Interest to continue farming among agricultural students who is a child of a farmer

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Abstract. This study uses factors of student age, education and experience of farmers, income, size of the farm and type of plants as factors that influence the interests of agricultural students to continue farming. This study uses quantitative data obtained from surveys. Data is collected from 204 respondents and analysed with binary logistic regression model. The variables of parents' experience in farming, age of the students and type of the plant significantly influence whether or not students are interested in continuing farming. Three other variables, namely income from the farm, sizes of the farm and education or training of the parents related to farming were found to not significantly affect interest in farming.

1. Introduction
One important input of food production is agricultural land. Agricultural land in Indonesia has been reduced. According to data from the Indonesian Central Bureau of Statistics [1], rice harvested area decreased from 8.13 million hectares in 2012 to 8.01 hectares in 2015. Agricultural labour as an important production input also experienced a decrease in numbers. There was a decrease of 29.2% in a year from February 2017 to February 2018 [2]. An important issue in agricultural labour in Indonesia is not only that the numbers are getting smaller but the composition of workers in the agricultural sector is dominated by older workers. In 2018, the age of workers (60 years and over) is more than double that of young workers (15-24 years) [3]. Based on the results of the 2003-2013 agricultural census, the predominance of workers in old age has been found in the agricultural sector. Thus workers in the agriculture sector are not only decreasing but also aging. This might stem from of various factors that influence the low interest of young people to continue farming.

The image of the agricultural sector which is not so good is also reinforced by the opinion that the government does not in the farmers' side. This can be seen from government policies that tend to prioritize increasing agricultural production without considering to the welfare of the producers (farmers). Efforts to increase the added value in agricultural production cultivated by farmers are often enjoyed by other parties in the production and marketing chain [4].

The portrait of most Indonesian farmers is as small farmers with low capital. Capital assistance from banks to help finance agriculture is very much needed. However, banks in Indonesia are also reluctant to in the farmers' side, whereas as formal legal financial intermediary institution banks can assist farmers in matters of helping farmers' capital. Loans from national banks are just under six
percent. This value shows the impartiality of banks to the agricultural sector [5]. Various reasons for refusing banks to lend credit to the agricultural sector include high risks. Naturally, farming is a high-risk business [6;7], especially in developing countries [8].

With the image of the agriculture sector that is not so good, the government and banks being impartial and at high risk in the agricultural sector, it is not surprising that young people are reluctant to choose agriculture as their future. Moreover, studies have found that farmer parents do not want their children to become farmers like them [9]. This will hamper efforts to foster interest in farming among young people. Interest in entrepreneurship among young people must be identified and analysed its constituent factors. Thus, this study wants to analyse the factors that influence interest in farming among farm children who are also students of agriculture in order to have sufficient knowledge in agriculture.

Theoretically, someone's interest can actually be assumed to be influenced by several factors. These factors are internal factors, social factors, emotional factors and economic motives [10]. From several studies on intergenerational farmland transfers [11; 12; 13], this study chooses the student age variable as a factor from within oneself and emotional maturity factors. Someone's interest to continue farming owned by the family will arise if the farm is a successful business, the personal attributes of the farm owner (parents) such as education and experience of farming are important factors determining the success of farming [14; 15]. Thus this study also chooses the factors of parents farming experience and education related to agriculture as a determining factor in interest in farming. In relation to economic motives as factors that influence interest, this study chooses farm income factors as another determining variable. The size of the farm is expected to affect interest in continuing farming. Several studies [16; 17] found a relationship between land area and interests, because the existence of land, allows interaction between parents as landowners and their children as heirs. The greater the size of the farm is also often equated with the higher income. Likewise with plants, high-value plants are also often associated with high income. Thus this study uses factors of student age, education and experience of farmers, income of the farmer, size of the farm and type of plants as factors that influence the interests of agricultural students to continue their parents farming.

2. Data and methods

This study uses quantitative data obtained from surveys. Data is collected through a questionnaire. The location of the study is in Indonesia because there is a growing lack of young agricultural workers in Indonesia. Furthermore, because Indonesia is a vast country, there are doubts that it might not be representative of the data. To overcome this, the questionnaire was distributed online in the form of goggle form, hoping that students from various regions of Indonesia could provide a response.

In accordance with the objectives of the study, the study population is all agricultural students in Indonesia, who are also children of farmers. The choice of a farmer's child is because the farmer's child will at least inherit his parents' land as the main capital and have experience or knowledge about the type of agriculture managed by their parents. The questionnaire was first uploaded in May 2019. Acceptance of responses continued until it reached 200 respondents. Finally, it was only in August 2019 that the response exceeded the desired target.

After going through the data sorting process, the data is ready to be analysed. Analysis of the data used is a logistic regression. Logistic regression is a test that analyses the relationship between dependent and independent variables, with categorical dependent variables. This regression can also predict the occurrence of an event by plotting data into a logistic curve. This regression is often also referred to as a logistical or logit model [18]. Logistic regression is different from linear regression because the outcome variable in logistic regression is dichotomous or binary [19]. The independent variable in logistic regression is in the form of odds, because logistic regression calculates the probability of an event occurring above the probability of an event not occurring. If the probability of an event occurring is \( \pi \) and does not occur is \((1-\pi)\), then the appropriate opportunity is the value \( \pi/(1-\pi) \) [20]. In logistic regression, this opportunity is then changed in the form of natural logarithms, so the model of the natural log odds as a linear function of the explanatory variable is:
logit (y) = ln (odds) = g(x) = ln \left[ \frac{\pi(x)}{1-\pi(x)} \right] = \alpha + \beta X \tag{1}

Taking the antilog of that equation on both sides, one can derive an equation for the prediction of the probability of the occurrence of interested outcome as

$$
\pi(x) = \frac{\exp(g(x))}{1+\exp(g(x))} = \frac{e^{\alpha+\beta x}}{1+e^{\alpha+\beta x}}
$$

The model used in this study is:

$$
g(x) = \ln \left[ \frac{\pi(x)}{1-\pi(x)} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 \tag{3}
$$

where:

- \(\pi(x)\) = Student’s interest ( \(\pi(x) = 1\) if interested and \(\pi(x) = 0\) if not interested)
- \(\frac{\pi(x)}{1-\pi(x)}\) = Odds ratio
- \(X_1\) = Parents’ Experience in Farming (year)
- \(X_2\) = Parent’s Income from farming (Rp)
- \(X_3\) = Age of the Students (year)
- \(X_4\) = Size the Farm (ha)
- \(X_5\) = Type of Plant
- \(X_6\) = Parents’ Education or Parent’s Training Related to Farming (year)

Before presenting the model produced by logistic regression, first examine the soundness of the logistic regression model. There are several tests that are commonly used to check this, namely overall model evaluation, goodness-of-fit statistics and statistical tests of individual predictors [20]. Overall model evaluation aims to see whether the formation of a model is better than the intercept-only model or null model. The goodness-of-fit statistics looks at whether the logistic model is fit against actual outcomes. Finally, the level of significance of individual predictors coefficients is tested using the Wald chi-square statistic.

3. Results and discussion

After going through the data sorting process, 204 respondents were found to be suitable for further analysis in this study. The name of the university, the number and percentage of respondents are presented in Table 1. Based on the Table it can be seen that respondents are students from 33 universities stretching from Manokwari to Banda Aceh. It was also seen that there were student representatives on almost every major island in Indonesia. Thus, although not very perfect, this study can approach the conditions in Indonesia.

Furthermore, the age distribution of respondents is presented in Table 2. The Table shows that most respondents were 20 years old. The largest age range is between 19 to 23 years. The age of the youngest respondent is 18 years old, and the oldest is 25 years old. Based on the age level of the respondents it appears that the respondents are mature enough to be included in respondent and answer the question of whether to continue their family farming.

In addition to the origin of the university and age of the respondent, data on respondents’ intention to continue or not continue farming will also be described descriptively. Data on the description of respondents' interest is presented in Table 4. Based on the data in the Table, it appears that most respondents are interested in continuing family farming. More than 80 percent of respondents expressed an interest in continuing their family farming.
Table 1. Origin of university of respondents

| No. | University                                           | Number of Respondents | Percent |
|-----|------------------------------------------------------|------------------------|---------|
| 1   | Polbangtan Medan                                    | 55                     | 26.96   |
| 2   | Pertanian USU                                        | 43                     | 21.08   |
| 3   | Udayana Bali                                        | 12                     | 5.88    |
| 4   | STIPAP Medan                                        | 10                     | 4.90    |
| 5   | Syiah Kuala, Banda Aceh                             | 10                     | 4.90    |
| 6   | Universitas Mataram                                 | 10                     | 4.90    |
| 7   | Universitas Muhammadiyah Tanah Grogot Kaltim        | 7                      | 3.43    |
| 8   | Malikulsaleh, Lhokseumawe, Aceh                     | 5                      | 2.45    |
| 9   | Universitas Bandar Lampung                          | 5                      | 2.45    |
| 10  | Universitas Srimulya Palembang                      | 5                      | 2.45    |
| 11  | Andalas Padang                                      | 3                      | 1.47    |
| 12  | IPB Bogor                                           | 3                      | 1.47    |
| 13  | Polbangtan Goa                                      | 3                      | 1.47    |
| 14  | Polbangtan Manokwari                                | 3                      | 1.47    |
| 15  | PPD Polindia Banyuasin Palembang                    | 3                      | 1.47    |
| 16  | Universitas Muhammadiyah Palembang                  | 3                      | 1.47    |
| 17  | Universitas Palangkaraya                            | 3                      | 1.47    |
| 18  | AKN Banyuasin Palembang                             | 2                      | 0.98    |
| 19  | Pertanian UB Malang                                 | 2                      | 0.98    |
| 20  | Pertanian Universitas Islam Makassar                 | 2                      | 0.98    |
| 21  | UGM Yogyakarta                                      | 2                      | 0.98    |
| 22  | Universitas Islam Riau                              | 2                      | 0.98    |
| 23  | Delihusada Medan                                    | 1                      | 0.49    |
| 24  | Pertanian Hasanuddin Makassar                        | 1                      | 0.49    |
| 25  | Pertanian Taman Siswa Padang                        | 1                      | 0.49    |
| 26  | Politek Kelapa Sawit Sari Citra Widya, Bekasi, Jabar| 1                      | 0.49    |
| 27  | UIN Aceh                                            | 1                      | 0.49    |
| 28  | UISU Medan                                          | 1                      | 0.49    |
| 29  | UMN Medan                                           | 1                      | 0.49    |
| 30  | UNDIP Semarang                                      | 1                      | 0.49    |
| 31  | Univ Wiralodira Indramayu                           | 1                      | 0.49    |
| 32  | Universitas Lancang Kuning Pekan Baru               | 1                      | 0.49    |
| 33  | Universitas Samudra Langsa, Aceh                    | 1                      | 0.49    |
|     | Total                                                | 204                    | 100     |

Table 2. The age of respondents

| No. | Age | Number of Respondents | Percent |
|-----|-----|------------------------|---------|
| 1   | 20  | 44                     | 21.57   |
| 2   | 19  | 38                     | 18.63   |
| 3   | 22  | 38                     | 18.63   |
| 4   | 21  | 34                     | 16.67   |
| 5   | 23  | 23                     | 11.27   |
| 6   | 25  | 14                     | 6.86    |
| 7   | 24  | 8                      | 3.92    |
| 10  | 18  | 5                      | 2.45    |
|     | Total | 204                  | 100     |
Table 3. The interest of respondents to continue farming

| Interest      | Number of Respondent | Percent |
|---------------|----------------------|---------|
| Not interested| 33                   | 16.18   |
| Interested    | 171                  | 83.82   |
| Total         | 204                  | 100     |

The evaluation of logistic regression model started with overall model evaluation. As stated in the methodology section this test aims to see whether the formation of the model is better than the intercept-only model or the null model. The results of the G statistical tests are presented in Table 5.

Table 4. The result of G Likelihood Statistic

| Step | Initial -2 Log Likelihood | -2 Log likelihood | $\chi^2(0.05;5)$ |
|------|---------------------------|-------------------|------------------|
| 11   | 170.37                    | 16.065            | 154.305          | 11.0705        |

The Table shows that the difference value of -2 log likelihood is greater than the Chi-Square value of alpha five percent and degree of freedom five. Thus a logistic model is said to provide a better fit to the data because it demonstrates an improvement over the intercept-only model or the null model. Goodness-of-fit statistics assess the fit of a logistic model against actual outcomes. The result of this test yielded an insignificant value ($p = 0.123$), suggesting that the model was fit to the data well. In other words, the null hypothesis of a good model fit to data was tenable. The result of the variables that significantly influence interest in continuing farming or the results of the Wald test are presented in Table 6.

Table 5. The result of Wald Test

| Variable                                             | B     | S.E.  | Wald   | df | Sig.  |
|------------------------------------------------------|-------|-------|--------|----|-------|
| Experience in Farming (Parents)                      | 0.483 | 0.2   | 5.838  | 1  | 0.016 |
| Income of Farmer                                     | 1.092 | 0.775 | 1.984  | 1  | 0.159 |
| Age of Students                                      | 10.592| 4.504 | 5.53   | 1  | 0.019 |
| Size of the Farm                                     | 1.351 | 1.297 | 1.085  | 1  | 0.298 |
| Type of Plant                                        | 6.011 | 2.72  | 4.883  | 1  | 0.027 |
| Parents’ Education or Training related to farming    | 1.808 | 1.705 | 1.125  | 1  | 0.289 |
| Constant                                             | -210.208 | 89.582 | 5.506  | 1  | 0.019 |

The first important variable that determines whether or not to continue family farming is the experience of parents in farming. This is possible because experienced farmers tend to want their children to continue their business. It is estimated that they tend to try to transmit their interests and knowledge to their children. This is also supported by the argument that besides sharing their knowledge, experienced parents will provide experienced workers, because the workers have learned from experienced farming owners. This influence will in turn produce more profitable farming [21]. The opposite is expected to occur to inexperienced farmers. They do not want their children to continue farming, because the lack of experience and knowledge has made it difficult for them to farm.

The experience of farmers is more influential compared to agricultural education. The variable of agricultural education was found to have no effect on whether or not a student to continue farming. This is due to the lack of good agricultural education available to farmers. There are only a few respondents who stated that their parents had received education or training related to the farming they were currently in. Thus, it is very important to increase agricultural extension to farmers, in order to increase agricultural production while increasing farmer's self-confidence so that they can continue his farming business with their children.
The second important variable that significantly influences the interest in continuing or not continuing farming is age of the students. It is with the help of the experience of his parents, the older the age of students, the greater the tendency to be interested in continuing their parents' business. This may be supported by the maturity of agricultural education obtained by students in their classrooms and the support of experienced parents. Studies on large-scale farming [22] also show that the success of farm succession increases with the increase in age of farming heirs. Seeing the important role of agricultural education for the heir in the succession of farming, it is very necessary to strengthen agricultural education that is more applicable to the agricultural business world. It is also necessary to have a persuasive attitude from the university to support the interest in the sustainability of farming.

Another variable that influences significantly is the type of plant. The types of plants planted by their parents significantly influence their interest in continuing farming. In accordance with the reason's parents have experience with the types of crops planted, farmers who plant estate crops will tend to continue to plant estate crops because they consider this type of plant profitable. Conversely, farmers who grow rice will feel safer because they produce staple food to meet the needs of their families. For farmers who live in highland areas to produce horticultural crops is an advantage that is not owned by farmers in other areas. It is very rare for a parent to inherit a plantation, and the heir will continue to plant rice, although this is possible. Thus the type of plant becomes an important determinant in terms of whether or not someone is interested in continuing farming. This opinion is supported by study [23] which states that the type of plant will determine whether a farm will be continued or not, because high-value crops tend to have successors.

In this study, the estimated income factor apparently had no significant effect. This is because the respondents' income was found to be varied, they did not have a pattern related to interests or not in continuing farming. Agricultural income depends on the size of the farm, the type of crop, and there is also the effect of variations in farming time, especially for tree crops. In addition, most respondents do not depend entirely on agriculture, there are respondents whose parents have other jobs besides farming.

The size of the farm variable was found not significantly to affect whether or not interested in continuing farming. It is estimated that this happened because the sizes of the farm of respondents were not so different from one another, not so broad, which is a characteristic of agricultural land in Indonesia. Actually, the size of the farm variable alone will not have much effect if it is not accompanied by experience and strong persuasion from parents. Observation of the data also shows that there are respondents who have a large area of land but expressed no interest to continue their parent's farm.

4. Conclusions
The variables of parents' experience in farming, age of the students and type of the plant significantly influence whether or not students are interested in continuing farming. Three other variables, namely income, sizes of the farm and education or training related to farming were found not significantly affect interest in farming.

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