally it was also recognized that there are two factors extracted in the Household Human Resource Dimension, five in the Agricultural Asset, seven in the Access to Social Facility, and two in each of the last three dimensions (the Access to Information, Agricultural Economic Activity, Non-Agricultural Economic Activity) are considered as the indices used to construct a Poverty Causal Model. We provide **Table 1** to clearly present the complete result of Factor Analysis.

4.2. Test for Goodness of Fit and Significance of the Path Coefficient

It is important to re-note that there are two statistical criterions used to test for goodness of fit of the Poverty Causal Model constructed. They are coefficient of determination (R^2) and F -value. While the test for significance of the path coefficient, we used the significance level of 10% ($\alpha = .10$). The fundamental reason in doing this way relies on the following fact that this level enables us to have much more wider structure to extract association among variables so that covering flexibility situation to record complexity of the social phenomenon or reality as wider as possible.

Before further discussing, it is also important to re-clarify that for testing the significance of the path equation in the model, two important stages were undertaken. Firstly, we regress all of twenty-one Indices (from **Table 1**) of the four independent variables dimensionally or conceptually {(Household Human Resource (X_1), Agricultural Land and Farm Equipment (X_2), Access to Social Facility (X_3), Access to Information (X_4)} and of the two intermediate variables dimensionally {(Agricultural Economic Activity (X_5) and Non-Agricultural Economic Activity (X_6)} on the Poverty as dependent variable. Secondly, we also regress all of indices of the four independent variables dimensionally on each of the intermediate ones so that the overall test for goodness of fit of the path equa-

Table 1. Complete Results of Factor Analysis by Dimension

Dimension	Factor			Label of Variable	Description of Variable
	Extracted	Index	Code		
HOUSEHOLD HUMAN RESOURCE (X ₁)	Factor 1	Age Structure with Education	X ₁₁	AGE_HEAD EDU_HEAD AGE_WIFE EDU_WIFE AGE_CHIL	Husband's age Husband's education Husband's age Wife's education Children's age
	Factor 2	Family Structure with Age and Education	X ₁₂	HOS_MEMB AGE_WIFE EDU_CHIL	Number of household member Wife's age Children's education
AGRICULTURAL ASSET (X ₂)	Factor 1	Cultivated Land Area with Farm Equipment	X ₂₁	COC_AREA TCRO_AREA TAGRI_AREA SPRAYER CROWBAR	Cocoa plantation area Total estate crop area Total agriculture area Number of sprayer for farming Number of crowbar
	Factor 2	Total Paddy Field and Estate Crop Area with Farm Equipment	X ₂₂	COF_AREA ORAN_AREA TPADY_AREA S_MACHETE	Coffee plantation area Orange plantation area Total paddy field area Number of short machete
	Factor 3	Paddy Upland Area with Farm Equipment	X ₂₃	UPL_AREA SHARP_BLADE S_MACHETE	Paddy upland area Number of sharp blade Number of short machete
	Factor 4	Clove Area with Farm Equipment	X ₂₄	CLO_AREA MATTOCK	Clove plantation area Number of mattock
	Factor 5	Paddy Field Area	X ₂₅	PAD_AREA	Paddy field area
	Factor 1	Source of Water for Cooking	X ₃₁	DISTN_WATCO TIMEL_WATCO	Distance to the water source for cooking Spent time for collecting water for cooking
	Factor 2	Access to Public Health Center	X ₃₂	FRE_HEALT 1 FRE_HEALT 3 DISTN_HEALT 2	Degree of utilization of integrated health post ("POSYANDU") Degree of utilization of primary public health center ("PUSKESMAS") Distance to the auxiliary public health center ("PUSTU")

ACCESS TO SOCIAL FACILITY (X ₃)	Factor 3	Water Utilization	X ₃₃	FRE_WATCO FRE_WATBW TIMEL_WATBW	Degree of collecting water for cooking Degree of collecting water for washing/bathing Spent time for collecting water for washing/bathing
	Factor 4	Distance to Secondary School and Primary Public Health	X ₃₄	DISTN_HEALT 3 DISTN_EDUC 2 DISTN_EDUC 3	Distance to PUSKESMAS Distance to Junior High School Distance to Senior High School
	Factor 5	Primary and Auxiliary Health Center	X ₃₅	FRE_HEALT 2 DISTN_HEALT 3	Degree of utilization of PUSTU Distance to PUSKESMAS
	Factor 6	Social Services Utilization	X ₃₆	DISTN_HEALT 1 DISTN_EDUC 1	Distance to POSYANDU Distance to Primary School
	Factor 7	Distance to Social Services	X ₃₇	DISTN_HEALT 2 DISTN_WATBW	Distance to PUSTU Distance to the water source for washing/bathing
ACCESS TO INFORMATION (X ₄)	Factor 1	Agriculture and Non-Agriculture Extensions	X ₄₁	CRED_AMOUNT FRE_INF_AGREX FRE_INF_NOAGR FRE_INF_PRICE	Credit amount for agriculture Frequency of getting the information of technology/agriculture extension Frequency of getting the information of non-agricultural business/occupation Frequency of getting the information for input and output in agriculture
	Factor 2	Agricultural Marketing	X ₄₂	FRE_SEL_BROC FRE_SEL_LOCAL	Frequency of selling the agriculture products to the broker Frequency of selling the agriculture products to the local market
AGRICULTURAL ECONOMIC ACTIVITY (X ₅)	Factor 1	Coffee and Orange Productions	X ₅₁	COF_PROD ORAN_PROD	Coffee production Orange production
	Factor 2	Clove Production and Livestock	X ₅₂	CLO_PROD INCOME_LIVESTO	Clove production Income from livestock
	Factor 3	Cocoa Production	X ₅₃	COC_PROD	Cocoa production
NON-AGRICULTURAL ECONOMIC ACTIVITY (X ₆)	Factor 1	Family Transfer-Source Income	X ₆₁	INCOME_TRANFM INCOME_OTHER	Income from family's transfer Income from other sources (social teacher, craftsman, extracting rattan from forest)
	Factor 2	Government Transfer-Source Income	X ₆₂	INCOME_PAWNIN INCOME_GOVER	Income from pawning Income from government (subsidy, social safety net)
POVERTY OF SMALLHOLDERS (HOUSEHOLD INCOME, X ₇)					Household Income

tion on each of the intermediate variables dimensionally could be also identified.¹¹⁾

As clearly depicted in **Table 2**, the overall test persuasively resulted in the acceptance of the Alternative Hypothesis (H_a) or rejection of the Null Hypothesis (H_0) in other words, that “there is no significant impact of independent variables on dependent variable in the Poverty Causal Model as a whole. This could be proved that all path coefficients in the Path Equation (PE) 1 are zero at given significance level ($\alpha=.10$). Besides, it can be also identified that the significance test for each of the six path coefficient of the intermediate variables lead us to accept H_a or reject H_0 that no significant impact of the independent variables on intermediate variable (as a dependent in this step) in the Poverty Causal Model.

The regression results (as apparent in **Table 2**) show the coefficient of determination (R^2) of each six path equations. We begin from Path Equation 1 (PE 1). Naturally, PE 1 is the path equation of the twenty-one independent variables (including intermediate as an independent) on “Household Income (X_7)” as dependent variable in this step of analysis. The R^2 of PE 1 reached 0.872. This figure tells us that 87.20% of the total variance of endogenous variable (Household Income) in general, can be explained so fairly robust by the all twenty-one explanatory (independent) variables. In other words, there is no large possibility (only 12.80%) for adding the additional variables in order to explain the nature of household income of cocoa smallholders in the country. Besides, as also shown in **Table 2**, the R^2 of each path equation of independent variables on the intermediate variables (PE 2, PE 3, PE 4, PE 5 and PE 6) are also depicted. For the sake of distinction clarity from PE 1 as Poverty Causal Model, these five path equations are classified into five Sub-models. The R^2 of these path equations (Sub-model) ranges between .311 (PE 3) and .957 (PE 6). This means that at least 31.10% of the total variance of dependent variables (intermediates in this case) is accounted for by the fourteen independent variables. However, the R^2 of PE 4 and PE 6 are more than 90%, an amazingly coefficient of determination in explaining social phenomenon which could be interpreted that more than 90% of the total variance of dependent variables are accounted for by the fourteen independent variables. Thereby, we may say that the Poverty Causal Model constructed through six dimensions in the research is more than adequate in explaining the household income as poverty proxy. Another ways, all six dimensions constructed in the model (Household Human Resource, Agricultural Asset, Access to Social Facility, Access to Information, Agricultural Economic Activity, and Non-Agricultural Economic Activity) could be classified into the important dimensions

11) However, the impact of independent variable on each of the two intermediate variables is not going to be explained in this article.

Table 2. Path Coefficients of Adjusted Hypothetical Model¹²⁾

DEPENDENT VARIABLE (Path Equation, PE)	NUMBER OF SIGNIFICANT VAR.	Intermediate Variable					Independent Variable															R ²	F
		X ₆₂	X ₆₁	X ₅₃	X ₅₂	X ₅₁	X ₄₂	X ₄₁	X ₃₇	X ₃₆	X ₃₅	X ₃₄	X ₃₃	X ₃₂	X ₃₁	X ₂₄	X ₂₃	X ₂₂	X ₂₁	X ₁₁			
X ₇ (1)	10	.167**	.258****	.557****	.195**	.377****			-.130**				.124**	-.206**	.104*	.469****					.872	27.143****	
X ₆₂ (2)	10						.351**	.359**	-.307**	-.367**	-.250*	.544****		-.492***			-.261*	.843****		.400**	.412	2.800***	
X ₆₁ (3)	4							.504***					.251*						-.467***	-.219*	.311	5.196***	
X ₅₃ (4)	9						-.090*	.177***			-.098*	.282****		-.110*		-.089*	-.088*	.165***	.851****		.926	56.977****	
X ₅₂ (5)	3						-.199*									.378***				-.428****	.425	11.598****	
X ₅₁ (6)	5										.137****	-.382****		.174****			-.101***	.611****			.957	199.225****	

Significant Level : ****P ≤ .001 ; ***P ≤ .01 ; **P ≤ .05 ; *P ≤ .10

12) Based on the Factor Analysis results in each of the six dimensions, we adjusted the Hypothetical Model (that is developed from **Figure 1**) by putting twenty-one factors (see **Table 1**) into the Path Diagram, so called Adjusted Path Diagram or Adjusted Hypothetical Model. The adjustment one is not visualized in this article and based on the Path Coefficient of the adjusted, then we constructed Poverty Causal Model of Cocoa Smallholders.

in explaining poverty of cocoa smallholders. This also leads us to argue that all significant variables constructed could be strongly expected to be a direction in formulating policy, especially dealing with poverty reduction in Indonesia.

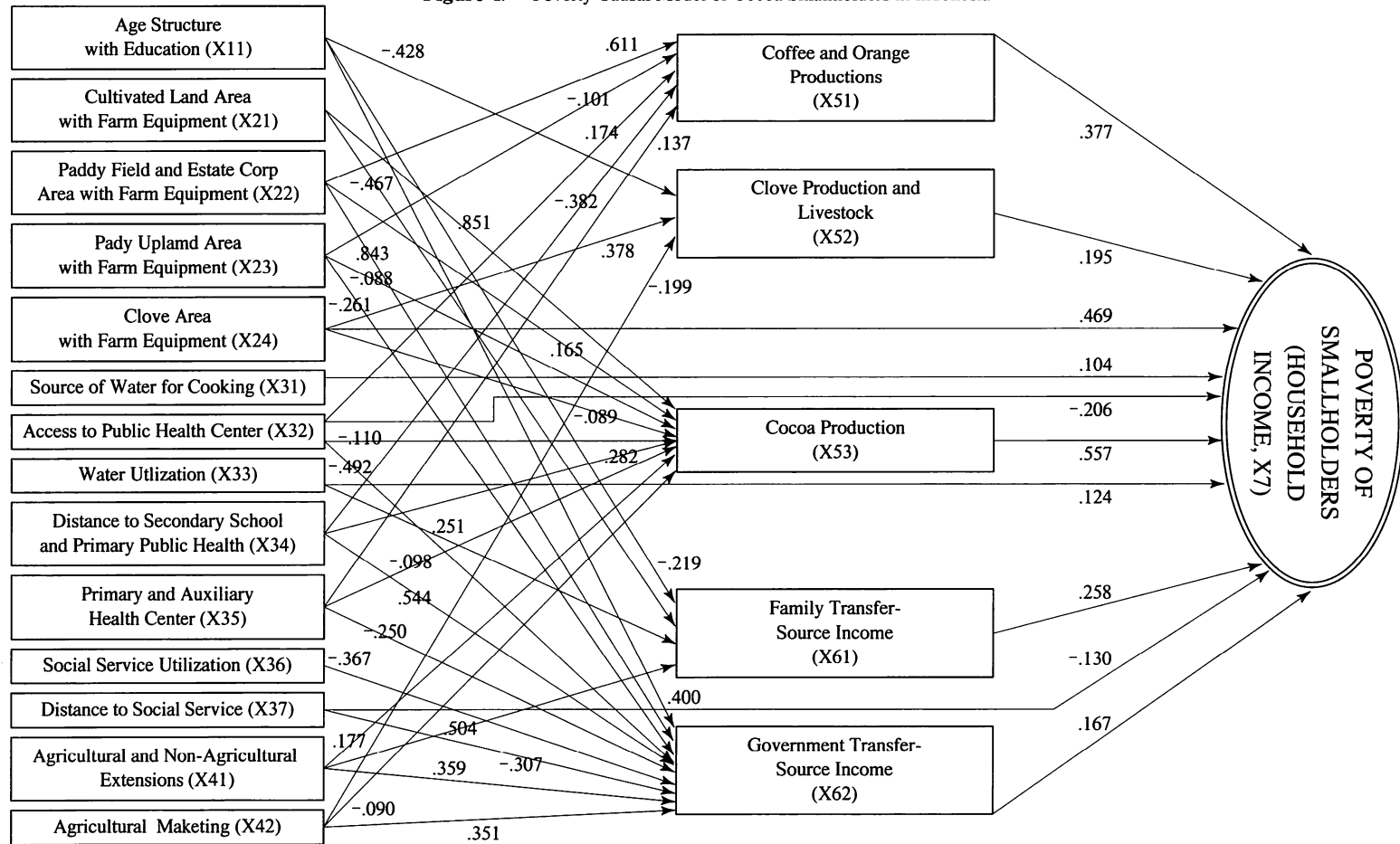
After testing for goodness of fit, the last test done is the t-test for the significance of all path equations in the model based on the regression result. Another consideration is that the number of significant path coefficient might also help to identify the important explanatory variable. In **Table 2** we also clearly present that all path equations in Poverty Causal Model have at least three significant path coefficients. The significant variables of each path equation are as follows: The Poverty Causal Model (PE 1) has 10 significant variables (X_{62} , X_{61} , X_{53} , X_{52} , X_{51} , X_{37} , X_{33} , X_{32} , X_{31} , X_{24}), while PE 6 (Government Transfer-Source Income Sub-model) has five (X_{35} , X_{34} , X_{32} , X_{23} , X_{22}), PE 5 (Family Transfer-Source Income Sub-model) has three (X_{42} , X_{24} , X_{11}), PE 4 (Cocoa Production Sub-model) has nine (X_{42} , X_{41} , X_{35} , X_{34} , X_{32} , X_{24} , X_{23} , X_{22} , X_{21}), PE 3 (Clove Production and Livestock Sub-model) has four (X_{41} , X_{33} , X_{21} , X_{11}) and PE 2 (Coffee and Orange Production Sub-model) has ten (X_{42} , X_{41} , X_{37} , X_{36} , X_{35} , X_{34} , X_{32} , X_{23} , X_{22} , X_{11}).

4.3. Constructing Poverty Causal Model

Based on the path coefficient for those six path equations as displayed in **Table 2**, we will construct a diagram for Poverty Causal Model by following **Figure 1**. However, only path coefficients that have significant level ($\alpha \leq .10$) are included in the model. **Figure 4** displayed the Poverty Causal Model. The primary purpose of use Path Analysis is to distinguish between Direct and Indirect Impacts (Causal Impacts) of independent variables on the dependent variable.¹³⁾ Direct Impact is simply defined as an impact which is not transmitted through the intermediate variables. In practice (see **Figure 4**), we go back once and then stop [e. g. the impact of variable Coffee and Orange Productions (X_{51}) on the variable Household Income (X_7)]. While Indirect Impact is an impact which are transmitted by the independent variables through the intermediate on the Household Income (X_7). In this case, we go back two or more times and never come forward [e. g. the variable Total Paddy Field and Estate Crop Area with Farm Equipment (X_{22}) sends its impact to the "Household Income (X_7)" through the variable Coffee and Orange Productions (X_{51})]. One of the important considerations in doing so is that there is differentiation between

13) It is important to note that in this case the intermediate variables also functioned as dependent variables in the model (regression of independent variables on intermediate variables). However, we also treated intermediate variables as independent (regression of independent variables on dependent variable Household Income, X_7).

Figure 4.^a Poverty Causal Model of Cocoa Smallholders in Indonesia



^a Only the Standardized Path Coefficient (β weights) at significant level ≤ 1.0 are included in the model

those two impacts (direct and indirect) on dependent variable.¹⁴⁾ As apparent in **Figure 4**, it explicitly presents the Direct Impact of each independent variable (including intermediate) on dependent one (Household Income, X_7) which are going to be explained as follows based on the standardized path coefficient (β weights). For the sake of interpretation ways, we categorize β weights into the intervals below :

+ .800 or higher	“very strong positive impact”
+ .400 to + .790	“strong positive impact”
+ .219 to + .390	“moderate positive impact”
+ .088 to + .200	“weak positive impact”
− .088 to − .200	“weak negative impact”
− .219 to − .390	“moderate negative impact”
− .400 to − .790	“strong negative impact”
− .800 or lower	“very strong negative impact”

In the model, all five intermediate variables {Coffee and Orange Productions (X_{51}), Clove Production and Livestock (X_{52}), Cocoa Production (X_{53}), Family Transfer-Source Income (X_{61}) and Government Transfer-Source Income (X_{62})} and five independent variables {Clove Area with Farm Equipment (X_{24}), Source of Water for Cooking (X_{31}), Access to Public Health Center (X_{32}), Water Utilization (X_{33}) and Distance to Social Service (X_{37})} send their significant direct impact on dependent variable “Household Income (X_7)”. Another ways, the other nine independent variables have no impact directly on “Household Income (X_7)”. Interestingly, those five intermediate variables have significant positive direct impact on “Household Income (X_7)”. In other words, all five intermediate variables have no negative direct impact on “Household Income (X_7)”. However, of those five intermediate variables which have positive impact on the variable Household Income (X_7), the variable Cocoa Production (X_{53}) has highest β weight meaning strongest impact ($\beta = .557$) than the latter four variables. Based on these results, statistically we may say that the higher cocoa production, the much higher household income of smallholders will be, resulting the decrease of poverty. Therefore, we may argue that the variable Cocoa Production (X_{53}) is considerable important than the other variables in improving household income meaning alleviate poverty of smallholders. It indicates that the smallholders are still keeping their dependency on cocoa production in daily life. This then implies that it is still considerable important to expand cultivated land area in order to increase cocoa production as the most important source of income for the smallholders.

The next two important intermediate variables which have significant direct impact on

14) However, we will not explain their Indirect Impact on the Household Income (X_7) in this paper.

“Household Income (X_7)” in the model (**Figure 4**) is “Coffee and Orange Productions (X_{51}) with $\beta = .377$ as well as variable Family Transfer-Source Income (X_{61}) with $\beta = .258$. Based on our interval in β weight, these two variables are classified into a “moderate positive impact” meaning they send their positive impact moderately on “Household Income (X_7)”. Some possible interpretations could be emphasized. Firstly, the more increase in coffee and orange productions, the more increase in household income and in turn poverty situation will be better. This is a truly phenomenon. In the research site, smallholders who have coffee and especially orange production (beside cocoa) having better household economic situation than the others. This leads us to argue that beside cocoa, developing orange production can be also expected to be the next route in alleviating poverty of smallholders in the community.

Secondly, the more money transferred to the poor smallholders, the more money will be received by the smallholders, increasing household income and in turn the poverty situation will be better. This is also reasonable result. The definition of variable Family Transfer-Source Income (X_{61}) in this research is household income which is coming from the other household member who working outside of the country such as Malaysia (resulting remittance) in which access to information (see for example the variable agricultural and non-agricultural extension/business information, $\beta = .504$ in **Figure 4**) is really indispensable. Presently, some smallholders expect to send their family member to find jobs in Malaysia for getting remittance, but they don't have any working network or information to go. All these arguments clearly strengthen the facts finding that besides providing agricultural extension, non-agricultural business information such as trading and finding job outside of the country especially in Malaysia could be strongly expected to improve family transfer-source income, resulting more household income, and in turn the poverty situation be better. Clearly, the positive impact of the variable Family Transfer-Source Income (X_{61} , $\beta = .258$) conveys a message that the household income which is coming from the other household member who working outside of the country especially Malaysia (resulting remittance) could be also the next important factor in reducing poverty situation in the country.

Then, another remaining two intermediate variables which sends their direct impact on the variable Household Income (X_7) in the model (**Figure 4**) is “Clove Production and Livestock (X_{52} , $\beta = .195$) and the variable Government Transfer-Source Income (X_{62} , $\beta = .167$). Even if these two variables have standardized path coefficient (β weights) relatively weak in our intervals (ranged between .167 and .195) means weaker or smaller impacts, but the variables give us crucial information to understand the nature of poor household

income as a whole. For this, two possible interpretations could be concretized on these variables statistically. Firstly, the more increase in clove production and livestock, the more money will be gained by the households, and in turn increasing household income which naturally resulting the decrease of poverty. An interesting point is the variable clove production and livestock moderately depends on the clove area expansion ($\beta = .378$ in **Figure 4**). This fact finding could be justified in the following ways. Theoretically, the higher clove cultivated land area, the higher clove production will be gained and in turn increasing household income. Besides, the larger cultivated clove area, the higher income from the livestock will also be. One of the possible reasons to support this finding is that many smallholders who successfully in harvesting clove estate, meaning get much more income from clove estate, then in turn they invests their income to develop their livestock business especially chicken livestock. In short, they used their income from clove estate to develop their own livestock. In the research site, it is a truly phenomenon that the chicken livestock is a very typical livestock and dominantly developed by the smallholders. Then, based on the directly observation during the field survey, smallholders who develop their chicken livestock looks likely having better situation in daily life than the others. This conveys an important message that one of the possible routes to alleviate poverty is developing clove production and livestock so that household income can be improved, meaning reducing poverty of smallholders.

Secondly, we may say that the higher government transfer-source income, the more money (cash transferred) will be received by the poor household in helping daily life desires. This is also truly phenomenon. The meaning of the variable Government Transfer-Source Income (X_{62}) in this case is the household income which is coming from the government transfer. It is generally true that the Indonesian government has been providing not only financial support (cash transferred) to the poor household especially in rural area such as Social Safety Net Program, but also the government subsidizes agricultural sector through agricultural input such as fertilizer and chemical pesticide as well as farm equipment (especially paddy field) to the smallholders. It means that the higher transfer income from the government could provide more money (cash) and input (non-cash) in agricultural activity, and in turn decrease poverty. Another ways, transfer income appears to be a crucial part of this interpretation. Therefore, it is reasonable to say that the higher transfer income from the government, the more money for smallholders will be. This leads us to argue that the transfer income from the government to the smallholder community still can be considered in maintaining smallholders' daily life, means helping them moving out poverty.

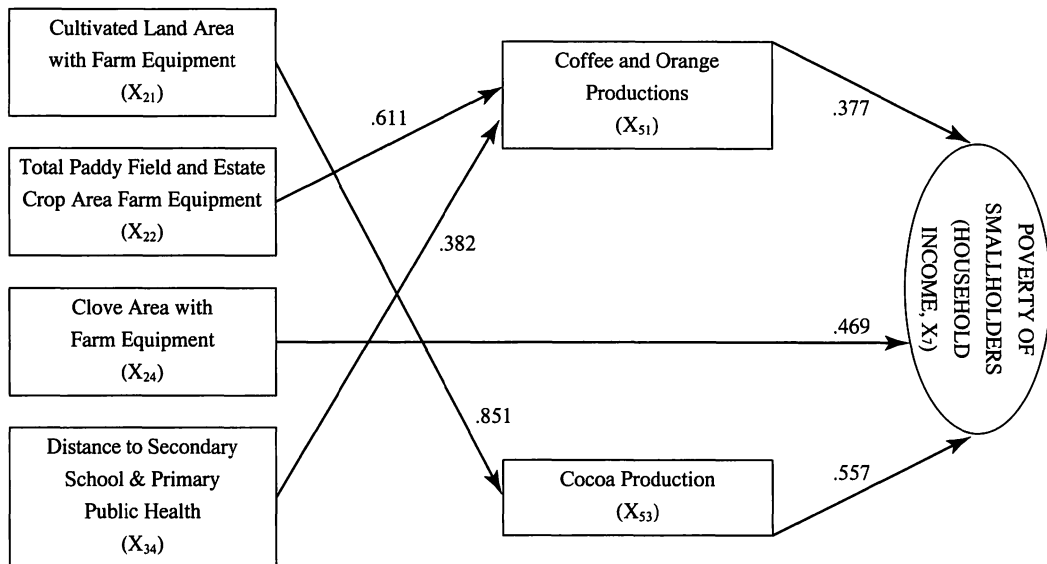
Besides these direct impact of intermediate variables on the variable Household Income (X_7), as shown in **Figure 4**, there are also five independent variables {Clove Area with Farm Equipment (X_{24}), Source of Water for Cooking (X_{31}), Access to Public Health Center (X_{32}), Water Utilization (X_{33}) and Distance to Social Service (X_{37})} send their significant direct impact on dependent variable “Household Income (X_7)”. Three out of five variables have direct positive impact i.e. the variable Clove Area with Farm Equipment (X_{24}), Source of Water for Cooking (X_{31}) and Water Utilization (X_{33}). Of these three variables which have direct positive impact, the variable Clove Area with Farm Equipment (X_{24}) has stronger impact ($\beta = .469$) followed by the variable Water Utilization (X_{33} , $\beta = .124$) and Source of Water for Cooking (X_{31} , $\beta = .104$). These latter two variables are categorized into the weaker impact in our interval.

Statistically, some possible interpretations associated with these results. Firstly, we may say that the larger clove area with farm equipment, the higher clove production will be gained and in turn the more household income will also be, resulting poverty alleviation of smallholders. This is an interesting finding on this particular variable for the reasons below. Based on the standardized path coefficient (β weight), the variable Clove Area with Farm Equipment (X_{24}) has β weight four times larger than the other two variables which have direct positive impact on “Household Income (X_7)”. Therefore, from independent variables side which have direct positive impact on “Household Income (X_7)”, we may say that the variable Clove Area with Farm Equipment (X_{24}) has strongest impact on “Household Income (X_7)”. Given these findings, we may argue that the variable Clove Area with Farm Equipment (X_{24}) is the most important independent variables in explaining “Household Income (X_7)”. This then implies that expanding clove area as well as improving farm equipment can be also strongly expected (besides cocoa) to increase household income so that the welfare of smallholders will be better means reducing poverty of smallholders.

Secondly, the other two independent variables which have direct positive impact on “Household Income (X_7)” are “Water Utilization” (X_{33} , $\beta = .124$) and “Source of Water for Cooking” (X_{31} , $\beta = .104$). These two variables have similar characteristic as a source and water utilization. In addition, based on the interval of standardized path coefficient (β weights), these variables also have the same impact (weaker) on the variable Household Income (X_7). Therefore, for the sake of interpretation ways, these variables are re-categorized into “Access to Water Resource”. Based on these results, we may interpret that the better access to water resource, the higher household income will be, and in turn poverty situation will be better. This is also persuasively finding. The meaning of “water resource” in this case refers to the degree of utilization and spent time for collecting clean

water for cooking, washing and bathing. In the community, water resource (especially for cooking/drinking) is one of the scarcity resources. Therefore, collecting water (associated with the degree of utilization and spent time) means the more utilize in clean water (the better access for preventive care, in other words) the better life will be. This could help the smallholders in taking care for better life so that poverty situation will be also better. So even though statistically, the variable “Water Utilization” (X_{33} , $\beta = .124$) and “Source of Water for Cooking” (X_{31} , $\beta = .104$) have smaller β weights meaning weaker influences or impacts in our interval, however, this then also leads us to argue that providing clean water for smallholder community means making clean water accessible for the smallholders who far away from the source could help poverty alleviation in the country. This makes clear that the area of residence also has bearing on clean water accessibility.

Besides direct positive impact, there are also two independent variables have direct negative impact on “Household Income (X_7)” as shown in **Figure 4**. They are “Access to Public Health Center (X_{32} $\beta = -.206$)” and “Distance to Social Service (X_{37} $\beta = -.130$)”. Even if all of these five variables have standardized path coefficient (β weights) relatively weak in our intervals (ranged between $-.130$ and $-.206$) means smaller negative impacts, but some possible interpretations should be placed on. However, for a variety of reasons including both for simplification and clarity of explanation, these two variables is also re-categorized under the name “Social Services”. In addition, these two variables have the same characteristics and falling into the same β weight interval. We may interpret that the difficult access to social services such as public health center, meaning further distance, the less household income will be. In the research area, the primary (called PUSKESMAS) and auxiliary (called PUSTU) public health centers are more often used by the smallholders’ families. So if the PUSKESMAS and PUSTU are further, the more time and money will be spent to travel, then the more household income at hand will be lost. Another ways, distance appears to be a crucial part of this particular interpretation. Therefore, it is reasonable to say that the difficult access to social services such as public health center, the less household income will be and in turn exacerbating poverty of smallholders. Now, this also suggests that providing access to public health center as easily as to the smallholder community should be considered in order to save much more household income so that poverty situation can be gradually reduced. For the sake of visualization clarity, we re-extracted a flow chart from **Figure 4** for explanatory variables which have strong impacts (as **Figure 5**) on “Household Income” as Poverty proxy in the analysis.

Figure 5.^a Strong Impacts of Explanatory Variables in Poverty Causal Model of Cocoa Smallholders

^a Extracted from Figure 4 and only β weights $\geq .377$ are included to visualize the explanatory variables which have strong impacts on "Household Income (X_7)" as a Poverty proxy. In previously intervals, it is true that β weight of $.377$ is slightly less than strong ones ($.400$). However, for a variety of reasons including rounding, we are still keeping it in the flow chart.

5. Initial Findings

Some important initial findings on poverty reduction for cocoa smallholders in South Sulawesi Province, Indonesia could be identified through the Poverty Causal Model constructed ; (1) there are six crucial dimensions in explaining poverty of cocoa smallholders i.e. Household Human Resource, Agricultural Asset, Access to Social Facility, Access to Information, Agricultural Economic Activity, and Non-Agricultural Economic Activity ; (2) each of the five dimensions has at least two representative factors and at least one of the variables strongly loaded on each of the representative factors. Finally, twenty-one factors are considered as indices to construct a Poverty Causal Model ; (3) all fourteen independent variables and five intermediates ones used in constructing Poverty Causal Model are significant explanatory variables. It indicates that the model in the research more than adequate in explaining poverty of cocoa smallholders. In practical ways, we may argue that all significant explanatory variables should be considered in formulating policy for poverty reduction solution ; (4) based on the interval of standardized path coefficient (β weight), the variable Cocoa Production (X_{53}) has highest β weight meaning strongest impact ($\beta = .557$). Therefore, the variable Cocoa Production (X_{53}) is considerable important in improving household income meaning alleviate poverty of smallholders ; (5) the next

important element should be considered in reducing poverty of cocoa smallholder is expanding clove area as well as improving farm equipment ($\beta = .469$); (6) another two important variables which have direct impact on “Household Income (X_7)” in the model is “Coffee and Orange Productions (X_{51} , $\beta = .377$) as well as variable Family Transfer-Source Income (X_{61} , $\beta = .258$). These two variables are classified into a “moderate positive impact” meaning they send their positive impact moderately on “Household Income (X_7)”. Therefore, developing orange and coffee productions could be the next routes to reduce poverty of smallholders. Similarly, the positive impact of variable Family Transfer-Source Income (X_{61}) conveys a message that the household income which is coming from the other household member who working outside of the country especially Malaysia (resulting remittance) could be also an important factor in fighting poverty situation directly. In terms of social services, providing public health centers ($\beta = -.206$) as accessible as for smallholders could also help poverty reduction effort in the country.

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(Received June 5, 2009)