

## **The Influence of Farmer Characteristic and Farming to the Farmer Motivation on Using Organic Manure (Case Study in East Tombatu District, South-East Minahasa Regency)**

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**ABSTRACT:-** *This research intended to investigate the farmer characteristic (sex, education level, number of family member) and farming \*area number, farming experience, the distance with manure source, contact with instructor) to the farmer adoption through farmer motivation in using organic manure. This research was carried out by the method of survey in East Tombatu District, South East Minahasa Regency, North Sulawesi Province. Sample of farmer was selected by using purposive sampling. Determination of sample village was based on the program implementation of SL-PTT (Field School of Integrated Cropping Management) so it was obtained 5 (five) sample villages such as the villages of Molompar Dua, Esandom, Esandom Satu, Mundung, and Mundung Satu. Results showed as follow: 1) the farming characteristic such as age, education level, and number of family member, and farming characteristic such as area number, farming experience, the distance to manure source, and contact with the instructor which influenced to farmer motivation in using organic manure; 2) farming characteristic such as area number, the distance with manure source and farmer motivation influenced the level of innivation adoption; 3) variable of farmer motivation was functioned as the mediation intervening variable between farmer characteristic (age, education level, and number of family member) and farming characteristic (area number, farming experience, the distance with manure source, and contact with the instructor) to the influence on farmer adoption in using organic manure.*

**Keywords:** *farmer characteristic, farming characteristic, farmer adoption, organic manure*

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### **I. INTRODUCTION**

Incoming organic agriculture has been known since a long time ago such as since planting science was known by human. At that time, the whole of them was traditionally carried out and using natural materials. Equally with the development of agricultural science and population rapid growth, so the food demand was also increasing. Green revolution in Indonesia at this time gave significant product to the fulfilling food demand which the using of synthetic chemical manure, cropping high yield variety, the using of pesticide, intensification of area, etc were increasing. However, for the next there was found any problem due to the managerial mistake in agricultural area. The pollution of chemical manure etc because of the more using of this material gave impact to the decreasing of environmental quality and human healthy due to be always dirtied by the synthetic materials [1]. The understanding of synthetic chemical material danger in a long time beginning to be realized so there was found the alternative of cropping which could produce the free product of synthetic chemical material pollutant and could maintain the healthier environment. Since that time, there has looked back to nature or now it is known as the organic agriculture. The giving of organic material was as one of the input components in approaching the integrated cropping management. Application of technology that can support the increasing of product and paddy productivity have not been fully carried out in crop plantation. Some study results like Integrated Cropping Management (PTT) and plantation system of paddy integration with cattles intended to manage soil, water, crop, and the organism of crop disturber (OPT) in the position of balance with technological input of qualified excellent seed, young seed, and manuring based on the status of soil nutrient and crop demand of nutrient, and cropping with the technology of “Tabela legowo 2:1” and “Tapin legowo 2 : 1” was really able to increase the productivity until 15-30% and it was saving the employers until 30% [2].

The new problem was appear when the implementation in field indicated that for changing the farmer attitude was not too easy. Farmers who had usually used anorganic manure that could be easily obtained in small shops of paddy product facility (“saprodi”) had to change with organic manure that was esldomly difficult to be obtained in market. This condition has pushed the government and most of related stakeholders to hard work for introducing the new innovation such as organic manure to the farmers in order to be able to be adopted in

farming activity. Innovation adoption is as a process of decision making like “The mental process of an innovation to a decision to adopt or to reject to confirmation of this decision” [3]. Then, Rogers [3] presented that there were 4 (four) main elements which influenced the idea distribution such as innovation, communication channel, time, and social system. It meant that diffusion was a process which an innovation was communicated through certain channel from time to time among the members in a social system.

According to the research of Rukka [4], the internal characteristic (non formal education, farming experience, and cosmopolitanism) influenced the farmer motivation. However, the external characteristic like market chance, innovation characteristic, fund and facility, asset, and intensity of instructor did not influence. Based on this fact, there was necessary to be carried out a research to analyze the farmer characteristic (sex, age, education level, number of family members) and farming characteristic (area number, farming experience, the distance with manure source, contact with instructor) to farmer adoption through farmer motivation in using organic manure.

## **II. MATERIALS AND METHODS**

Research location was purposively determined such as in East Tombatu District, South East Minahasa Regency by considering as follow: 1) South East Minahasa Regency is as agricultural region with 73,328 ha area number of 17,486.69 ha (23.93%) ; 5.49% (4,014 ha) is as rice irrigated area; 2) East Tombatu District is as one of the districts that has development potency of paddy farming, it is seen from the rice irrigated area reaches 2,330.50 ha or 64.20% of East Tombatu District area number which reaches 3,630 ha.

Population in this research was the farmers in East Tombatu District. In this research, researcher could not take the whole population of 23 farmer groups or 230 farmers, it was due to that the groups were distributed in 11 villages where the area was far to each other. Sample of farmers were as purposive sampling and the samples number were 55 respondents. According to Sugiyono [5], representative of sample number for association analysis were as 5 until 10 times of research variables number. In this research, there were 11 variables, so the minimum samples number were 5 x 11 or 55 respondents. If it was related to the absolute minimum samples size in structural model as path analysis and SEM, number of 50 samples has also been representative [6]. Determination of sample village was based on the program implementation of SL-PTT (Field School of Integrated Cropping Management), so it was obtained 5 (five) sample villages such as villages of Molompar Dua, Esansom, Esansom Satu, Mundung, and Mundung Satu. Analysis tool which was used in this research was path analysis which evaluated the influence of farmer characteristic, plantation to farmer motivation, and farmer characteristic, plantation, and farmer motivation to farmer adoption by using organic manure.

## **III. RESULTS AND DISCUSSION**

### **Description of research variable**

Table 1 presented the farmer characteristic such as the majority of farmers were males with the age of 30 to 40 years old, education level was senior high school, and number of family member was 3 to 4 persons. However, the characteristic of farming indicated that the farmers generally had the area number less than 0.5 hectare with the farming experience between 1 to 10 years, manure source was less than 1 km, and the frequency of interfacing with the instructor was 1 time.

This result showed that males more adopted the organic manure than females. Whereas the majority of farmers in South East Minahasa were on productive age such as 30 to 40 years. From educational aspect, there was seen that the farmers generally on the enough level of education such as Senior High School, so in thinking and decision making of farming, they were more punctual and had ability to make the best decision for their farming although there were not less farmers which had low education such as 48%.

The number of farmer family member were 3 to 4 members which included wife, husband, and 2 children and it was as an ideal number because in the other side, it can support the planned family program of government such as 2 children was enough. Whereas, there were 60% of farmers had narrow area number such as 0.5 ha. Farmers in this research had high enough experience such as 50% of farmers had experience of 10 years even there were 5.45% of farmer that had worked more than 41 years.

This condition indicated that the farmer characteristic was in low category because the ownership of area was low, but they had experience of farmer long enough, because cropping paddy was as the society hereditary effort in South East Minahasa Regency because the area condition was suitable for food crop agriculture especially paddy. In addition, farmers had the ease to obtain organic as well as anorganic manure because in every village there was the paddy production facility (saprodi) which supplied some farmer demands for farming activity. Whereas number of instructor visitors which were only once a month was the special

problem. Because the number of instructors in South East Minahasa were only 4 persons which had to serve 11 villages, but ideally there was one instructor in one village.

Table 1 The characteristic of farmer and farming

Characteristic	Criterion	Percentage
Sex	Male	76.4
	Female	23.6
Age (year)	30 – 40	34.6
	40 – 50	25.5
	50 - 60	32.7
	60 – 70	5.5
	70 - 80	1.8
Education	Elementary	18.2
	Yunior high school	29.1
	Senior high school	52.7
Task (person)	1 - 2	5.5
	3 - 4	60.0
	5 - 6	29.1
	7 - 8	5.5
Area (ha)	≤ 0.5	60.0
	0.6 - 1.0	25.5
	1.1 - 1.6	9.1
	1.6 - 2.1	1.8
	≥ 2.1	3.6
Farming Experience (year)	1 - 10	49.1
	11 - 20	20.0
	21 - 30	16.4
	31 - 40	9.1
	> 40	5.5
Distance (km)	≤ 1.0	61.8
	0.6 - 1.0	34.5
	1.1 - 10.9	3.6
Instructor Visitor (time)	0 – 1	38.2
	2 – 3	34.5
	4 – 5	18.2
	≥ 5	9.1

Table 2 described the motivation and adoption of farmer which was presented in the form of frequency and percentage of respondent opinion, and the score average of interception criterion in 5 levels such as follow [5]: 1) very low (the average of 1.00 to 1.80); 2) low (the average of 1.80 to 2.60); 3) medium (the average of 2.61 to 3.40); 4) high (the average of 3.41 to 4.20); and 5) very high (the average of 4.21 to 5.00)

Table 2 Motivation and adoption of farmer

Characteristic	Indicator	Average
Motivation	Y1.1	4.44
	Y1.2	4.27
	Y1.3	4.09
	Y1.4	4.35
Adoption	Y3.3	4.02
	Y3.4	4.04
	Y3.5	4.05

Based on the descriptive analysis in Table 2, there looked that the level of farmer motivation to organic manure using was in the range of 3.41 to 4.29 (high scale), and there were some indicators on very high scale (4.21 to 5.00) which indicated that the farmers in East Tombatu District, South East Minahasa Regency had very high motivation level to the using of organic manure. However, farmer adoption on high level meant the farmer adoption level in using organic manure was in good level. It was caused that there was farmer conciousness to the use of organic manure for crop and it can increase soil fertilizer and safe for human and surrounded environment. Farmers can directly sdopt organic manure because they had willingness, know the manner and had the facility to carry out. This was fitted with the opinion of Rogers [3] which expressed that to adopt an innovation was as humanic decision and this decision was based on four items such as 1) willingness to carry out; 2) knowing the manner that will be carried out; 3) knowing to carry out; and 4) to have the facility to carry out

### Path analysis

Table 3 presented the result of path analysis on the influence of farmer and farming characteristic to farmer motivation.

Table 3 Path analysis on the influence of farmer and farming characteristic to motivation

Independent variable	Beta	P-value
<b>Farmer characteristic</b>		
Sex (X1)	0.093	0.390
Age (X2)	0.619	0.000
Education level (X3)	0.345	0.008
Number of family member (X4)	0.537	0.000
<b>Farming characteristic</b>		
Area number (X5)	0.024	0.845
Farming experience (X6)	0.040	0.747
The distance with manure source (X7)	-0.300	0.025
Contact with instructor (X8)	0.327	0.005

The value of R2 was 0.503 or 50.3%, it meant that farmer motivation (Y1) was influenced of 50.3% by sex, age, education level, number of family member, area number, farming experience, the distance with manure source, and contanct with instructor, but the other 49% was influenced by the other factors.

Table 3 presented the evaluation of farmer characteristic to the farmer motivation and it was seen that the factors of age, education level, number of family member influenced farmer motivation because the value of P was 0.05 with significant level of 5%. The three factors could be described as follow:

- Path coefficient of age (X2) to the farmer motivation (Y1) was 0.619 with P-value of 0.0000. Because of P=value was < 0.05, so it could be concluded that there was the influence of age (X2) to the farmer motivation (Y1), it meant that the older of someone age would cause the higher motivation for using

organic manure. The influence of age to the farmer motivation could be proved by crossed tabulation which presented that 60% of respondents with young age (less than 45 years or 38.2%) had low motivation with the average of questionnaire score less than 4). In addition, 40% of respondents were old (more than 45 years old) and 27.3% of them had high motivation with the average of questionnaire score more than 4). It proved that the higher age of farmer would cause the higher motivation too. In the other side, the lower age of farmer would cause the lower motivation. Slamet [18] presented that the factor of age was very important in participating and generally on the group of 30 to 40 years old, the older age would cause the more active on participating to the farming activity.

- Path analysis between education level (X3) to the farmer motivation (Y1) was 0.345 with the P value of 0.008. Because the P-value was less than 0.05, it could be concluded that there was the influence of education level (X3) to the farmer motivation (Y1). It meant that the higher education level of someone would cause the higher motivation too for using the organic manure. The influence of education to farmer motivation could be proved with crossed tabulation which presented that 47.3% of respondents had low education level such as elementary and junior high school, 30.9% of them had low motivation too with the average of questionnaire score was less than 4). In the other side, 52.7% of respondents which had the education of senior high school had high motivation with the average of questionnaire score more than 4. It proved that the higher education level of farmer would cause the higher motivation. In addition, the lower education of farmer would cause the lower motivation. It was suitable with the opinion of Kartasapoetra [19] which presented that formal education very influenced the motivation of someone especially in responding for accepting the innovation. Someone with high formal education would be easier in responding the developed innovation and issue.
- Path analysis between the number of family member (X4) to the farmer motivation (Y1) was 0.537 with the P-value of 0.0000. Because the P-value was < 0.05, it could be concluded that there was the influence on the number of family member (X4) to the farming motivation (Y1). It meant that the more number of family member would cause the higher farmer motivation for using the organic manure. The influence of task to the farmer motivation could be proved from crossed tabulation which presented that 30.9% of respondents such as less than 3 persons had less task, 27.3% of them also had low motivation with the average of questionnaire score was less than 4. In addition, 69.1% of respondents had more task, 45.5% of them had high motivation with the average of questionnaire score was more than 4. It proved that the higher task number of a farmer would cause the higher motivation too. In addition, the lower task of a farmer would cause the lower motivation. Soekartawi [20] presented that the more family member would cause the heavier life load that was fulfilled by the family. The number of family that had an area were lower by the addition of family member while the production demand mainly food would be increasing. According to Hasyim [21], the number of family task was a factor that was necessary to be attended on determining the income in fulfilling demand. The number of family task would stimulate the farmer for carrying out many activities especially in finding and increasing the family income.

From the analysis result of farmer characteristic to the motivation by using organic manure, there was seen that only the variable of sex was not influenced the motivation by using organic manure. It was caused by the male as well as female had the same responsibility to increase the farming so they made effort the best for the whole farming activity.

In evaluation of farming characteristic to the farmer motivation, it was seen that factor of the distance with manure source and the contact to instructor influenced the farmer motivation because the P-value was < 0.05. Description of the two factors were as follow:

- Path coefficient between the distance with manure source (X7) to the farmer motivation (Y1) was as -0.300 with the P-value of 0.025. Because the P-value was < 0.05, so it could be concluded that there was the influence of the distance with manure source (X7) to farmer motivation (Y1). Because the path coefficient was negative (-0.300), it indicated that the relation was negative. It meant that the nearer distance with manure source would cause the higher motivation for using organic manure. The influence of distance to farmer motivation could be proved from crossed tabulation which presented that 29.1% of respondents had near distance such as less than 1 km, 27.3% of them had high motivation with the average of questionnaire score was more than 4. In addition, 70.9% of respondents had far distance such as more than 1 km, 29.1% of them had low motivation with the average of questionnaire score was less than 4. It proved that the nearer distance would cause the higher motivation. In the other side, the farther distance would cause the lower motivation.

- Path coefficient between contact with instructor (X8) to the farmer motivation (Y1) was 0.327 with the P value of 0.005. Because P-value was less than 0.05, it was concluded that there was the influence of contact with instructor (X8) to the farmer motivation (Y1). Because path coefficient was positive such as 0.327, it indicated that the more contact with instructor would cause the higher motivation to use organic manure. The influence of contact with instructor to farmer motivation could be proved by cross tabulation. It indicated that 72.7% of respondents were seldomly contact to instructor with the contact was less than 2 times, 50,9% of them had low motivation with with the average of questionnaire score was less than 4. In addition, 27.3% of respondents were frequently contact to instructor of more than 2 times, 27,3% of them had high motivation with the average of questionnaire score was more than 4 times. It proved that the higher contact frequent of farmer with instructor, it would cause the higher motivation too. In addition, the lower contact frequent of farmer with instructor, it would cause the lower motivation. Instructor had an important function to help the farmer in farming activity. Mosher [22] described about agricultural instructor such as teacher, analyst, advisor, organisator, developer of changed demand, changed motivator, and stabilator of farmer society relation. Van Den Ban and Hawkins [23] presented that instruction was as the involving of someone to carry out consciously the communication of information with the aim was to help the target for giving the opinion so that could make the right decision. The activity was carried out by someone which was called as agricultural instructor. Graphically, result of path analysis which evaluated the characteristic of farmer and farming to the motivation in using organic manure was presented as in Figure 1 below..

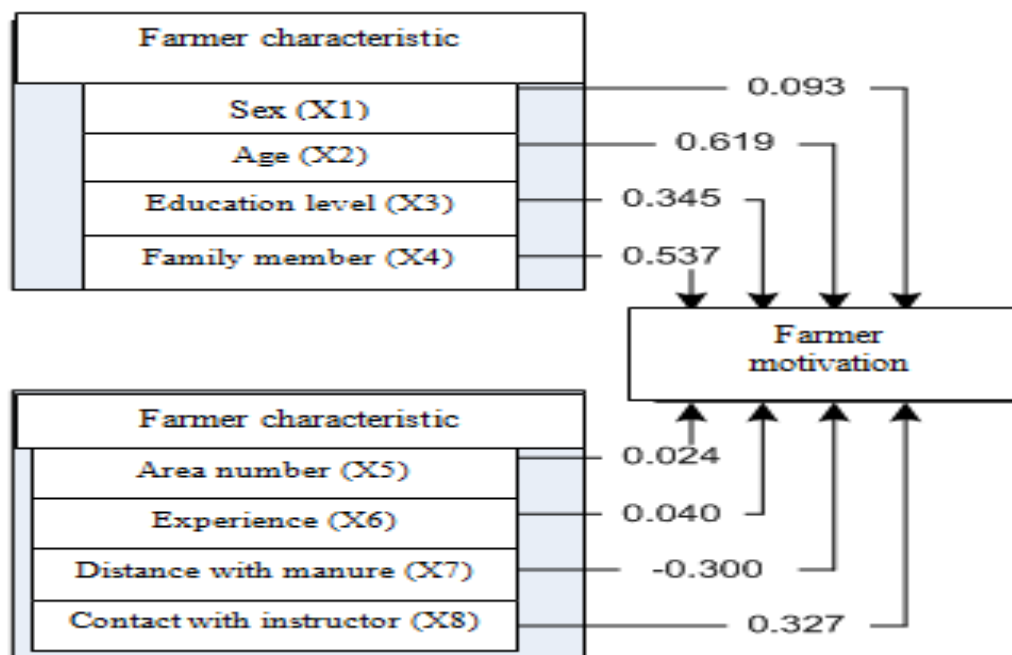


Figure 1. The influence of farmer and farming characteristic to the motivation

Table 4 presented the result of path analysis about the influence of farmer characteristic and motivation to farmer adoption.

Table 4 Path analysis on the influence of farmer and farming characteristic, and farmer motivation to the farmer adoption

Independent variable	Beta	P-value
<b>Farmer characteristic</b>		
Sex (X1)	0.069	0.349
Age (X2)	0.122	0.283
Education level (X3)	0.021	0.855
Number of family member (X4)	0.106	0.322
<b>Farming characteristic</b>		

Area number (X5)	0.452	0.000
Farming experience (X6)	0.112	0.247
Distance with manure source (X7)	-0.460	0.000
Contact with instructor (X8)	0.038	0.676
Farmer motivation (Y1)	0.562	0.000

The value of R<sup>2</sup> was 0.788 or 78.8%. It meant that farmer adoption by using organic manure (Y2) was influenced of 78.8% by sex (X1), education level (X3), number of family member (X4), area number (X5), farming experience (X6), distance with manure source (X7), contact to instructor (X8), motivation to use organic manure (Y1), but the rest of 21.2% was influenced by the other factor.

In the evaluation of farmer characteristic to the farmer adoption, no one factor of farmer characteristic such as sex, age, education level, and number of family member which influenced to the farmer adoption, because all of O-value was > 0.05. It was caused by male as well as female had the same responsibility for their farming progress. However, the age of sample farmers were still in the average of productive age, so they still had the high motivation for developing their farming. Education level of respondents which were as the majority of senior high school was also assumed to be able to understand the known innovation, but number of family member between 3 to 4 persons was also assumed not to be loaded the family. Therefore, it was not calculated in making effort to increase the income level of family. It was suitable with the research of Ajewole [25] that identified the factors of socio-economic which influenced the farmer response to adopt the organic manure in part country of Oyo Nigeria. Research analysis of Ajewole indicated that formal education, household size of family member number, and number of instructor visitor influenced the adoption decision.

On Table 4 about the evaluation of farming characteristic to the farmer adoption, there were two factors such as area number and the distance to manure source which influenced to the farmer adoption with the descriptions were as follow:

- Path coefficient between area number (X5) to the farmer adoption by using organic manure (Y2) was 0.452 with the P-value of 0.000. Because the P-value was < 0.05, so it could be concluded that there was the influence of area number (X5) to the farmer adoption by using organic manure (Y2). Because path coefficient was positive, it indicated that the more area number would cause the more farmer adoption by using organic manure. The influence of area number to the farmer adoption could be proved from crossed tabulation which indicated that 69.1% of respondents which had area number less than 1.5 ha, however 47.3% of them were also had low adoption with the average of questionnaire score was less than 4. In addition, 30.9% of respondents which had area number more than 1.5 ha, however 25.5% of them had high adoption with the average of questionnaire score was more than 4. It proved that the higher area number would cause the higher adoption and on the contrary, the lower area number would cause the lower adoption.

Generally, the farmers in Tombatu Timur District had the area number less than 0.5 ha, it meant that the area number ownership of farmer was in narrow category [26]. Farmer which had wide area number would be easier to apply the innovation than the farmer which has narrow area. It was caused by the coefficient in using production facility [20].

- Path coefficient between the distance with manure source (X7) to the farmer adoption by using organic manure (Y2) was -0.460 with the P-value of 0.000. Because P-value was less than 0.05, so it could be concluded that the influence of the distance with manure source (X7) to the farmer adoption by using organic manure (Y2) indicated that the nearer distance with manure source would cause the higher farmer adoption in using organic manure. The influence of the distance to the farmer adoption could be proved from crossed tabulation which indicated that 29.1% of respondents which had the distance less than 1 km, however 25.5% of them had high adoption with the average of questionnaire score less than 4). In addition, from 70.9% of respondents which had far distance such as more than 1 km, however 49.1% of them had low adoption with the average of questionnaire score was less than 4. It proved that the nearer distance would cause the higher adoption and on the contrary, the farer distance would cause the lower adoption.

The influence of area number and the distance with manure source to the farmer adoption indicated that farmer which had wide area number would be easier to apply the new innovation because if there was failure in the farming, there was available other area to be made effort. It was suitable with the research of Ajewole [25]

which founded that area size and the distance with manure source did not influence the farmer adoption. However, on the variable of farming experience, Ajewole [25] presented the suitable result such as farming experience did not influence to the adoption of organic manure. It meant that the farmers in East Tombatu District which were as the beginners in paddy farming could be fastly caught the innovation because there was supported by the enough information about the using of innovation. The information was obtained from the instructor, friend, family, mass and printed media.

Path coefficient between farm motivation (Y1) to the farmer adoption by using organic manure (Y2) was 0.562 with the P-value of 0.0000. Because the P-value was  $< 0.05$ , so it could be concluded that there was the influence of farmer motivation (Y1) to the farmer adoption by using organic manure (Y2). It indicated that the higher motivation would cause the higher farmer adoption by using organic manure. The influence of motivation to the farmer adoption could be proved from crossed tabulation. It presented that 50% of respondents with low motivation and the average of questionnaire score was less than 4, however 32.7% of them also had low adoption with the average of questionnaire score was less than 4). In addition, from 49.1% of respondents which had high motivation with the average of questionnaire score was more than 4), however 29.1% of them had high adoption with the average of questionnaire score was more than 4. It proved that the higher motivation would cause the higher adoption and on the contrary, the lower motivation would cause the lower adoption [26].

The farmers in research location had high motivation in adopting the organic manure, it was caused by the conciousness to the danger of using anorganic manure in a long time. One of the indicators was the willingness to buy organic manure itself when there was not the helpfull from the government. It was not suitable with the research of Bulu *et.al* [27] which presented that the factor of human asset such as the farmer knowledge, work motivation, and farmer attitude to the innovation did not influence the level of innovation adoption. However, it was suitable with the opinion of Zainun [28] which presented that motivation illustrated the relation and hope. The benefit which was felt by using a technology could cause someone to be motivated for carryong out his/ her work.

Graphically, the result of path analysis about the influence of farmer and farming characteristic, and farmer motivation to the organic manure adoption were presented as in Figure 4.

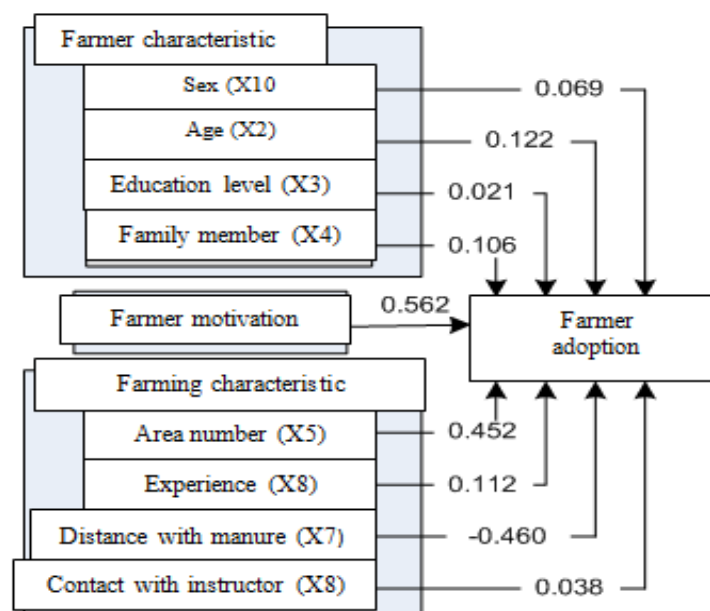


Figure 4 The influence of farmer characteristic, farming characteristic, and farmer motivation to the farmer adoption

Result of path analysis indicated that farmer characteristics such as age, education level, number of family memner indirectly influenced to the innovation adoption theorugh the intervening farmer motivation. It meant that the more age, education level, and number of family member would also cause the better adoption for using organic manure.

Farming characteristic included two aspects such as the distance with manure source and contact with instructor indirectly influenced to the innovation adoption through the intervening farmer motivation. It meant



that the nearer distance with manure source and the more contacts with instructor would cause the higher motivation in using organic manure, so it indirectly would cause the higher adoption in using organic manure. It did not suitable with the research of Ajewole [25] which presented that the distance from supplier source of commercial organic manure did not influence the adoption decision.

#### IV. CONCLUSION

Based on the evaluation as above, it was concluded as follow:

1. Farmer characteristic such as age, education level, and number of family member, and farming such as the distance with organic manure and contact to instructor influenced the farmer motivation. It meant that the more age, education level, number of family member, the distance to manure source, and contact with instructor would also cause the more farmer motivation for using organic manure.
2. Farming characteristic such as area number, the distance with manure source, and farmer motivation influenced the level of farmer adoption. It indicated that the more area number, the distance with manure source, and farmer motivation would cause the more farmer adoption for using organic manure.
3. Variable of farmer motivation had a function as intervening variable such as the mediator between farmer characteristic (age, education level, and number of family member), and farming (the distance with manure source, and contact with instructor) to the influence to the farmer adoption in using organic manure.

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