Farmer perception of utilization of rice ransplanterin Aceh Besar

Ainal Mardhiah¹, Khumaira¹, Abdul Azis¹, Basri A¹, Bakar², S.Panikkai³
¹ Lecturer at the Faculty of Agriculture Univ. Abulyatama (Unaya) Aceh
² Researcher of Aceh Assessment Institute Agricultural of Technology (AIAT)
³ Research of Indonesian Cereal Research Institut (ICERI)
Email: ainalmardhiah_pertanian@abulyatama.ac.id

Abstract. During the last two years, agricultural mechanization technology has been very widely introduced to farmers in Aceh to increase agricultural production, especially rice. One of the mechanizations that were introduced to farmers as an alternative solution to overcome the limited planting labour is the Rice Transplanter. The purpose of this study was to determine the level of farmers' perceptions of the use of Rice Transplanter technology in Indrapuri District, Aceh Besar District. This research uses the case study method in the research location. The sampling technique was intentionally "Proposive Sampling" with the consideration that the population in this study had used a rice transplanter machine, with a population of 20 farmers scattered in two villages, Aneuk Glee and Lam Ilei. Data obtained in the form of primary data through interviews with respondents and secondary data as supporting data. Furthermore, the data were analyzed using descriptive analysis using a Likert scale. The linkert scale used is divided into 3 levels: 1 (low), 2 (medium), and 3 (high). The results showed that the total perception score of farmers who used a rice transplanter machine was 809 and was at the perception index of 82.2% which was included in the high category. This means that with the presence of a rice transplanter machine, farmers can save on the use of production costs at every harvest season, in addition to the level of appropriateness of the use of machinery on this paddy field also meets the criteria so that it is easy to traverse and plant rice seeds. Farmers' perception of the use of Rice Transplanter machines in Indrapuri Subdistrict is high because in terms of profits it is better than the manual method (using sickle), so it is evident that the production costs incurred are lower than in conventional systems.

1. Introduction
Agriculture is one of the most dominant sectors of the economic aspect which has long been the concern of many parties. Farmers as the main actors in agriculture are included in the poor category. Therefore, to improve the welfare of farmers, it is necessary to formulate an agricultural development policy to achieve the desired conditions. According to [1] suggested that in the formulation of agricultural development policies need to be formulated a policy "Agricultural modernization". So revitalizing agriculture needs to be done as an effort to empower land use and the development of tools and machinery as one of the supporting factors of the agricultural sector.

Agricultural mechanization technology has been widely introduced to farmers to increase agricultural production, one of the mechanisms introduced to farmers as an alternative power plant solution is the Rice Transplanter. This technology plays an important role in agricultural activities to
accelerate rice seed planting activities in paddy fields. The maximum use of Rice Transplanter technology can be influenced by farmers' perceptions of the benefits of the technology.

Great Aceh regency is one of the centers of agriculture that has the potential to produce high agricultural production, especially in rice farming. For farmers in Aceh, the large use of Rice Transplanter technology is an innovation used in agricultural activities, especially in the process of planting rice seeds.

In general, innovation takes time to be accepted by the community as well as Rice Transplanter technology which requires a lot of education and information about the optimal use of this technology. This is due to the habits of farmers who use farmers planting techniques with conventional systems. The decision of farmers to use this technology is determined by farmers' perceptions of the benefits obtained, especially in economic terms. Perception is interpersonal communication that occurs in a person because its perception will affect someone in thinking and acting, and communicating with other parties [2]. Farmers' perception of using the Rice Transplanter machine is related to the willingness of the farmers to use the planting equipment. If the farmers' perception is high it will be easier for them to adopt the technology, but if the perception is low, there is a great opportunity to return using conventional planting systems.

The study was to determine the effect of intermittent irrigation systems and legowo 2: 1 spacing on rice productivity and CH4 (methane) GHG emissions on technical irrigated paddy fields. The purpose of this study was to determine the level of farmers' perceptions of the use of Rice Transplanter technology in Indrapuri sub-district of Great Aceh Regency.

2. Methodology

2.1. Location, object, and scope of research
The location of this research was conducted in Indrapuri District, Great Aceh Regency. The determination of the location of the study was carried out intentionally "Proposive Sampling" with the consideration that: 1. Farmers at these locations used rice transplanter machines as seed planting equipment, 2. This location received assistance from a rice transplanter machine. The object of this study is farmers who use rice transplanters in lowland rice farming. The scope of this research is limited to farmers' perceptions of the use of rice transplanters.

2.2. Population Sampling Methods and Techniques
The population in this study was farmers who used the Rice Transplanter machine in Indrapuri District, Great Aceh Regency. The method used the case study method. The sampling technique was intentional "Proposive Sampling" with the consideration that the population had used a rice transplanter machine. The population was 20 people spread in two villages, there are Aneuk glee and Lam Ilei. For more details explained in Table 1 below.

| No. | Village       | Population | Sample 50% |
|-----|---------------|------------|------------|
| 1.  | Aneuk Glee    | 36         | 18         |
| 2.  | Lam Ilie      | 24         | 12         |
| Total|               | 60         | 30         |

Source: 2017 Primary Data

2.3. Method of collecting data
To support this research needed relevant data both primary and secondary. Primary data obtained by interviewing guided questionnaires that have been provided previously and direct observation in the field. Whereas secondary data was obtained from library studies, scientific publications and related institutions related to research.
2.4. Indicator Variable
Hypotheses testing that had been formulated need the following indicators: perception, relative profitability, suitability level, complexity level, and level of ease (Production results).

a. Perception is the farmers’ response to the use of rice transplanter machines.
b. Relative advantage is the level at which a new idea can be considered better than existing ideas and economically profitable.
c. The level of suitability (compatibility), shows the suitability of rice transplanter machine innovation with the values, farmers’ trust, existing habits, previous experience, and farmers’ needs.
d. The level of complexity describes the difficulties of innovating the use of rice transplanter machines. The complexity indicator is the level of difficulty understanding and implementing the innovation.
e. The observability describes the degree of likelihood of innovation results from using the rice transplanter machines which can be observed.

2.5. Model Analysis and Testing Hypotheses
The Linkert scale only uses good and bad items, not including rather good, somewhat lacking, neutral, and other rankings between the two definite attitudes above (Nazir, 2003). Respondent response scores are summed and this number represents the total score, and this total score is interpreted as the position of the respondent on a Linkert scale. The Linkert scale uses an ordinal measure because it can only rank, but it is not known how many times one respondent is better or worse than another respondent on the scale.

The Linkert scale used to divided 3 qualities; they are (1) low, (2) medium, (3) high. This is because farmers who are respondents in this study are farmers who have low to moderate education. Farmers’ perceptions score testing of using Rice transplanter machines can be determined by using the formula: Each answer is linked to the form of a statement or attitude support expressed in the following words [5] High: 3, Medium: 2, Low: 1.

Total Score of each Criterium = Achievement Score x Number of Respondents
Where:
S3 = 3 x 30 = 90
S2 = 2 x 30 = 60
S1 = 1 x 30 = 30

The ideal number of scores for each question item (highest score) = 90 (High) Lowest number of scores = 30 (Low). How to calculate the overall score to determine the level of farmers’ perception of using the Rice Transplanter machine is: Total Score Total Criterium = Achievement Number of Scores x Number of Respondents x Number of questions
For:
S3 = 3 x 30 = 90 x 11 = 990
S2 = 2 x 30 = 60 x 11 = 660
S1 = 1 x 30 = 30 x 11 = 330

Analysis of the data used a descriptive analysis which is analyzed using a Likert scale (according to the Likert scale) according to [5] in the formula book and the data in statistical analysis is as follows: The range of classes used performance tests the level of farmers’ perception of using the Rice Transplanter machine is:

\[ R = \frac{I}{K} \]

Where: \( R \) = class range
I = Class interval (largest data - smallest data)
K = Class interval.
3. Results and Discussion

3.1. Farmer Characteristics

The characteristics of farmers observed in this study are internal and external characteristics which include: 1) age, 2) formal education, 3) non-formal education, 4) land area, 5) land status, 6) farming experience, 7) the number of dependents family. The distribution of farmers according to the characteristics of farmers can be seen in Table 2 below.

Table 2. Characteristics of farmers in the 2017 Research Area

| No | Internal and External Characteristics | Category | Respondents (n) | Percent (%) |
|----|--------------------------------------|----------|-----------------|-------------|
| 1  | Age                                  | Young (31-48 years old) | 21             | 70          |
|    |                                      | Old (49 - 65 years old) | 9              | 30          |
| 2  | formal education                     | Not completed in primary school | -              | -           |
|    |                                      | Graduated from elementary school | 30           | 100         |
|    |                                      | graduated from high school |                |             |
| 3  | non-formal education                | Never    | 2               | 6,6         |
|    |                                      | Ever     | 28              | 93,3        |
| 4  | Land area                            | Limited (0,17 – 0,50 ha) | 22             | 73,3        |
|    |                                      | Large (0,50 – 1 ha)    | 8              | 26,6        |
| 5  | Land Status                          | Owner    | 6               | 20          |
|    |                                      | Tenant   | 24              | 80          |
| 6  | Farming experience                   | Low (2-20 years old)  | 28              | 93,3        |
|    |                                      | High (21 - 45 years old) | 2              | 6,6         |
| 7  | Burden                               | Some (1-4 people)     | 26              | 86,6        |
|    |                                      | Many (5-6 people)     | 4               | 13,3        |

Source: Primary Data (processed), 2017

1. Age

Based on Table 2 shows that the age of farmers who use a rice transplanter machine ranges from 31-48 years and is included in the young category (70) and (30) in the old category. In general, Table 3 shows that most farmers are included in the young age group. Thus they try to more quickly adopt innovations even though they are still inexperienced in adopting these innovations [3].

2. Formal education

The formal education level of farmers is generally relatively high (100%) graduated from elementary school. The respondent's education level will affect farmers' perceptions of innovation. As revealed by Hadi in Witjaksono (1990) stated that the higher the formal education, the higher the ability to receive, filter, and apply the innovations introduced to him.
3. Non-formal education
Most farmers (93.3%) had attended non-formal education; a small proportion (6.6%) had never attended non-formal education. Thus the majority of farmers have experience following non-formal education gained is by attending courses and training in using rice transplanters.

4. Land area
The land cultivated average area for farming is 1,045 ha, with the narrowest area being 0.10 ha and widest 0.70 ha. In general, farmers have a narrow land area (73.3%) and the rest have a large area (26.6%). The reality in the field shows that farmers who work on large tracts of land generally have better socioeconomic status and can use more of their land for farming so that higher production is produced.

5. Land status
Most of the land status (20%) is the owner, while the rest (80%) is rented land. This factor can be one of their additional supporters because those who have the status of landowners will have relatively higher incomes.

6. Farming experience
The majority of respondents in this study (93.3%) had low experience (2 - 20 years). The range (21-45 years) is classified as having high experience (6.6%). Functional factors that influence perception come from needs, past experiences and other things included in personal factors (Rachmat, 2004).

7. Number of family dependents
The majority of farmers (86.6%) have a small number of family dependents, while (13.3%) have large family dependents. The number of family dependents will influence farmers in considering decisions in running their farming. As revealed by Soekartawi (1988) that family members are often used as material for consideration in making decisions to accept innovation.

3.2. Using Rice Transplanter Machines at the Relative Advantage Level
Perception in this study is defined as the understanding, views, or responses of farmers to use rice transplanter machines which are divided into four items, they are; 1) Perceptions of relative profits, 2) Farmers' perceptions of the suitability level, 3) Farmers' perceptions of the level of complexity, 4) Perceptions farmers on the level of ease (yields).

The relative advantage of innovation is the degree to which a new idea can be considered a better thing than the ideas that were previously and economically profitable (Timbulus, 2016). Farmers' perceptions of using rice transplanters can be seen in the following Table 3.

| Alternative answer | Alternative scores | Number of respondents | Percentage of respondents |
|--------------------|--------------------|------------------------|---------------------------|
| High               | 3                  | 28                     | 93                        |
| Medium             | 2                  | 0                      | 0                         |
| Low                | 1                  | 2                      | 7                         |
| Total              |                    | 30                     | 100%                      |

Source: primary data processed, 2017

Table 3 shows that 28 respondents or about 65% of respondents gained relative benefits using a rice transplanter machine. The high perception of farmers on rice transplanter machines in terms of relative profits proves that using this technology has saved production costs and increased the opinion of farmers, according to the analysis of Suhendrata (2013) the results of the analysis using rice transplanter can increase rice farming income by Rp. 2,690,000 / ha / growing season. While the respondents included in the category of low or about 7%. This condition shows that farmers have never tried using a rice transplanter machine because they are worried that they will experience a failure in planting activities so that later they will have to spend more on production costs to repeat the planting activities.
3.3. Rice Transplanter Machine at Conformance Level

The level of conformity is the level where innovation is felt according to the existing value, previous experience, and needs. Farmers’ perception of the use of rice transplanters can be seen in the following Table 4.

Table 4. Farmers' Perceptions of the Use of Rice Transplanter Machines at Compatibility Rates

| Alternative answer | Alternative scores | Number of respondents | Percentage of respondents |
|--------------------|-------------------|-----------------------|--------------------------|
| High               | 3                 | 15                    | 50                       |
| Medium             | 2                 | 12                    | 40                       |
| Low                | 1                 | 3                     | 10                       |
| Total              |                   | 30                    | 100%                     |

Source: primary data processed, 2017

Based on Table 4, it shows that 50% of respondents have a high perception conformity level of using Rice transplanter machines. This shows that rice transplanter technology is very suitable to be used in their rice fields. This is supported by farmers who already discern about their land condition so that the transplanter machine can function properly. They usually use the steps: ploughing the rice fields 2 times and 1 time of rooting then left to stand for 3 days. Also, this area of paddy fields is supported by irrigation channels to irrigate rice fields so the farmers can adjust water to operate the machine optimally. It means that the planted area which uses by the machine is neither too dry nor too wet.

According to [4] rice, transplanter can operate well in mud depths of less than 40 cm. Whereas 10% of respondents have a low perception appropriateness level of using transplanter machines. This was caused by many rice seeds that are not planted perfectly into the soil so the farmers must replant with conventional systems. The indications that cause rice seeds are not well planted into the ground due to uneven paddy fields.

3.4. Rice Transplanter Machine at the level of complexity

The complexity level of farmers’ ability to operate a rice transplanter machine is the faster planting process and working on their agricultural land using a rice grower machine (Table 5).

Table 5. Farmers' Perceptions of Using Rice Transplanter Machines at Complexity Level

| Alternative answer | Alternative scores | Number of respondents | Percentage of respondents |
|--------------------|-------------------|-----------------------|--------------------------|
| High               | 3                 | 15                    | 50                       |
| Medium             | 2                 | 10                    | 33                       |
| Low                | 1                 | 5                     | 17                       |
| Total              |                   | 30                    | 100%                     |

Source: primary data processed, 2017

Table 5 shows that 50% of farmers have a high perception complexity of the rice transplanter machine. The complexity of using a rice transplanter machine is divided into 2 factors: first, farmers skilled who are still lacking to operate the rice transplanter machine optimally so that farmers prefer to pay operators who have the expertise to plant with a rice transplanter machine or return to conventional planting systems. Second, there are still less skilled farmers in preparing seeds and seeding using seedbed/tray. Furthermore, 17% of farmers have low perception at the level of complexity of using a rice transplanter machine is a farmer who can operate a rice transplanter machine well and has skills in preparing seeds using a tray. If the tray is not available they use plastic to replace the nursery box.
3.5 Rice Transplanter Machine in Ease Level to See the Results

The ease level of innovation to see the result is the results degree of this innovation can be seen and can be felt by potential adherents. For more details can be seen in Table 6 below.

Table 6. Farmers’ Perceptions of the Use of Rice Transplanter Machines at the Ease of Results to See Results

| Alternative answer | Alternative scores | Number of respondents | Percentage of respondents |
|--------------------|--------------------|-----------------------|--------------------------|
| High               | 3                  | 19                    | 63                       |
| Medium             | 2                  | 5                     | 17                       |
| Low                | 1                  | 6                     | 20                       |
| **Total**          |                    | 30                    | **100%**                 |

Source: primary data processed, 2017

Based on Table 6, it shows that 63% of farmers have a high perception of using rice transplanter machine on the ease level to see the results. It states that farmers using their rice transplanter machines could save production costs for one growing season. The yield of rice production is not much different from the results of rice planted traditionally using the rice planting system.

Furthermore, 20% of farmers have a low perception of the ease level of seeing results. This reason because the rice seeds planted was vulnerably attacked by pests. It because the planted age was too young and when the farmers planting seeds with the rice transplanter machine it was not planted perfectly so that they have to repeat planting with the traditional system.

3.6. Utilization of Rice Transplanter Machine, Indrapuri Sub-district, Aceh Besar Regency

The level of perception is the level of experience about objects, events, or relationships obtained by inferring information and interpreting the message from a person about an object or the object he sees. Based on the results by using the Likert scale analysis that the total perception score of farmers who use the rice transplanter machine is 809 and the perception index is 82.2% which includes the high class. By using the rice transplanter machine, the farmers can save the production costs at every one harvest season. Besides, the suitability level of using the machine on this rice field also meets the criteria to make it easy to traverse and plant rice seeds.

The complexity level is one of the factors that made farmers difficult to adopt this technology. This was due to the lack of farmers’ ability to be able to operate the rice transplanter machine properly so that they prefer a wholesale system or pay for the expert person to operate the machine. Seeding on the tray was also difficult to do because of the lack of knowledge by the farmers. It made the seeding process did not grow well. The seeds planted on the tray were easily stuck in the engine so they prefer to plant seeds on plastic media to make it easier operation using the rice transplanter machine.

So, using the rice transplanter machine is easier than using a conventional system because of it more cost-effective and faster in the implementation.

4. Conclusion

Farmers’ perception of using Rice Transplanter machines in Indrapuri sub-district was relatively high (82.2%) because it can provide better benefits. It showed by the production costs incurred were lower than in conventional systems. Besides this machine was also suitable used in the research area and obtain better production results. It is suggested that: 1. The participation of stakeholders is needed to provide guidance and training for the farmers to make them understand how to operate the rice transplanter machine properly by following the SOP. 2. Providing rice transplanter assistance for the farmers so they can operate the rice transplanter machine properly.
References

[1] Husodo, S. Y. 2004. Pertanian Mandiri (Independent Agriculture). Penebar Swadaya, Jakarta.

[2] Rachmat, J. 2005. Psikologi Komunikasi (Communication Psychology). Bandung: PT. Remaja Rosdakarya.

[3] Soekartawi, 1986. Ilmu Usahatani dan Penelitian untuk Pengembangan Petani (Farming Science and Research for Farmer Development). UI Press, Jakarta.

[4] Taufik. 2010. Mesin Transplanter untuk Pilot Project UPJA Center EfisiensikanWaktuTanam. Dinas Pertanian Tanaman Pangan dan Hortikultura Provinsi Kalimantan Selatan. (Transplanter Machine for UPJA Center Pilot Project Make Efficient Planting Time. Department of Agriculture, Food Crops and Horticulture, South Kalimantan Province).

[5] Ridwan. 2007. Skala Pengukuran Variabel-variabel Penelitian (The Measurement Scale for Research Variables). Contents: Alfabeta.

[6] Hadiutomo, K. 2012. Mekanisasi Pertanian (Agricultural Mechanization). IPB Press. Bogor.

[7] Leavitt, Harold J. (1978). Psikologi Manajemen (Management Psychology). Jakarta: Erlangga Publisher.

[8] Niven. 2002 Psikologi Kesehatan Pengantar untuk Perawat dan Profesional Kesehatan Lain. Alih Bahasa Agung Waluyo (Health Psychology Introduction to Nurses and Other Health Professionals). Interpretation of Agung Waluyo; Editor: Monica Esther. Issue 2. Jakarta: EGC.

[9] Nurhasanah, Supardi and Syakur. 2012. Kesuburan Tanah pada Budidaya Konvesional dan SRI Kabupaten Aceh Besar (Soil Fertility in Conventional Cultivation and SRI Aceh Besar District). The Land Resource Management.

[10] Sugiyono, 2010. Metode Penelitian Kuantitatif Kualitatif dan R&D (Qualitative Quantitative Research Methods and R&D), Alfabeta, Bandung.

[11] Sugiyono, 2011. Statistika untuk Penelitian (Statistics for Research). Alfabeta, Bandung.

[12] Suhendrata, T and E Kushartanti. 2013. Pengaruh Penggunaan Mesin Tanam Pindah Bibit padi transplanter terhadap produktifitas dan pendapatan petani di Desa Tangkil Kabupaten Seragen. Prosiding seminar nasional Akserasi pembangunan pertanian yang berkelanjutan menunju kemandirian pangan dan energy, Solo, 17 April 2013 Fakultas Pertanian UNS.

[13] Timbulus, Meksy V, G, Mex L. Sondakh Grace AJ Rumagit. 2016. Persepsi Masyarakat Terhadap Peran penyuluh Pertanian di Desa Rasi Kecamatan Ratahan Kabupaten Minahasa Tenggara. (Public Perceptions of the Role of Agricultural Instructors in the village of Rasi Ratahan District of Southeast Minahasa Regency). Agri-Socioeconomic J. 12 (2A) 19-40

[14] Thoha, M. 2003. Perilaku Organisasi Konsep Dasar dan Aplikasinya (Organizational Behavior of Basic Concepts and Its Applications). King Grafindo Persada. Jakarta.

[15] Van Den Ban, A.W. and H.S. Hawkins 1999. Penyuluhan Pertanian (Agricultural Education). Yogyakarta: Canisius.