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## **Factors Affecting Transformation from Farm Labor to the Non-farm Sectors in Central Sulawesi**

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### **Abstract**

labor transformation from agricultural to non-agricultural sectors for developing countries including Indonesia is inevitable. Based on research results showed that transformation occurs relatively more rapidly in labor structures and sources of income, and growth moves faster in non-agricultural sectors than in agricultural in rural areas. The study of labor transformation had mostly been done at the macro level. This research used at the micro level approach. This research purposes are to: (1) analyze the general picture of labor transformation from agricultural farm to non-agricultural sectors at farmer's level; and (2) analyze the affecting Factors of labor transformation from agricultural farm to non farm sectors. The study was conducted in Sigi district, Central Sulawesi from December 2015 - February 2016. Secondary data was obtained from BPS and other related institutions, and the result of research in 2008. Data was analyzed with econometric model used Ordinary Least Squares (OLS) as the method of estimation. The results of the analysis showed that there had been a transformation of agricultural labor to non-agricultural sectors in Sigi, Central Sulawesi between 2008 and 2015 indicated by increased allocation of household labor to non-agricultural sector. The transformation of the household labor from farm to non-farm was significantly influenced by land area and total household expenditure. Labor wages in agricultural sector had a negative effect, while education had a positive effect on the transformation, although those were not significant. The transformation positively influenced total non-farm income and investment for education.

**Keywords:** agricultural; farmer; labor transformation; non farm.

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## **1. Introduction**

Transformation from farming labor to non-farm ones in a developing country is inevitable. The reason for this is that the development design of developing countries always emphasizes on a conceptual framework in which development is a structural transformation process from economy dominated by farming sector with subsistence tendency to capitalist and industrial-based economies. Such a structural transformation alteration is shown by the decline of farming sector contribution and the rise of industrial sector contribution followed by the increase of service sector contribution [21].

Structural transformation will also be accompanied by labor structural alteration from agriculture to industry and services as well as spatial change on the shift of production and job vacation from villages to cities [21]. This is strengthened by a number of research results which indicate that transformation has rapidly occurred on the structure of employment and income sources in the last few decades, in addition to a relatively faster development in non-farm sector than the farming sector in village areas [9;17;26;16] points out that transformation will usually result in the decrease of farming sector share in economic output.

Central Sulawesi is one of the provinces in Indonesia which is affected by such a structural transformation. In this province, the structural transformation alteration was shown by the shrinkage of farming sector contribution by 4.67 percent annually towards GNP of Central Sulawesi from 2010 to 2013. Such a decline was followed by the decrease of people working in farming sector in Central Sulawesi. Between 2009 and 2013, the number of population working in farming sector in Central Sulawesi tended to drop by 4.28 percent annually; from 679,720 thousands in 2009 to 579,176 thousands in 2013. On the contrary, there was a rise on the number of people working in non farming sector, including, service sector, from 13,136 thousands in 2009 to 221.723 thousands in 2013. In other words, there was a growth of averagely 8.62 percent per year.

In addition, structural transformation is marked by the degradation of farming land by approximately 1.21 percent annually from 2003 to 2013. It is alleged that the land decrease was due to competition for industrial and residential development, which definitely threatened the existence of farming sector. Conclusively, structural transformation brought about impacts on household structural demography. [1] explained that households play an essential role as an observation unit in which labor experience is ongoing as an object of study since households underwent alteration due to labor transformation.

Moreover, this structural transformation is more inevitable along with the increase of accessibility and connectivity from villages to cities so that job opportunity and contribution from non-farm structure is also rising. This condition may cause alternation on outburst, income, and expenditure of farmers' households. The labor outburst alteration to non-farm sector is likely to occur owing to supporting factors within farming sector itself. When farmers own limited farming land and their income deriving from farming is not adequate to fulfill their family needs, they are compelled to seek for additional income by working in other than farming sectors. Besides as a supporting factor, income might be a triggering factor for households to conduct transformation to non-farming sectors. Reference [2] stated that majority of households with less than two million rupiah income were generally those working in agriculture, animal farms, forestry, and fishery, amounting to 27.61 percent.

Meanwhile, the heads of the households working on service field were as many as 53.09 percent and obtained income of more than 2 millions. Thus, jobs in non-farming sectors offer better income than those in farming sector.

Referring to various conditions above, this research will review how transformation from farming labor to non-farm ones occur and the influence of the transformation towards the welfare of household farmers in Central Sulawesi Province. So far, various research or studies on transformation labor issues have been conducted at macro level. Reference [20] pointed out that there have not been many studies on the impacts of transformation on farming labor. Thus, this study is vital as it will address two main issues; 1. Does transformation involve farmers? (2) Does the inclusion increase the income? This research was carried out with an approach to farmer's level as they are the owners of the labor who are directly imposed on the direct impact of such transformation labor. Hence, the aims of this research were: (1) to descriptively analyze household labor transformation to non farm sector; and (2) to analyze factors affecting labor transformation to non-farm at farmer's level.

## **2. Material and Research Method**

### ***2.1. Period and Research Location***

This research was carried out in Central Sulawesi Province, from December 2015 to February 2016. The method used was survey, while research location determination and samples of respondents were conducted by using *purposive method*. Research location and respondents in this research were the same as the ones used in the research in 2008.

### ***2.2. Research Scope and Limitation***

Conducted in Sigi Distric of Central Sulawesi Province, this research had farmers who had non-farm income sources as its respondents. It investigated a number of activity aspects, including job allocation, production, income, and expenditure of farmers. The limitation of this research was its major focus on activities of farmers with regards to allocation of farming labor, allocation of work in non-farming, income from farming, income from non-farm, and household expenditure. The term "labor transformation" in this research refers to an alteration in allocation of domestic labor from farming to non-farm .

### ***2.3. Types and Sources of Data***

This research employed data in two periods of time: in 2008 and in 2015, with the same respondents. The collection of primary data took place between December 2015 and February 2016 in Sigi District, Central Sulawesi Province, while the secondary data were obtained from CBS, Food Crop Agriculture Office, Ministry of Agriculture, and some Offices/Institutions in Central Sulawesi Province as well as references relevant with the research. Other secondary data used were *cross section* data, the results of the 2008 research as a complement of primary data to depict the process of household labor transformation to non-farm between 2008 and 2015. Assemblage of research data was carried out by using panel data upon two periods of time; namely, 2008 and 2015 in addition to both cross section and secondary data. To answer the aim of this research,

econometric analysis using OLS (Ordinary Least Square) regression was used.

## **2.4. Data Analysis**

### **2.4.1. Transformation Index**

This is the score used as measurement to identify household labor transformation from farming to non-farm. Transformation Index was measured from ratio alteration of allocation on domestic work on non-farm activities towards ratio of domestic work on farming activities as described below:

$$\text{TRANSF} = \text{CKRTNP}_2 / \text{CKRTUT}_2 - \text{CKRTNP}_1 / \text{CKRTUT}_1$$

In which

TRANSF = Household labor transformation to non-farm

CKRTNP<sub>2</sub> = domestic work on non-farm activities in 2015 (HOK/year )

CKRTUT<sub>2</sub> = domestic work on farming activities in 2015 (HOK/year )

CKRTNP<sub>1</sub> = domestic work on non-farm activities in 2008 (HOK/year )

CKRTUT<sub>1</sub> = domestic work on farming activities in 2008 (HOK/year )

#### **2.4.1.1. Formulation and Spesification of Model**

Econometric model used in this research is an explanation of actual phenomenon in a systematic system or process [14]. A good econometric model will fulfill economic criteria involving statistical tests, and econometric criteria concerning econometric assumptions. The equation model for labor transformation to non-farm was influenced by women labor wage in non-farm sector, labor wage in farming, total farming land, education of men in the family, education of women in the family, age of men in the family, total use of labor outside the family, and total household expenditure with the following single equation model:

$$\text{TRANSF} = a_0 + a_1\text{RUWNP} + a_2\text{RUTKP} + a_3\text{RLL} + a_4\text{RPP} + a_5\text{RUP} + a_6\text{RTKLK} + a_7\text{RPGTK} + \mu_1$$

Hyphotesis:  $a_1, a_3 < 0, a_2, a_4, a_5, a_6, a_7 > 0$

in which:

RUWNP : women's wage in non-farm (rupiah/year )

RUTKP : wage in farming (rupiah/year )

RLL : total land (square meter)

- RPP : education of men in the family (year )
- RPW : education of women in the family (year )
- RUP : age of men in the family (year )
- RTKLLK : total use of labor outside the family (working day /year )
- RPGTK : total household expenditure (IDR/year )

### 3. Results and Discussion

#### 3.1. Description of domestic labor transformation to Non-farm

Household labor transformation to non-farm in Sigi district, Central Sulawesi Province was indicated by the change in the proportion of allocation of domestic work devoted to farming activities to non farming (Table 1). Allocation for domestic work on agriculture and non-farm in Sigi District, Central Sulawesi Province in 2008 had a relatively balanced proportion; each of which was approximately 50%. Seven years later, however, in 2015, households had allocated more work (approximately 74%) for activities in non-farm sector. Using transformation index, that is, ratio difference between non-agriculture and agriculture work in 2008 and 2015, transformation occurred with value index of 1.84. When compared between men and women groups, the proportion of household work performed by men and women in both farming and non-farm sectors also changed. In 2008, male household members allocated more work on non-farm activities (80.45%) than the farming ones (72.33%). Conversely, female household members allocated more time for farming activities (27.67%) than non-farm ones (19.55%). In 2015, furthermore, the proportion of job of men and women on farming and non-farm changed. In 2015, more male household members (79.50%) allocated their time to work on farming whilst more women (26.54%) allocated time to perform non-farm activities.

**Table 1:** Job allocation of farmer household members on rice farming in Sigi District, Central Sulawesi Province

Job Allocation of farmer household members	Year					
	2008		Total	2015		Total
	men	women		men	women	
Farming (working day /year )	80.55 (72.33)	30.82 (27.67)	111.37 (49.91)	58.71 (79.50)	15.14 (20.50)	73.85 (26.01)
Non-farm (working day /year )	89.90 (80.45)	21.85 (19.55)	111.75 (50.09)	154.32 (73.46)	55.74 (26.54)	210.06 (73.99)
Total	170.45 (76.39)	52.67 (23.61)	223.12 (100)	213.03 (75.03)	70.88 (24.97)	283.91 (100)

Table 2 shows that household farmer respondents conduct majority based on the age differed between men and women. In men’s group, labor transformation to non farm was dominant done at the age of 35 – 44. Meanwhile, women’s group, labor tranformation was dominant done < 34 years old. However, if it views from labor tranformation to non farm index, men’s group at the age of 45 – 54 have higher tranformation index than other group, while higher transformation index to women’s group was at the age of 35 – 44.

**Table 2:** Transformation from farming labor to non-farm ones based on age group of farmer respondents

Age group criteria (year )	Number of men (person)	Transformation Index	Number of Women (person)	Transformation Index
< 34	20	1,65	47	1,69
35-44	33	1,69	35	2,04
45-54	27	2,04	11	1,69
55-64	12	2,03	2	0,27
> 64	4	0.56	1	0

Table 3 shows that based on formal educational level criteria, household labor transformation from farming to non-farm was in the highest Transformation Index at secondary level or senior high school levels, occuring not only in men but also in women household members. This means that there was a tendency of household members to transform to non-farm sectors when they are at their secondary level of education. In the meantime, the lowest transformation occurred to male and female labor holding basic education or those graduated from elementary school. This indicated that transformation to non-farm sector was in line with the higher level of education. Reference [27] pointed out that the succes of transformation occurred when a labor had both high education and skills. Moreover, [8] stated that labor with elementary education mostly chose to work on farming sector rather than the others.

Working in non-farm sectors was more likely to be carried out by households with low income in villages as this would give positive impacts on the income increase for family’s expenditure. The decline and the rise of household income proportion from dependedlargely on waged jobs. Non-farm jobs such as creating a private business in a household is commonly conducted by female family members in order to gain additional income for the family. Majority of such a business tended to be run informally in accordance with the education possessed during 8-year study [19].

Non-farm jobs were performed by farmers so as to gain an opportunity to work in other than farming sector and to increase income in addition to the one obtained from farming activities. Reference [27] explained that household farmers were able to carried out jobs as labor in farming sector, or work in a non-farm area, or both, without leaving their job in farming. Household farmers, in other words, commonly work in farming but also run a non-farm business, wether or no it was related with farming.

Table 3, identifies that both male and female labor worked more as employees. Other jobs they usually have

include construction workers, workshop workers, public transportation drivers, motorcycle drivers, and coachmen. Female labor, on the contrary, transformed more to trading business than being labor. The male and female workforce transformation to non-farm was due to increasingly narrow land ownership. The above condition was indeed supported by Reference [25] who explained that household members conducted farming activities accompanied by non-farm ones at the same time. Farmers' household would then keep adding their non-farm activities maintained their farming activities. Reference [21] also pointed out that household with narrow farming land might not be able to meet their living needs if they only had one source of income.

**Table 3:** Household labor transformation from farming to non-farm based on the criteria of formal education level and types of non-farm jobs of household members of farmer respondents

Criteria	Number of men (person)	Transformation Index	Number of women (person)	Transformation Index
Formal education level:				
Elementary	18	1.16	28	1.30
Juior High School	26	1.27	27	1.75
Senior High School	52	2.23	41	2.11
Types of Jobs:				
Labor	54	2.02	8	2.21
Employee	22	2.26	20	2.85
Trader	1	1.61	16	2.58

Table 4 shows that the smallest Transformation Index occurred in farmers' household with relatively small number of family members, and vice versa. This indicated that transformation to non-farm was greater in a household with bigger number of family members. It was assumed that this was also in line with the bigger expenditure of households when their members were bigger, which accordingly, forced household members to conduct transformation to non-farm .

Additionally, ownership of farming land by farmers' households played an important role in the occurrence of workforce transformation from farming to non-farm. Data in Table 4 presents that transformation to non-farm conducted more by households with narrow farming land (< 0.5 ha).

The assumption was that narrow land ownership led to the use of labor within the household, resulting in not optimal income which then forced the households to perform transformation to non-farm business. Reference [4] stated that household asset, such as farming land, played an essential role in the occurrence of transformation.

Reference [7] added that despite the fact that farming became the main source of farmers' household income; non-farm jobs had contribution to household income, particularly for the narrow land owners. Thus, narrow land ownership and lower income from farming activities tended to push workforce of farming household to move to work at non-farm areas, while education level eased them to do this way.

**Table 4:** Transformation of farming labor to non-farm based on the number of household members and land ownership of farmer respondents

Number of household members (person)	Number of respondent farmer households	Transformation Index
≤ 2	15	1.71
2 - 4	71	1.85
> 4	10	1.80
Land ownership (m <sup>2</sup> )		
2000 - 6499	41	2.07
6500 - 10999	40	1.66
11000 - 15499	7	1.30
15500 – 20000	8	1.30

Table 5 specifies that transformation to non-farm affected both income and household expenditure of farmers in Sigi District, Central Sulawesi. In 2008, before household allocated majority of their work at non-farm jobs, farmers' household income average per year reached Rp. 17.36 millions per year. In 2015, however, after farmers conducted transformation to non-farm business, their income average increased by 19.61% reaching Rp 20.76 millions per year. Besides, transformation to non-farm could be viewed from farming income contribution which declined from 2008 to 2015 as much as 7.80%, whilst non farming income rose to 53.64%. Such an occurrence was supported by [10] who stated that non-farm activities were resources which largely influenced household income. [19] added that the main factor underlying transformation to non-agriculture was related to household income.

**Table 5:** Household Income and Expenditure of rice farmers in Sigi District, Central Sulawesi Province

Income sources	workforce	Year 2008	Year 2015	Change
		Contribution (Rp)	Contribution (Rp)	(%)
Rice Farming	Men+Women	9 613 175	8 863 035	-7.80
Non-farm	- men	5 659 815	8 288 909	46.45
	- Women	2 086 813	3 612 945	73.13
		7 746 627	11 901 853	
Total farming + non-farm		17 359 802	20 764 888	19.61
Food consumption		5 952 908	8 267 143	38.88
non-food onsumption		4 663 569	5 824 033	24.88
Total		10 616 477	14 091 175	

Table 5 indicates the influence of transformation towards household expenditure in which there was a rise for both food and non-food consumption between 2008 and 2015. Expenditure spent for food consumption was more than that for non-food consumption. The increase household expenditure could not only be the



supporting factor to carry out transformation to non-agriculture, but also the impact of the increase of household income.

### ***3.2. Factors affecting transformation of household workforce to non-Agriculture***

Based on the result of OLS (Ordinary Least Square) estimated parameter, the transf equation model formed was best fit to describe factors affecting workforce transformation to non-farm. Determinant coefficient resulting from the result of estimation was 0.27002; it was the variables of women labor wage in non-farm, labor wage in farming, farming total land, education of male in the family, education of female in the family, ages of male members in the family, total usage of workforce outside family, and household total expenditure that could explain the 27.00 percent from transformation of farming labor to non-farm activities (Table 6). Data in Table 6 explain that women's wage in non-farm (RUWNP) had an influence and was related positively to transformation of farming labor to non-farm (TRANSF). This meant that the increase of wage from non-farm jobs made labor gave more attention to these jobs so as to gain more income for the family. In other words, wage was a supporting factor to work in non farm. Farmers would decide to perform non-farm jobs if the wage offered was high. In contrast, it was found that farmers were likely to work for whatever income just to increase the income for family. In addition, non-farm activities would be performed by farmers as they wanted to utilize spare time they had among the jobs they conducted in farming. As for women, working in non-farm was due not only to the opportunity to work there but also to under-five-year children they had in the family and other activities they had to take care in the house, such as taking care of the husband, cleaning the house, and cooking. Reference [23] pointed out that one of the characteristics of farming jobs was to wait for the harvest time; it was, therefore, possible for farmers to utilize this time to work at non-farm sectors. One thing influencing labor market in relation to planting season pattern experienced by household farmers was the time when there was no job or no activities in farming sector; as a result, non-farm activities at such a particular time was superior. In busy seasons, in contrast, the demand for labor in farming would increase in line with the rise of working wage. One of the factors which played an essential role in the existence of working opportunity was, labor characteristic. Reference [22] stated that factors directly affected working opportunity and income of households in villages include: (1) village characteristic condition /agroecosystem. Different agroecosystem conditions would lead to dissimilar farming patterns; (2) human resources (the number and structure of people according to their education and sexes) were variables used as an indicator of labor vacancy; (3) capital resources in the form of land ownership. One of the indications of development realization in villages was the development of non-farm sectors accompanied by the increase of demand for land which finally brought about the change of land ownership patterns and distribution; (4) regional economy roles (including banking) related to regional accessibility; (5) technology change affecting growing intensity changes; (6) socio-cultural factors (farmers' image gave less pride as a social status, particularly for young generation, so they preferred to work at non farm sector); (7) seasonal working pattern which allowed spare time to work outside agriculture ; (8) population density level. Furthermore, farming wage level, though not significantly, influenced negatively labor transformation to non agriculture. This shows that high wage levels in farming sector would increase cost for production input in farming. This occurred when households hired labor outside the family as they had to pay these labor by reducing household expenditure and increasing household work allocation for their own farm. Besides, the rise of domestic work in farming activities created the tendency for not conducting transformation

to non-farm – this occurred particularly in busy seasons of farming. Transformation of workforce to non-farm was significantly influenced by farming total area (RLL); this meant that farmers owning narrow land would allocate smaller working activities compared to those with wider farming land. It was estimated that farmers with limited land would gain low income; thus, in order to add their income household members tended to perform transformation to non-farm sectors. Reference [24] pointed out that the size of land that a family had influenced the decision for labor allocation. Non-farm jobs were considered important due to its great contribution to family life strategies. The wage of each job affected labor allocation positively. Reference [3] added that due to limited land ownership, there were many farmers who were not merely dependent on farming income and tried to gain additional income from jobs other than farming. This was a common phenomenon occurred in villages of developing countries. Formal education levels of both male and female positively influenced transformation to non-farm; higher formal education levels enabled farming labor to transform to non-farm. Households allocated high education level members to work in non-farm sectors rather than farming. However, there was still possibility for household members with low education levels to carry out transformation to non-farm by working on informal jobs which did not need high education and skills (such as labors or services) in order to raise family income. According to. Reference [13] when education level of household farmer members increased, it would have impact on non-farm activities, including time re-allocation of farming jobs. Education was significantly more required in non-farm activities than in farming ones. This is due to the decline of household workforce supply in farming and the rise of household workforce supply on non-farm activities which offer higher income compared to working in farming activities. Reference [18] furthermore, added that each household member would provide their service when the wage offered was interesting for them. Nevertheless, to meet urgent needs, particularly in the case of poor households, they would accept any amount of wage as long as they could have income.

**Table 6:** Results of parameter estimation on equation of household labor transformation to non-farm

Variable	Parameter Estimasi	Standard Error	Pr >  t	Elasticity	Label Variable
<b>Household labor transformation to non farms (<math>R^2=0,27002</math>)</b>					
Intercept	5.890532	5.471721	0.2847		Intercept
RUWNP	5.725E-7	6.374E-7	0.3715	0.0150	Women labor wage in non-farm Labor wage in agriculture
RUTKP	-0.00018	0.000143	0.2029	-3.8746	Farming land area
RLL	-0.00015	0.000050		-0.6709	Education of males in family
RPP	0.086002	0.067802	0.0037**	0.4408	Education of women in family
RPW	0.036360	0.071051	0.2080	0.2045	Men's age in family
RUP	0.000243	0.014407	0.6101	0.0061	Total use of labor outside the family
RTKLL	0.012280	0.007335	0.9866	0.4562	Total household expenditure
RPGTK	1.566E-7	4.569E-8	0.0977*	1.1456	
			0.0009***		

Note:

\*\*\* : significant on real level  $\alpha = 99\%$

\*\* : significant significant on real level  $\alpha = 95\%$

\* : significant significant on real level  $\alpha = 90\%$

Similarly, men's age positively affected workforce transformation to non agriculture. This meant that in line with the increase of farmers' working age, transformation to non-farm also arose. In other words, farmers at productive age tended to perform transformation to non-farm, and conversely, for older farmers, possibility to transform to non-farm went down, or even there was by no means transformation to non-farm and allocated their work only on farming activities. It was estimated that for growing older farmers, it would be difficult for them to adjust or adapt to new jobs in non-farm areas. Moreover, getting older means declining of work productivity compared to younger farmers. Reference [6] pointed out that there was a decrease in participation of male labor who were above 65 years old.

Variable of the use of workforce outside family (RTKLN) were related positively and influenced significantly towards labor transformation from farming to non-farm. This means that transformation of household workforce to non-farm tended to increase the use of labor outside family in order to help farming activities in completing production process, from land cultivating to harvesting. The reason for this was that farmers allocated more working time on non-farm activities and decreased their time allocation on farming ones; therefore, they needed labor outside family to be hired to help accomplish farming jobs. In the busy season in farming, there was a tendency for farmers to hire labor outside family to help them work in their farm, such as at production stage – from land cultivating, seedling, planting to harvesting. It was estimated that the bigger number of labor outside family hired by farmers, the more time used by farmers to transform to non-farms.

Next, total expenditure of farmers' household (RPGTK) were positively related and significantly influenced workforce transformation to non-farm. This means that the increase of household expenditure due to the increase of daily life needs forced farmers to find jobs other than the one they had in farming to gain more income. Indeed, this could be a triggering factor for farmers' household to conduct transformation to non-farms. The farmers' expenditure include the needs for food consumption, non-food consumption, and investment in farmers' household, as well as expenditure that could not be produced by farmers and, therefore, had to be bought in the market. Reference [11] pointed out that farmers had to buy food for the following reasons: (1) income from farming or non-farm business could not be directly consumed, (2) farming production could be directly consumed but the amount was not adequate for household food needs, (3) strategies to press storage cost or substitution for food quality being consumed. If a household belonged to category (1) then both farming and non-farm activities were commercial. Farmers' household belonged to category type (2) described households which lacked of food from their farming, and the one belonged to category type (3) was households which sold their product then bought better food or lower quality food with lower price. The number of family members depicting household economy burden was indicated from the amount of expenditure. The bigger number of household members would lead to bigger amount of expenditure, including expenditure for food consumption to buy.

Members of farmers' family allocated time to work in farming, non-farm, and in the household. Time spent

for household production directly influenced consumption of goods and services (foods and child care, for instance). In the process of consumption and production, time allocation was an integral part of decision making since it reflected the goal of individual as well as contribution of household members [15]. With the increase of consumption, farmers total expenditure would also increase; accordingly, farmers were forced to find additional jobs from non-farm sectors so as to obtain extra income to meet their daily needs.

#### **4. Conclusion and Suggestions**

Research results indicate that household labor transformation to non-farm occurred in Sigi district, Central Sulawesi province, between 2008 and 2015. Such a labor transformation was affected by total farming land owned by farmers, the use of labor outside the family, and total farmers' household expenditure. Transformation was able to increase farmers' household income. Accordingly, household labor transformation to non-farm tended to be inevitable.

Referring to the above research result, it was suggested to carry out further research on household labor transformation to non-farm by relating it with migration in overcrowded and vast areas with diverse agroecosystems. Moreover, further research on household labor transformation to non-farm based on household stratification using variables including total land or land ownership status, and the use of culture technology or alsintan technology are also required to obtain a more complete description of the influence differences of household labor transformation in farmers' level.

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