

Original Paper

The Influence of Socio-Economic Factors toward the Farmer's Adoption Rate on Soy Bean Crop Farming in the Semi Arid Area of South Amanatun Sub District, the South-Midle Timor District

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Abstract

It is neccery to realize that soy bean has certain important benefits for people, either for food or for fulfilling the row materials needed by such industries as: animal feed, medicine, liquid paint, and printed ink industries. For food, people should consum the soybean, primarily by people who are living in the areas placed far from the source of fish and meat, because the soy bean contains nabati protein in a high level of percentege, around 40-41%, and nine kinds of important matters functioning to prevent women from breast canccer infection. People can consume soybean in the type of: fermented soy bean cake (tempeh), tofu, soy bean milk, et cetera. Although the soy bean is categorized as an important food, but the number of farmers cultivating this crop in Indonesia, as well as in the Province of Nusa Tenggara Timur (NTT), included in the Sub District of South Amanatun as a semi arid area, are still very limited, while the availability of natural resources supporting the growth of this crop is very potensial, and then the soy bean needed by industries operated near by this Sub District dominantly are supplied by outside of the NTT, such as from: Java, Bali, and Lombok, even from U. S. A. Farmers in the Sub District of South Amanatun, only a few who have cultivated soy bean crops, while the majority of them have not cultivated yet. These facts indicate that among farmers probably because of their having different level of socio-nomic factors which influence them to adopt or not to the soy bean crop farming. To examine whether or not these different level of socio-economic factors have signicant influence to the farmer's adoption on the soy bean farming, then a study had been done in 2018. On the basis of results of the data analysis by applying the Linear Probablity Modle

demonstrated that: the socio-economic factors which have the significant influence to the farmer's adoption on the soy bean crop farming in the study area were: (1) the level of farmer's knowledge related to soy bean cultivation and soy bean processing, (2) the level of farmer's perception on the soy bean cultivation, (3) the level of farmer's interest on the soy bean crop farming, and (4) farmer's family income. The other socio-economic factors such as the level of farmer's formal and non formal education, the level of farmer's cosmopolitan, the farmer's orientation on soybean crop farming, and the farmer's size of land operated for soybean crop farming have no significant influence to the farmer's adoption on soybean crop farming.

Keywords

Socio-economic factors, Influence, Adoption, Farming, Soybean

1. Introduction

Background Knowledge; Soy bean seed has certain important benefits for people, both for food and for fulfilling the raw materials needed by such industries. As food, the soy bean seeds, among them, can be processed to become tempeh, tofu, soy bean milk, soy sauce, and taugé. Then as the raw material of industry, the soy bean seeds can be processed to become animal feed, paper, liquid paint, printed ink, and textiles. Adie and Krisnawaty (2006) stated that, as food, the soy bean seed has more advantages compared to the other kind of food, primarily due to its content of high level of protein, around: 40 – 41%, and nine important nutrient benefits to human body health for people consuming it. On the basis of important roles played by soy bean, then Agricultural Department of Indonesian Republic, especially in the era of Unity Indonesian Cabinet, placed this commodity as the one of staple foods like: rice, maize, sugar, meat, and soy bean. Therefore, soy bean crop farming should be accelerated its development for minimizing the number of its import (Syahyudi, 2006). One of agricultural development targets in the year of 2017 was the achievement of self sufficient of five kind staple foods, including the soy bean (Research Institution of Various Kinds of Beans and Tubers, 2015). Indonesia, involving the Province of Nusa Tenggara Timur (NTT), has natural resources which are compatible with the growth of soy bean crop. According to data published by Central Institution of Indonesian Statistic in 2013 indicated that, only ten provinces of the country which were categorized as the central of soy bean production. Those were: East Java with the production of 152,986 tons dry seeds; Central Jawa with the production of 152,416 ton of dry seeds; West Nusa Tenggara with the production of 74,156 tons of dry seeds; Aceh with the production of 51,439 tons of dry seeds; West Java with the production of 47,156 tons of dry seeds; the Special District of Yogyakarta with the production of 36,033 of dry seeds; South Sulawesi with the production of 29,938; South Sumatera with the production of 12,162 tons of dry seeds; Bali with the production of 8,210 tons of dry seeds, and the Middle Sulawesi with the production of 8,202 tons of dry seeds.

According to data figured out by the Trade Distribution of Soy Bean Commodity, the total production of soy bean farming of Indonesia in the year of 2013 was only achieving: 600 – 800 ton of dry seeds,

while our need to this commodity in that year up to 2,6 million tons of dry seeds (Statistic Institution of Indonesia, 2013). These data indicated that the most of Indonesian Needs related to the soy bean must be imported from outside the country. This condition must be acknowledgeable because in the period of last ten years, the growth of production and the size of land harvested in Indonesia decreased around 5.85% per year in terms of production, and 5.77% per year with respect to the harvested size of land operated (Central Institution of Indonesian Statistics, 2013).

In 1990, the NTT Province was participated in the national program of soy bean development with named of "Special Eford to Accelerate the Increase of Soy Bean Crop Production" (the NTT Information Institution, 1990). The target of size of area planted by this crop in this program was 7,000 hectares with the production of 7,000 tons dry seeds. Then in 2015 this province was also participated in a national program with named of PAJALE (Padi, Jagung, Kedelai = a development to increase the yield of rice, maize, and soy bean crop). At the end of the program, results achieved were only 3,563 hectares in size of harvested area with the production of 3,615 tons of dry seeds. These data indicated that farmers of NTT interesting to grow the soy bean crop was in low category. Therefore, it is necessary to design an effective strategy how to develop the soy bean farming in NTT.

To design an effective strategy for developing the soy bean crop farming in NTT, it is important to find out formally farmers' socio-economic factors influencing their rate of adoption on the soy bean crop farming. On the basis of this consideration, then a study with titled of: The Influence of Socio-Economic Factors to the Rate of Farmers' Adoption on Soy Bean Crop Farming in the Semi Arid Area of South Amanatun Sub District, South - Middle Timor District. Choosing South Amanatun Sub District as the study area is because this sub district is categorized as semi arid area, and compared to others sub districts in the District of South-Middle Timor District, this sub district has the highest number of farmers cultivating the soy bean crop.

Research Problems; On the basis of background knowledge described formally, such research problems needed to solve by conducting this study as: (1) what are the characteristics of soy bean crop farming operated by the farmer's in the study area, the level of farmer's education, both formal and non formal, the level of farmer's knowledge, perception, interest, and orientation in the soy bean crop farming, the market availability to buy the soy bean crop farming yields produced by the farmers in the study area; and (2) what are the influences of farmer's socio-economic factors toward the farmer's adoption on the soy bean crop farming.

Research Objectives; On the basis of research problems, then the objectives of this study were: (1) to understand the characteristics of soy bean crop farming, the socio-economic factors belonged to farmers, the level of farmer's education, the knowledge, the perception, the interest, the orientation in operating to the soy bean crop farming, the farmer's cosmopolitan, the market availability of the soy bean crop farming yields, the farmer's adoption; and (2) to analyze the influence of farmer's socio-economic factor on the adoption of soy bean crop farming in the study area.

2. Research Methodology

2.1 Conceptual Framework of the Study

Soy bean crop constitutes the one of crops that should be grown by farmers because of its yields have certain advantages for human being's life, both as the healthy food for people and the income source for farmers. Therefore, farmers should adopt the soy bean crop farming. The adoption is defined the acceptance and the use of an innovation (Rogers, 1995).

In 1990, the Province of Nusa Tenggara Timur (NTT) also participated in the national program of soy bean development with the name of "Special Eford to Accelerate the Increase of Soy Bean Crop Production" (the NTT Information Institution, 1990). The target of land size should be planted by this crop in the program was 7,000 hectares with the target production of 7,000 tons dry seeds. Then in 2015 this program was run again with name of PAJALE (Padi, Jagung, Kedelai = a development program to increase the yield of rice, maize, and soy bean crop). At the end of the program, the achievement was only 3,563 hectares in size of harvested area, and from this size of land was only able to yield 3,615 tons of dry seeds. These data indicate that the land and climate of NTT are suitable for growing the soy bean crops, however these data reflect that farmers in the Province of NTT are not so interested in growing the soy bean crops, because the size of harvest land is still far below of the size of land targeted. Shortly, Fesbain and Azsen, *cited* by Ancok (1997) pointed out that farmer's adoption on certain innovation is depended on farmer's knowledges, farmer's attitude, and farmer's interest on that innovation.

As an innovation, whether or not the soy bean crop farming will be adopted by farmers, if the characteristics of farming are received by the farmers as follows: (1) the farming has the relative advantages for farmers, (2) the farming is compatible with the farmer's situation like: the farmer's value, the farmer's capability, the farmer's orientation in farming, the management used by farmer in farming, and the resources owned by farmers, (3) the farming is not difficult to practice, (4) the farming can be trailed by farmers, and (5) the farming production can be observed by farmers (Adams, 1988).

Rogers (1995), as well as Van Den Ban and Howkins (1993) pointed out that among factors influencing the acceleration farmer's adoption on an agricultural innovation are farmer's socio-economic factors, broken down into such variables as: farmer's education, both formal and non formal; farmer's cosmopolitan; farmer's knowledge, perception, and interest to the innovation; farmer's orientation in operating the soy bean crop farming; the size of land operated; and the rate of farmer's income. By understanding what those factors have a significant influence on the farmer's adoption, then it helps decision maker to design the effective strategy used in agricultural extension program. On the basis of hypothetical factors influencing farmer's adoption on the soy bean crop farming then the conceptual framework of this study can be depicted as follows:

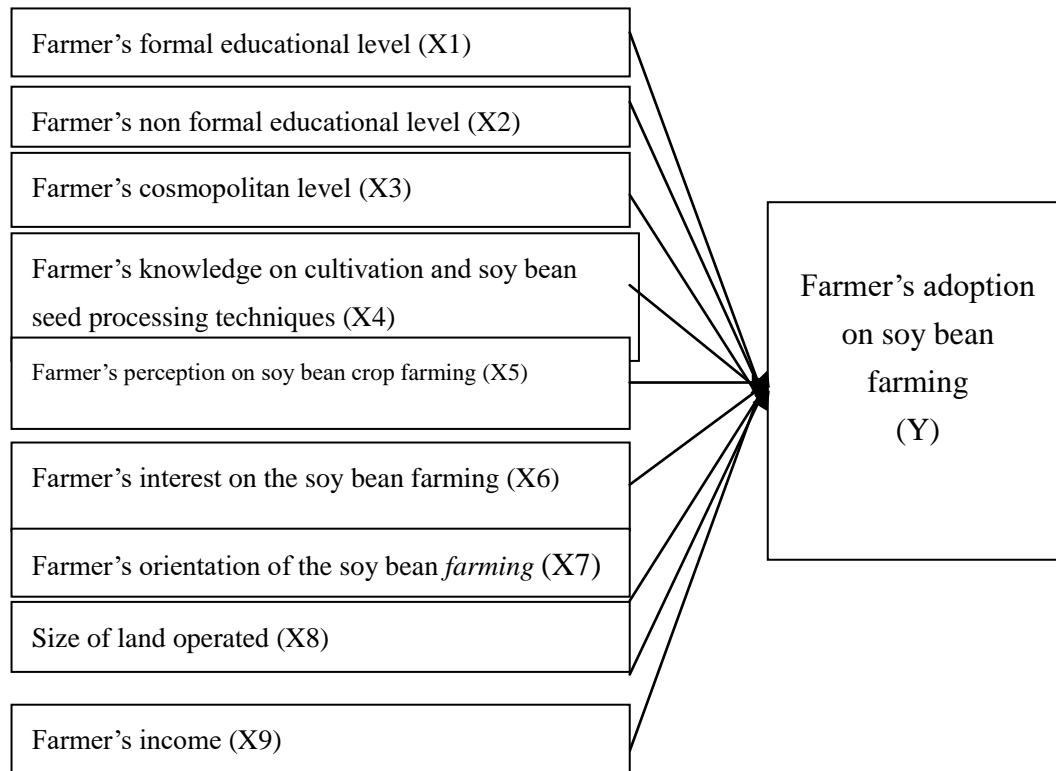


Figure 1. Flow Chart of the Influence of Each Socio-Economic Factor to the Farmer's adoption on the Soy Bean Crop Farming

2.2 Research Hypothesis

Related to the conceptual frame work of the study described formally, then such hipotesis of this study stated as follows: the farmer's formal education (X1), the farmer's non formal education (X2), the farmer's cosmopolitan (X3), the farmer's knowledge (X4), the farmer's perception (X5), the farmer's interest (X6), the farmer's orientation (X7), the size of land operated by a farmer (X8), and the farmer's income have significant influence to the farmer's adoption on soy bean crop farming.

2.3 Research Location

This study was carried out in the South Amanatun, the one of Sub Districts located in the District of Southern Middle Timor, the Province of Nusa Tenggara Timur. This Sub District is categorized as a semi arid area because of its rainy season is only occurred in three or four months per year. Then from all Sub Districts placed in the Southern Middle Timor District, this Sub District has the highest number of farmers growing the soy bean crop (the NTT in Figures, 2016). Therefore, this research location selected purposively.

2.4 Kind and Source of Data

Data needed in this study were both primary and secondary data. The primary data regard with: farmer's education level, both formal and non formal, farmer's cosmopolitan, farmer's knowledge related to the techniques of plant cultivation and and the soy bean seed processing, farmer's perception on the soy bean crop farming, farmer's interest to the soy bean crop farming, farmer's orientation on

soy bean crop farming, the size of land operated, and the rate of farmer's family income, and the farmer's adoption on soy bean crop farming. While the secondary data covered in this study regard with the profile of society, the availability of infrastructures, the potential of natural resources and economic resources of the population living in the study area.

The primary data were collected from respondents by the use of face to face interview technique and focus group discussion (FGD), while the secondary data were gathered from the Village Office, the Sub District Office, the Agricultural Extension Institution of South Amanatun Sub District, the District Office of Agricultural Department, Statistic Institutions of District and Province level.

2.5 Research Sampling Technique

Research sample consists of village and farmer samples. The village sample was determined purposively, based on the consideration that the number of farmers growing soy bean crops in that village are the highest among the number of farmers belong to other villages located in the study area. Then to determine the number of farmer sample, it was applied the Krejcie Table quoted by Padmowiharjo (2002). Moreover, the member of farmer sample were selected by the technique of simple random sampling, particularly by the use of lotrey sistem.

2.6 Data Collection Technique

Primary data were collected by using the *face to face interview* with respondents based on questioners prepared before. While secondary data were gathered from the books of Village Potensial, South Amanatun Sub District in Figure, the Result Report of Agricultural Extension Program offered by the Institution of Agricultural Extension in Sub District Level, and Southern Middle District in Figure.

2.7 Variable Measurement

Variables discovered in this study were measured by the following scales:

1. **Socio-economics variables:** a) farmer's age (ratio scale: year); b) farmer's gender (measured by nominal scale: female or male); c) farmer's level of formal education (measured by ratio scale: years); d) farmer's level of non formal education (measured by ratio scale: frequencies of farmer's participation in the training or in the agricultural extension services); e) farmer's family size (measured by ratio scale: number of people whom their daily needs depended on the farmer); f) farmer's side occupations (measured by nominal scale: kind of occupation); g) farmer's family income (measured by ratio scale: number of Rupiah).
2. **Rate of Farmer's Cosmopolitan:** to what extent the number of farmer's travelling to the city or to the other region during the year of 2017 to seek information related to the soy bean crop farming (measured by ratio scale: frequencies).
3. **Level of Farmer's knowledge upon the soy bean crop farming and its seed processing:** to what extent the farmer's knowledge in relation to cultivating the soy bean crops, and the seed processing to become tempe, tofu, and milk (measured by ordinal scale, but conversed to score based upon the Likert Scale Method (Mueller, translated by Kartawidjaja, 1996);
4. **Level of farmer's perception on the soy bean crop farming:** to what extent the farmer's evaluation

on the benefit of the soy bean crop farming (measured by ordinal scale but conversed to score based upon the Likert Scale Method (Mueller, *translated* by Kartawidjaja, 1996);

5. **Level of farmer's interest on the soy bean farming:** to what extent the farmer's interest upon soy bean crop farming (measured by ordinal scale but conversed to score based upon the Likert Scale Method (Mueller, *translated* by Kartawidjaja, 1996);

6. **Farmer's orientation on the soy bean crop farming:** What is the objective of farmer in operating the soy bean crop farming (measured by the Gutman Scale: if the orientation is for commercial will be score 1, while if the orientation is for subsistence will be scored 0).

7. **The size of land operated for the soy bean crop farming:** to what extent the size of land used to operate the soy bean crop farming;

8. **Rate of farmer's adoption on the soy bean crop farming:** Whether or not a farmer adopts the soy bean crop farming (measured by the Gutman Scale, but conversed to score 1 if farmer adopts and score 0 if the farmer does not adopt).

Data Analysis; Data collected in this study were analyzed based upon the objectives of study.

1. **Related to the objective 1,** the data are analyzed by the application of descriptive statistics, particularly by the application of Mean and Percentage calculation, as well as the Distribution of Frequencies according to Guideline of Hadi (1998). Sequentially, the steps of analysis are as follows:

a. Firstly, constructing the reference category or theoretical category based upon the interval value, and the number of categories as pointed out by the following Table:

Table 1. The Reference Category of Farmer's Knowledge, Perception, and Interest to the Soy Bean Crop Farming

No.	Percentage of Mean Score in Achieving the Maximum Score (%)	Category of the Percentage Value Achieving the Maximum Score	Farmer's Based on Mean Score in	Number of Responent (People)	Percentage (%)
1	20 - 35	Very Low/Very Bad /Very Uninteresting		.....	.....
2	36 - 51	Low/ Not Good/ Uniteresting		.....	.....
3	52 - 63	Moderate/ Good Enough/Quate Interesting		.....	.....
4	68 - 83	High/ Good/Interest		.....	.....
5	84-100	Very High/ Very Good/Very Intersting		.....	.....
Sum				.....	.....

Notes. Very low to very high (the category of farmer's knowledge); Very bad to very good (the category Perception); Very uninteresting to very interesting (the category of Interest).

- b. Finding out the Mean Scores of farmer's knowledge, perception, and interest on the soy crop farming according to calculation of Hadi (1998);
 - c. Calculating the percentage value of mean score in achieving the maximum skor, that is 5;
 - d. Comparing the percentage value of mean score to the Reference Category, and in what category that value is fallen down, then that is the category of farmer's knowledge, perception, and interest in soy bean crop farming.
2. Related to objective 2, the data are analyzed by the application of the Linear Probability Model according to Gasperz (1991) by the following formulation:

$$Y = \alpha + \beta X_i + \mu_i$$

In which:

X_i = Attribution Value of a farmer such as: level of education, both formal and non formal, level of cosmopolitan, level of farmer's knowledge, perception, interest in the soy bean crop farming, farmer's orientation in the soy bean crop farming, the size of land operated, rate of family income.

$Y_i = 1$ for farmer adopted the soy bean crop farming,

0 for farmer not adopted the soy bean crop farming.

β = Regression Coefficient, that is the change of Y_i caused by per unit change of X_i .

μ_i = the level of error appearing on i observation assumed as a random variable distributed randomly with the zero point of Median Value.

3. Results of Data Analysis and Discussion

3.1 General Description of Research Location

The location of research was the Sub District of South Amanatun, as the one of 32 sub districts located in the District of Sothern Middle Timor (Sothern Middle Timor District in Figures of 2017). Geographically, the district is placed in: $9^{\circ}26' - 10^{\circ}10'$ South Latitude and $124^{\circ}49'01'' - 124^{\circ}04'00''$ East Longitude.

In the year of 2015, the size of South Amanatun Subdistrict was 94.58 Square Kilometers. Its topography is hilly, and its soil is dominantly covered by the red soil, and grown by any kinds of floras, among them are coconut trees, leak trees, and other kinds of forest trees, as well as by the natural gress for animal feed. Kind of animals living in this area consists of animal husbandries and wild animals. Among the animal husbandries are beefs, horses, pigs, goats, dogs, chickens, and ducks. While the such kinds of wild animals consist of deer, wild pigs, monkeys, and any kind of tropic birds. Moreover, the Sub District of South Amanatun is located on ≥ 500 meters above sea level, categorized as tropical area, and the texture of soil is rough (the Sub District of South Amanatun in Figures of 2016).

This sub district is passed through by three rivers, namely: the river of Noesnaem (2.02 kms in length),

the river of Noenela (2.60 kms in length), and the river of Noetoko (3.10 kms in length) (South Amanatun Sub District in Figures of 2016). These rivers have not used yet as the source of irrigation for agriculture, because these rivers are located under areas passed by the rivers and there is no flat lands been feasible to operate the field of wet rices. Therefore until now, either local or national government, has no plan to build dams for agricultural irrigation to those rivers. So the agriculture operated by the farmers in this sub district is categorized as dry land agriculture in which the irrigation for crops and plants totally is depended upon the rain fall in rany season.

As a semi arid area, this sub district has climate of D3 to D4 types according to Oldeman Clasification, meaning that this area has climate of a little bit dry to dry. The high rain fall usually occurs in Desember, January, and February (for three months) in a year, the moderate rain fall usually occurs in March, April, May, Juni, and July (for four months), while no rain fall occurs in August, September, October, and November (for four months) (the Observation Station of Rain Fall of South Amanatun Sub District, the year of 2018). In 2014, the number of rain fall days belonged to this sub district were 106 days with the intensity of 961 mms, mean while in the year of 2015 occurred in 86 days with insenticity of 961 mms. Farthermore, the average of air temperature of this sub district is around 24⁰C – 32⁰C. This sub district is located on the area classified as non beach area.

In the year of 2015, the Sub District of South Amanatun connsis of 13 villages. With respect to administration development, these villages haved the following status: (1) there was no village categorized as self-helping village; (2) the number of villages categorized as self- developing village were 6; and (3) the number of villages categorized as self-suporting village were 7 (South Amanatun Sub District in Figures of 2016).

The distance between the central of village and the capital city of Sub District and Distict can be seen in the following Table.

Table 2. The Distace between Central of Villages and the Capital City, Both of South Amanatun Sub District and of the District of Southern Middle Timor (Kms)

No.	Name of Village	Name of thee Village Central	Distance to Capital City (Kms)	
			South Amanatun Sub District	Southern Middle Timor
1	Oinlasi	Oinlasi	1	49
2	Kokoi	Kokoi	5	54
3	Fatulunu	Fatulunu	10	59
4	Nunleu	Nunleu	12	61
5	Kualeu	Kualeu	14	63
6	Fenun	Fenun	8	57
7	Anin	Anin	2	51

8	Toi	Toi	12	61
9	Nifuleo	Nifuleo	13	62
10	Sunu	Sunu	16	65
11	Lanu	Lanu	19	68
12	Fae	Fae	6	55
13	Netutnana	Netutnana	5	54

Source: South Amanatun Sub District in Figures of 2016.

From Table 2, it can be found that such villages located farthest from the Capital City of the Southern Middle Timor District, that is Soe, are Lanu Village (68 kms), Sunu Village (65 kms), Kualeu Village (63 kms), Nifuleo Village (62 kms), Nunleu Village (61 kms), and Toi Village (61 kms). Because the location of these villages is too far from the capital city of district and the bad condition of road to reach them, seemingly influence the rates of developmental services given, then not surprising that these villages are still categorized as self-helping villages.

In the year of 2015, the number of population belong to the Sub District of South Amanatun were 19,912 people, consisting of males were 9,523 people (48%), and females were 10,389 people (52%). This number was united in 5,111 families. From this number, as many as 4,958 families (97%) were farmers as the main job, it was only 153 families (3%) working as another jobs (Agricultural Extension Institution of the South Amanatun Sub District, 2017).

Furthermore, of the productive land in this sub district, as many as 8,264 hectares were used as described in the following Table.

Table 3. Distribution of Land Size in the Sub District of South Amanatun Based upon Land Use in 2017

No.	Jenis Pemanfaatan	Size (Ha)	Percentage (%)
1	House Yard	340	4.14
2	Garden/Field/Dry Field	4,037	46.85
3	Plantation	280	3.39
4	Forest	45	0.54
5	Pastureland	65	0.79
6	Fishpond	1	0.01
7	Sleeping Land	334	4.04
8	Others	3,160	35.24
	Sum	8,264	100.00

Source: Institution of Agricultural Extension of the Sub District of South Amanatun, 2018

3.2 General Description of Sample Village

Sample village of this study was Kualeu. This village was determined by purposive sampling, because of 13 villages covered by the Sub District of South Amanatun, only this village which had farmers growing soy bean crops. The Kualeu Village has 9 km² in size, located at the height of 1,089 meters above sea level, categorized as self-helping village, and placed on the area of non beach. Its topography is slope and hilly, and among 13 villages of the Sub District of South Amanatun, this village is located on the highest area above sea level.

3.3 Soy Bean Crop Farming Operated by Farmers in the Sample Village

Farming is the main job of population of the Kualeu Village. In the year of 2015, this village participated in national program aimed to develop the soy bean crop farming. Farmers participating to this program were farmers who had become the members of farmer group. The name of farmer group in which its farmers participated in the program was “*Haimloimhemok*”, built in the year of 2010.

Results of data analysis pointed out that, from 32 of respondents, only 10 people or 31,25% had ever grown the soy bean crop. By this percentage value, then it can be concluded that the rate of farmer’s adoption on the soy bean crop farming is still in “low category”. The average size of their land used to operate for soy bean crop farming was two acres, ranging from one to three acres. By these data indicating that the soy bean crop farming was not being interested by farmers. Primary reasons why farmers were not interested with the soy bean crop farming were follows: (1) the selling prize of this commodity was lower than the selling prize of kidney bean; (2) the soy bean seeds could not been consumed directly as food by people as the other kind of beans, but firstly it should be processed to become tempeh, tofu, or soy bean milk, mean while farmers did not know how to process it; and (3) farmers had ever had bad experience regarding with the soy bean crop farming, in which when soy bean farmers sold their soy bean seeds to the industries of tempeh/tofu existing in Soe, the industries did not buy these seeds, they prefer to buy the soy bean seeds supplied from Java, Bali, and NTB, even from U. S. A. This experience formed farmer’s perception that the operation of soy bean crop farming seemly could not give benefits to farmers. According to farmers, if they operate the soy bean crop farming, they will get nothing, except they know how to process the soy bean seeds to become such food as tempeh, tofu, and soy bean milk, ecetra.

4. Socio-Economic Characteristics of the Sample Farmer

Sosio-economic characteristics of the sample Farmers included: gender, age, size of family, formal education, non formal education, main job, side job, size of land operated, and the family income of 2017. Description of each characteristic can be explained as follows.

4.1 Respondent’s Gender, Age, and Family Size

Farmers used as respondents in this study were 32 people, in which males were 17 people (53%), and females were 15 people (47%). According to results of data analysis, their age was 47 years in average, and the size of family was categorized as small family, three people per family. Mostly, the status of

family member was student.

4.2 Respondents of Formal and Non Formal Education

Respondents had variation related to formal education, some of them were illiterate formal, but some were graduated from: elementary school, junior high school, and senior high school. The following table described the respondents' formal education.

Table 4. Distribution of Respondents According to Level of Formal Education

No.	Level of Formal Education	Number (People)	Percentage (%)
1	Illiterate	9	28.12
2	Elementary School	15	46.88
3	Junior High School	4	12.50
4	Senior High School	4	12.50
	Sum	32	100.00

Source: Primary Data Processed in 2018.

Interms of non formal education had ever been participated by respondents, only five people (15.62%) had ever participated in the non formal education that was the agricultural extension activities. The others had never got the non formal education. This might be happened as the consequence of location of Kulaeu Village was too far from the Capital City of District, and also because the condition of road to this village was very bad, so that the governmental apparatus, especially field agricultural extension agent rarely visited to this village.

4.3 Main and Side Jobs of Respondents

Main job of respondents was farming. By this job farmers could fulfil almost all of their daily needs such as for: food, health, cloths, children education, light, and making money. Among farmers, as the side jobs, some were also raising animals, weaving traditional cloths, playing as a builder or carpenter, becoming the animal trader, and collecting the products of tamerind. From these side jobs, the most income gained by farmers who did it was raising animals and doing animal trading.

4.4 Characteristics of Farming Operated by Respondents

Size of farm land used by respondent to operated farming was 1.39 hectares in average, ranging from 0.5 to 3 hectares. Status of that land was private property.

On the farm lands operated were cultivated dominantly by corn, kidney bean, long bean, peanuts, potatoes, kasava, and sweet potatoes. Some others, besides growing these crops, they were also cultivating with soy bean crop, squash, banana, carrot, pitchai, pachoy, and cabbage. The products of corn, cassava, sweet potatoes, and banana in general were used for fulfilling the need of food. While the product of kidney bean, long bean, potatoes, carrots, pitsai, pakcoy, cabbage, and squash, were used to market with the price as described in the next table.

In general, the crops grown by respondents were cultivated by the application of intercropping pattern but in disordered, meaning that, upon the same land, the farmer grew some kinds of crops but in disordered pattern. Farmers perceived this cropping pattern as wisdom, because by this pattern not just to prevent farmers from the risk of harvesting fail, but also to economize the cost of labour, and to optimize the use of land in a rainy season.

Besides farmers growing crops pointed out before, farmers also planted areca nuts and betel vines. These plants were also playing role as source of farmer's income, because eating areca nuts and betel vines constituted a very strong tradition applied by people in the location of research.

In terms of raising animals, kinds of animals raised by farmers for commercial orientation were beefs, pigs, goats, and chickens. From these animals, the most economical value was beef. By raising this animal, mostly farmers can build a living house.

5.5 Respondent's Income in the Year of 2017

On the basis results of data analysis indicated that the income gained by respondents in the year of 2017 was Rp. 3,664,531.25 in average; moreover, the number of cost used to fund the farming was Rp. 140,937.50 in average. Therefore, the net income gained by farmers from selling the agricultural products in the year of 2017 was Rp.3,523,593.75 in average. Kinds of agricultural products used by farmers to gain money was: kidney bean, potatoes, pitchay, pakchoy, squash, soy bean seeds, and corn. The following Table will be figured out kinds agricultural products sold completed with the price of them.

Table 5. The Selling Price of Each Kind of Agricultural Commodity Produced by Farmers of Kualeu Village in the Year of 2017

No.	Kind of Commodity	Selling Price (Rp.)
1	Kidney Beans (per kg)	20,000 – 25,000,-
2	Potatoes (per kg)	10,000 – 15,000,-
3	Pitchay (per unit)	15,000,-
4	Pakchoy (per unit)	5,000,-
5	Squash (per fruit)	5,000,-
6	Soy Bean (per kg)	5,000 – 10,000,-
7	Corn (per kg)	5,000,-

Source: Primary Data Processed in the Year of 2018.

The products of cassava, sweet potato, and banana, farmers did not use them as commercial commodities, but for food of family. Besides, small portion of respondents raised animal, selling the products of areca nut and betel vine for getting money. Unfortunately, although these farmings had

good prospective but only small portion of respondents operated them.

5. Farmer's Knowledge, Perception and Interest on the Soy Bean Crop Farming

Farmer's knowledge, perception, and interest on soy bean crop farming can be described as follows.

5.1 Farmer's Knowledge on Soy Bean Crop Farming

The program of soy bean crop farming development had been offered to farmers of the Village of Kualeu in the year of 2015. Number of farmers participated in this program were 17 people, they were the members of the group farmer with named of "Haimloimhemok". As the consequence of developmental program existing was the occurrence of learning process in the participating farmers. McCreary in Blackburn (1989) stated that, the one of results of learning process is the change of knowledge of people participated in the learning process. Moreover he also stated, there are three kinds of knowledge, those are: (1) *declarative knowledge* (knowing what); (2) *procedural knowledge* (knowing how); and (3) *conceptual knowledge* (knowing when and why).

According to results of data analysis figured out that the mean score of farmer's knowledge related to the cultivation and seed processing of soy bean was 2. The percentage value of this mean score in achieving the maximum score, that was 5, was 40%. If this value was referred to the Referred Table, then we could find that this value fell down on the ranging of 36 – 51% (classified as Low Category). On the basis of this result it could be concluded that the level of farmers' knowledge related to soy bean cultivation and seed processing in the Village of Kualeu, was in "Low Category". This result was not surprising because, as mentioned before, that only five people (15.62%) had ever participated in the non formal education that was the agricultural extension activities. The following table would be figured out the distribution of respondents upon their category of knowledge.

Table 6. Distribution of Respondents Based on the Their Level of Knowledge in Cultivating and Seed Processing of Soy Bean, the Year of 2017

No.	Percentage of Mean Score in Achieving the Maximum Score (%)	The Category of Farmer's Knowledge Level in Achieving the Msximum Score	Number of Respondents (People)	Percentage (%)
1	20 – 35	Very Low	14	43.75
2	36 - 51	Low	6	18.75
3	52 - 67	Moderate	11	34.38
4	68 – 83	High	1	3.12

6	84 – 100	Very High	0	0,00
	Sum		32	100.00

Source: Result of primary data analysis in the year of 2018.

From Table 6, it could be found that, the more number of respondents were in very low and low category as many as 62.50% (43.75% in very low category + 18.75% in low category), while in moderate and high categories were only 37.50% (34.38% in moderate category + 3.12% in high category). In addition, there was no farmer being in very high level of knowledge. Therefore, it was not surprising that in average the level of farmer's knowledge regarding with soy bean cultivation and soy bean seed processing was in "low category". Certainly this level of knowledge, it could not be expected to have a high level of farmer's rate in adopting the soy bean crop farming.

5.2 Farmer's Perception on Soy Bean Crop Farming

Perception is a process by which someone organizes and interpretes his or her sensorical impression in order to give certain meaning to his or her environments (Robinson in Muchlas, 2005). More complit, Van Den Ban and Hawkins (1985) defined that perception is a process by which we receive information or stimuli from our environment and transfere it in to our psychological awareness. Moreover Van Den Ban and Howkins (1985) pointed out the general principle of perception as following: (1) Our perceptions are relative, not absolute; (2) Our perceptions are selective; (3) Our perceptions are organised; (4) We perceive what we expect or are set to perceive; and (5) One individual's perception will differ markedly from another's in the same situation because of different 'cognitive style'.

The farmer's perception ivestigated in this study was perception related to the economic benefit of operation of the soy bean crop farming. This was because, according to Mardikanto (2010), from the total variables influencing the adoption of an innovation by farmers, the most influence was the economical benefit.

Results of data analysis indicated that the mean score of farmer's perception on economical benefit of the soy bean crop farming was 1.4. The percentage value of this mean score in achieving the maximum score was 28%. If this value was compared to the Reffered Table, it fell down to the range of 20 – 35%, with the category of "Very Unbenefit". Therefore it was concluded that the farmer's perception on the operation of soy bean crop farming was in "Very Unbenefit Category". This was not a surprising, because farmers had ever bad experience in the operation of soy crop farming, in which the soy bean seeds that farmers sold to the tempeh/tofu industries operated in Soe were not bought by the industries, they prefered to buy the soy bean seed supplied from out side of the province, even from U. S. A. Besides, the selling price of soy bean seeds was lower than that of the kidney bean and potetos

In detail, the distribution of respondents upon their category of perception on the economical benefit of soy bean crop farming operation could be figured out in the following Table.

Table 7. Distribution of Respondents Based upon Their Category of Perception on the Soy Bean

Crop Farming, in the Year of 2018

No.	The Percentage of Mean Score in Achieving the Maximum Score (%)	The Category of Farmer's Perception on the Soy Bean Crop Farming	Number of Respondents (People)	Percentage (%)
1	20 – 35	Unbenefit	22	69.00
2	36 - 51	Less Benefit	7	22.00
3	52 - 67	Moderate Benefit	3	9.40
4	68 – 83	Benefit	0	0.00
6	84 – 100	Very Benefit	0	0.00
Jumlah			32	100.00

Source: Result of primary data analysis in the Year of 2018.

From the Table 8, it could be found that the most portion of respondents were in the Unbenefit Category, that was 69%, followed by those who perceived Less Benefit, that was 22%, and those who perceived Enough Benefit was only 9.40%. Those who were in Benefit and Very Benefit category were in 0%.

5.3 Farmer's Interest to the Soy Bean Farming

Interest or favorable is affectif attitude or someone's feeling on something that is favorable or unfavorable of someone on certain object (Rogers, 1995; Vane Den Ban and Howkins, 1993). Soy bean farm was introduced in the Village of Kualeu started in 2015. On the basis of this point, this farm, therefore, is categorized as an attitude object affecting the feeling interest or uninterest in the mind of farmers living at that village.

Results of data analysis indicated that average score of farmer's interest on the soy bean crop farming was 1.53. If this score was percentaged in acieving the maximum score (5) it was found a percentage value of $30.60\% = 31\%$, placed in the range of 20 to 31% on reference category. Therefore it could be concluded that the respondent's interest to the soy bean crop farming at the Village of Kualeu was in the "No Interest Category". The Distribution of respondents on the basis of farmer's intrrest on the soy bean farm can be pointed by the following Table.

Table 9. Distribution of Renpondents Based on Their Category of Interest to the Soy Bean Farm

No.	Percentage of Reaching the Maximum Score (%)	The Category of Farmer's Interest Based on the Percentage of Reaching the Maximum Score	Number of Respondents (People)	Percentage (%)
1	20 – 35	No Interest	22	68.75

2	36 - 51	Less Interst	5	15.62
3	52 - 67	Adequate Interest	3	9.38
4	68 – 83	Interstet	2	6.25
6	84 – 100	Very Interest	0	0.00
Jumlah			32	100.00

Source: Result of primary data analysis in the year of 2018,

As mentioned before that soy bean farmers in Kualeu, had ever had a bad expereance in selling the soy bean crop farmng products to the industry of tempeh and fofu operated in Soe, the Capital City of South Midle Timor Dstrict in which their soy bean products were not bought by the manufacturers of tempe and tofu indutries because their products were not qualifive. The manufacturers prefered to buy the soy bean seeds supplid from Jawa, and Lombok even from America. This result was not surprising because the farmer’s knowledge related to the soy bean crop farming was in low category and the farmer’s perception on this farming was in “Unbenefit Category”. Fisbain and Azjen in Ancok (1997) stated that, the interst of someone to an innovation is influenced by his or her level of knowledge about that innovation.

6. Famer’s Cosmopolitan

Rogers (1995) stated that, farmer’s cosmopolitan means the frequencies of farmer going out to the city or the other places in a year. Moreover he stated that someone’s cosmopolitan influenced the level of farmer’s adoption on an innovation.

In this study, results of data analysis showed that 100% of respondets rarely went out to Soe, as the capital city of district because the distance of this village to Soe was too far, \pm 63 kilometers, and the condition of roud from Soe to this village was too bad, and therefore, until now, the number of the public transporation operating to this village is very limit.

7. Farmer’s Orientation in the Operation of the Soy Bean Farming

Rogers (1995) stated that farmer’s orientation on the operation of a farm was the objective of farmers in operating of their farms. He also stated that, there were two kinds of farmer’s orientation in the operation of farm that was: the subsistence as well as the commercial orientation. The subsistence orientation meant results of farming was only to fulfill the self needs of farmers, while the comecial orientation meant results of farming was to market. Moreover he stated that farmers who had the commercial orientation in farming, in general, were faster than of farmers who had subsistence orientation in relation to the adoption of innovation.

Results of data analysis indicated that for farmers living in the Village of Kualeu, almost all kinds of peanuts, except string bean, the orientation of farming, including farming the soybean was the marketed orientation or the commercial orientation. It means there is no variation interms of farmer’s

orientaation in operating the soy bean crop farming. Therefore it can be predict that, the farmer's orientaion in orperating the soy bean crop farming have no significant influence to the adoption of soy bean crop farming in the Sub District Of South Amanatun.

8. Farmer's Adoption on the Soy Bean Farming

Adoption, basicly meaning that the process of acceptance and the use of innovation by someone or the change of someone's behaviors, either in terms of knowledges, attitudes, or skills after receaving an innovation offered by facilitators to his or her beneficiaries (Mardikanto, 2010). Moreover, Rogers (1995) stated that the level of adoption or rate of adotion could be identified by measuring the number of people from a social sistem who had adopted an innovation in a certain periode.

Soy bean farming is viewed as an innovation by farmers in the Village of Kualeu, because this farm was introduced to them just in the year of 2015. On the basis of data analysis, from 32 respondents, the number of farmers who had adpted the soy bean farm in 2017 were 10 farmers or 31.25%. Related to this percentage meaning that the rate of adoption of farmers on the soy bean farm was in "very low category".

9. Problems Faced by Farmers in the Soy Bean Farming

According to the information pointed out by respondents, problems faced by farmers in farming the soy bean were: (1) the knowledge related to the technique of soy bean cultivation was in very low category; (2) the selling price of soy bean produced by farmers in the research location was lower compared to the seling price of kidney bean; (3) the soy bean could not be consumed directly as the other kinds of beans; (4) the fabric of tempe/tofu located in Soe did not buy the soy bean produced by famers living in the the research location, the fabrics priffered to buy the import soy bean from Java, Bali, and NTB, even from U. S. A.; and (5) It was difficult to get soy bean seeds.

10. Socio-Economics Factors Influencing the Farmer's Adoption on the Soy Bean Farming

By the application of Linear Probability Model, the influence of socio-economics factors on the farmer's adoption of soy bean farming was depicted in the following Table.

Table 10. Results of Linear Probability Model Analysis Related to the Influence of Socio-Economic Factors on the Farmer's Adoption of Soy Bean Farming

No.	The Influence of Socio-Economics Factors on the Adoption Rate (Y)	Constanta Value	The Coefisien Value of Probability	The Value of R^2	The Value of (α)	Explanation
1	Formal Education					

1	(X1) on the Adoption Rate (Y)	0,386	-0.138	0.19	0.452	No Significant
2	Non Formal Education (X2) on the Adoption Rate (Y)	326	-0.029	0.004	0.737	No Significant
3	Farmer's Cosmopolitan (X3) on the Adoption Rate (Y)	All X3s were scored 0				No Significant
4	Farmer's Knowledge (X4) on the Adoption Rate (Y)	- 0.278	0.548	0.301	0.001	Significant
5	Farmer's Perception (X5) on the Adoption Rate (Y)	- 0.262	0.537	0.268	0.002	Significant
6	Farmer's Interest (X6) on the Adoption Rate (Y)	0.161	0.369	0.136	0.038	Significant
7	Farmer's orientation in soy crop bean farming (X7) on the Adoption Rate (Y)	All X7s were scored 1				No Significant
8	Farmer's land size operated (X8) on the Adoption Rate (Y)	0.246	- 0.189	0.036	0.299	No Significant
9	Level of famer familie's income (X9) on the Adoption Rate (Y)	2.837	0.537	0.069	0.1	Significant

Source: Results of Primary Data Analysis, 2018.

From the Table 10 above, it could be found the value of α of the influence of each nine independent variable to the farmer's adoption on the soy bean crop farming. This value very strongly determined whether or not the independent variable had a significant influence to the farmer's adoption rate on the soy bean crop farming. The followings were the description of the influence of each variable.

a. *The Influence of the Farmer's Formal Education Level toward the Farmer's Adoption Rate on the Soy Bean Crop Farming*

The Table 10 above pointed out that the value of α related to the influence of farmer's formal education on the farmer's adoption rate on the soy bean crop farming was 0.452. On the basis of this value, it was decided that the farmer's formal education level had no significant influence toward the farmer's adoption rate on the soy bean crop farming, because the value of $\alpha > 0.05$. This result was not surprising because the value of determinant coefficient (R^2) (see Table 10) was only 0.19, meaning that it was only 19% of the variation of the farmer's adoption rate constituted as the cause of variation of the farmer's formal education level. By this result then it could not use the level of farmer's formal education to predict the value of probability of farmer's adoption rate on the soy bean crop farming. This result was the same as the result of Serman's research (1999) concluding that the level of farmer's formal education had no significant influence to the farmer's adoption rate on the soil and water conservation practices in Ontario, Canada.

b. *The Influence of the Farmer's Non Formal Education Level toward the Farmer's Adoption Rate on the Soy Bean Crop Farming*

In the Table 10, it was found that the value of α related to the influence of non formal education level toward the farmer's adoption rate on the soy bean crop farming was 0.737. This value was > 0.05 . Therefore it was decided that the farmer's non formal education level had no significant influence toward the farmer's adoption rate on the soy bean crop farming, because the value of $\alpha > 0.05$. This result was not surprising because the value of determinant coefficient (R^2) (see Table 10) was only 0.004, meaning that it was only 0.4% of the variation of the farmer's adoption rate constituted as the cause of variation of the farmer's non formal education level. By this result then we could not use the level of farmer's non formal education level to predict the value of probability of farmer's adoption rate on the soy bean crop farming. This result was not surprising, as mentioned before that the field agricultural extension workers rarely come to the village because of the distance of that place too far and the condition of road was too bad.

c. *The Influence of Farmer's Cosmopolitan to the Farmer's Adoption Rate on the Soy Bean Crop Farming*

The Table 10 pointed out that all X3s was score of 0. This meant that all respondents had never gone to outside the village. On the basis of this value demonstrated that there was no variation in relation to the farmer's cosmopolitan. Therefore it could be ensured that the variation of the farmer's adoption on the soy bean crop farming was not because of the influence of the farmer's cosmopolitan.

d. *The Influence of the Farmer's Knowledge to the Adoption Rate on the Soy Bean Crop Farming;*

The Tabel Of 10 pointed out that the Coefisien Value of Probability of the Inlucence of farmer's knowledge on the farmer's adoption rate on the soy bean crop farming was 0.548 with the value of α was 0.001. On the basis of this value, it was decided that the level of farmer's knowlege about soy bean crop farming had a significant influence on the farmer's adoption rate on that farming the value of $\alpha < 0,05$. In relation to the coefisien value of 0.548, it meant that per unit incearse of the level of farmer's knowledge about soy bean crop farming could increase the probabilitly of farmer's adoption rate on the soy bean crop faming as many as 0,548. This result supported the Roger's generalization (1995) that farmer's adoption rate on an innovation depended on farmer's knowledge on that innovation. And also supporting the Model of Fisbain and Azjon *in* Anclok (1997) which stated that someone's knowledge about the innovation can influence someone's behavior on that innovation.

e. *The Influence of Farmer's Perception to the Adoption Rate on the Soy Bean Crop Farming*

As pointed out in the Table 10, the Coefisien Value of Probability of the Influence of farmer's perception to the farmer's adoption rate on the soy bean crop farming was 0.537 with the value of α was 0.002. On the basis of this value, it was decided that the level of farmer's perception on the soy bean crop farming had a significant influence on the farmer's adoption rate on that farming because the value of $\alpha < 0.05$. In relation to the coefisien value of 0.53, it meant that per unit incearse of the level of farmer's perception on the soy bean crop farming could increase the probabilitly of farmer's adoption rate on that faming as many as 0,548. This result supported the Roger's generalization (1995) that farmer's adoption rate on an innovation depended on farmer's perception on that innovation. And also supporting the Model of Fisbain and Azjon *in* Anclok (1997) stating that someone's knowledge, including perception, on the innovation can influence someone's behavior on that innovation.

f. *The farmer's Interest to the Adoption on the Soy Bean Crop Farming*

As figured out by the Table 10, the Coefisien Value of Probability of the influence of farmer's interest to the farmer's adoption rate on the soy bean crop farming was 0.369, with the value of α was 0.038. On the basis of this value, it was decided that the level of farmer's interest to the soy bean crop farming had a significant influence on the farmer's adoption rate on that farming because the value of $\alpha < 0.05$. In relation to the coefisien value, it meant that, per unit increase of the level of farmer's interest to the soy bean crop farming could increase the probability of the farmer's adoption rate on that farming as many as 0.369. This result supported the Roger's generalization (1995) that farmer's adoption rate on an innovation depended on farmer's interest on that innovation. And also supporting the model of Fisbain and Azjon *in* Anclok (1997) stating that someone's interest to the innovation can influence someone's behavior on that innovation.

g. *The Influence of Farmer's Orientation to the Farmer's Adoption Rate on the Soy Bean Crop Farming*

The Table 10 pointed out that all X7s was in score of 1. This meant that all respondents had the same of

orientation in operating the soy bean crop farming, it was to the commercial oriented. Because all respondents had the same score, that was 1, meaning that there was no variation in relation to the farmer's orientation in operating the soy bean crop farming. Therefore it could be ensured that the variation of the farmer's adoption on the soy bean crop farming was not as the cause of the farmer's orientation, it might be as the influence of other variables. So, the Farmer's orientation in operating the soy bean crop farming could not be used as the predictable variable in relation to the farmer's adoption rate on the soy bean crop farming.

h. The Influence of Land Size Operated to the Farmer's Adoption Rate on the Soy Bean Crop Farming

As pointed in the Table 10, the Coefficient Value of land size influencing the farmer's adoption rate on the soy bean crop farming was -0.189 , with the value of α was 0.299 . Because the value of $\alpha > 0.05$ then it was decided that the land size operated had no significant influence to the farmer's adoption rate on the soy bean crop farming. This result was not surprising because the variation of farmer's adoption rate was only 3.6% as the cause of the variation of farmer's land size operated. It meant that the size of land operated by the farmers was almost same. On the basis of this result than it could be stated the size of land operated by farmers was not able to be come the predictable variable of the farmer's adoption rate on the soy bean crop farming.

i. The Influence of Farmer's Family Income to the Farmer's Adoption on the Soy Bean Crop Farming

As figured out by the Table 10, the Coefficient Value of Probability of the influence of farmer's family income to the farmer's adoption rate on the soy bean crop farming was 0.537 , with the value of α was 0.1 . Because the value of $\alpha > 0.05$, it meant that the farmer's family income had no significant influence to the farmer's adoption rate on the soy bean crop farming. However because this study was categorized as a social study, this influence was still included as a significant influence. Therefore, it could be stated that the increase of per unit level of the farmer's family income could increase the farmer's adoption rate on that farming. as many as 0.537 . This result supported the Roger's generalization (1995) that farmer's adoption rate on an innovation depended on the farmer's income, because in the application an innovation, farmers usually needed a number of expenditure to buy certain inputs.

10. Conclusion and Suggestion

Conclusion; On the basis of data analysis and discussion, then the conclusion of this study were:

- (1). The availability of natural source to support the development of soy bean crop farming in the research location was potential;
- (2). The Level of farmer's knowledge related to the soy bean crop farming was in low category, but it had a significant influence to the farmer's adoption rate on the soy bean crop farming;
- (3). The level of farmer's perception related to the soy bean crop farming was in very unbenefit

- category, but it had a significant influence to the farmer's adoption rate on the soy bean crop farming;
- (2). The Rate of farmer's adoption on the soy bean crop farming in the research location was in ver low category;
 - (3). The level of farmer's interest to the soy bean crop farming was in no interest category, but it had a significant influence to the farmer's rate of adoption on the soy bean crop farming;
 - (4). The frmer's orientation to the soy bean crop farming was comercial oriented, but there was no significant influence to the farmer's adoption rate on the soy bean crop farming;
 - (5) The orientation of farmers in operating the soy bean crop farming was coemercial oriented;
 - (6) The cosmopolitan of farmers operating the soy bean crop farming was in category of no cosmopolit;
 - (7) The market of the soy bean crop farming yield was availabel but its place too far and had never bought the soy bean crop farming yields of the farmers produced;
 - (8) The farmer's adoption rate on the soy bean crop farming was in very low category;
 - (9) The socio-economic factors which had a significant influence to the farmer's adoption rate on the soy bean crop farming were: the farmer's knowledge, the farmer's perception, the farmer's interest, and the farmer'family income; while farmer's level of eduction, farmer's orientation, farmer's cosmopolitan, and the farmer's land size operated had no significant influence.

Sugestion; On the basis of conclusions stated above, then suggestions neceserily pointed out were:

- (1) The district government shoud give a serious attention to support the development program of soy bean crop farming in the research location;
- (2) The local industries of tempe/tofu shoud participate in supporting the development of soy bean farming in the research location;
- (3) In designing the development program of soy bean crop farming in the research location, training in seed processing for farmers constituted the first activity should be offered in order to increase the farmer's knowledge, perception, and interest to the soy bean crop farming.

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