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Relationship between Tractor Technology Adoption and Increased Rice Production in Asaki Village, Lambuya Subdistrict, Konawe District

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Abstract

This research aims to determine the relationship between the adoption of rice production technology and increased rice production in Asaki Village, Lambuya District, Konawe Regency. Determining the research location purposively. The time of the research was carried out in May 2024. The population in this study were farmers in lowland rice farming activities in Asaki Village. The sample was determined using a proportional random sampling technique of 56 people. Data analysis used sperm rank correlation analysis with the help of SPSS. that the use of tractors has a significant relationship with increasing rice production in Asaki Village can be seen from the Spermman rank correlation coefficient value of 0.542 with a significance level of 0.000. This is a significant value smaller than 0.05, meaning that there is a positive correlation between the use of tractors and increased rice production so that Ho is rejected and Ha is accepted. The relationship between the adoption of tractor technology and increasing rice production is in the fairly close category, namely 0.40-0.599, so that the better the use of tractors in cultivating land, the higher the increase in rice production.

Keywords: Relationship, Adoption of Tractor Technology, Rice Production.

INTRODUCTION

The agricultural sector is one of the most important sectors in economic development in Indonesia, where the majority of the population is engaged in agriculture and is supported by adequate soil conditions, climate, and other supporting resources for farming. The agricultural sector is the most effective income multiplier in alleviating poverty and improving people's living standards and welfare (Arifin, 2005).

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The development of paddy rice farming in Southeast Sulawesi is progressing, making this commodity one of the priorities in development because rice is the staple food of most of the population as well as a source of income for farmers in rural areas. This success is supported by the role of the government and related agencies in formulating policies, while farmers as managers of rice paddy farming. Agricultural extension plays an important role in improving farmers' knowledge and skills to be more responsive to new technologies. Increased rice productivity is also supported by the provision of superior seeds, fertilizers, irrigation, and modern cultivation technology (Southeast Sulawesi Agriculture Office, 2016; Ilham, 2010).

According to Soekartawi (in Apriani et al., 2018), increased agricultural production is driven by technological improvements, from the use of old technology to new technology in various aspects of production. Although these innovations can reduce costs and increase productivity, not all farmers are able to adopt them. Technology adoption by farmers is influenced by internal and external factors, such as age, education, land size, and income. Technological innovations will not be effective if they are not used by farmers, who are the main actors in agricultural development (Fatchiya et al., 2016; Simarmata et al., 2014).

Farming communities have diverse social characteristics, with differences in attitudes, skills, knowledge and capital that affect their ability to farm. However, there are also behavioral similarities that can be utilized in technology development strategies through a learning-by-doing approach. In Konawe District, especially Lambuya Sub-district, the potential for wet-rice farming is very large. Appropriate utilization of this potential can increase regional, farmer, and community income, and create jobs. A balance between industry and agriculture is needed to create high economic value products and support regional autonomy (Lestari, 2009).

Table 1 Paddy rice production in Konawe district in 2022 and 2023 with 2023 data

District/city	Rice Production (tons)		Rice Production (tons)	
	2022	2023	2022	2023
Buton	5.852,10	6.919,30	3.360,74	3.973,61
Muna	1.769,58	2.395,62	1.016,23	1.375,76
Konawe	132.209,23	151.675,85	75.925,00	87.104,28
Kolaka	51.063,36	54.800,20	29.324,63	31.470,62
South Konawe	88.805,39	76.126,76	50.999,07	43.718,00
Bombana	76.588,65	68.424,96	43.983,27	39.295,03
Wakatobi	-	-	-	-
North Kolaka	5.125,64	5.813,82	2.943,55	3.338,75

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North Buton	2.862,39	2.267,85	1.643,80	1.302,38
North Konawe	8.952,07	8.272,57	5.140,96	4.750,76
East Kolaka	88.994,39	89.083,35	51.107,61	51.158,71
Konawe Islands	492,54	449,32	282,86	258,04
West Muna	5.387,73	5.608,63	3.094,05	3.220,92
Central Buton	25,29	27,05	14,52	15,53
South Buton	-	-	-	-
Kendari City	2.329,73	2.211,85	1.337,90	1.270,22
Baubau City	8.499,94	8.224,82	4.881,34	4.723,34
Southeast Sulawesi	478.958,03	482.371,05	275.055,53	277.015,64

Source: *BPS Kabupaten/kota, 2023*

In table 1. Shows that the production of paddy rice in Konawe district in 2023 reached 151,675.85 tons, the largest production of paddy rice was in Konawe district with rice production of 87,104.28 tons.

Lambuya sub-district in Konawe district, Southeast Sulawesi, has an area of 17.48 km² consisting of agricultural land, public facilities and forests. The region's main commodity is paddy rice, with Asaki Village as one of its production centers. Since 1995, farmers in Asaki Village have been using agricultural machinery, especially tractors, to cultivate 154 hectares of paddy fields. Grain production in this village ranges from 5 to 8 tons per hectare. The use of tractor technology has been adopted by all farmers in Asaki Village as part of an effort to increase agricultural productivity.

Tractors are tools used to cultivate land, before tractors were made farmers cultivated land using animal power such as buffalo or cows that were paired with tools to cultivate land. But nowadays, farm tractors are becoming an indispensable component of agricultural and rural development. People are witnessing the rapid development of the use of hand tractors in the countryside. People know that it is not uncommon for farmers to experience the benefits of using tractors. So that many farmers switch from the previous manual and now use tractors, because the existence of tractors can facilitate farmers in working on large fields. Working on the land will be faster and does not drain a lot of physical energy, thus reducing the level of fatigue at work. Because doing tillage with a tractor is more profitable than in other ways.

Based on the above background, the authors are interested in conducting research with the title, "The Relationship between Tractor Technology Adoption and Increased Production in Asaki Village, Lambuya District, Konawe Regency".

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METHOD

The population of this study were all wet-rice farmers in Asaki Village who were members of 5 farmer groups totaling 126 people. Determination of the sample in this study was done by simple random sampling using the slovin formula which amounted to 56 samples. The type of data in this study is quantitative data. Data collection techniques were carried out by observation, interview, and documentation. The variables observed in this study are:

1. The dependent variable is (X) Adoption of tractor technology users through stages: knowing, paying attention, assessing, trying and applying.
2. The independent variable (Y) is the increase in farmers' rice production. Increase in production, change in paddy price, rice yield loss

Data on the relationship between the use of tractor technology and rice farming production were tabulated using microsof excel and analyzed using SPSS 2022.based on sperman rank correlation analysis (Sugiono, 2015). with the sperman rank correlation formula.

$$P = 1 - \frac{6?bi^2}{n\,(n^2-1)}$$

Description:

P = Spearman rank correlation coefficient

bi^2 = Difference of each rank pair

n = number of respondents/samples

According to Sugiyono (2015), the guidelines for interpreting the correlation coefficient are as follows:

- 0.00-0 = Not very close
- 0.20-0.399 = Not close
- 0.40-0.599= Moderately close
- 0.60-1.000= Very close

This research uses a Likert scale with a scale of 1-5:

SS (Strongly Agree)	5
S (Agree)	4
R (Undecided)	3
TS (Disagree)	2
STS (Strongly Disagree)	1

Sperman rank correlation test to see the relationship as follows:

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H_a accepted if significant count ≥ α = 5% (0.5)
H_0 rejected if significant count ≤ α = 5% (0.05)

RESULTS AND DISCUSSION

Tractor technology adoption

In farming activities, especially rice paddies, land cultivation is a very important first step because it directly affects the results that will be obtained. Good tillage must consider time, cost, and efficiency. Modern technology such as tractors are very helpful for farmers in increasing their agricultural productivity. Tractors, which are specialized for plowing and tillage, allow farmers to complete the work more quickly and efficiently, thus having a positive impact on increasing agricultural yields. In Asaki Village itself, tractors are often used by farmers in carrying out their farming, even in every land cultivation every planting season they always use tractors, for more details on the level of application of tractors to farmers in Asaki Village can be seen in table 2.

Table 2 Farmers who use tractors in paddy rice farming in Asaki Village, Lambuya District 2024

No.	Usage	Frequency	Percentage (%)
1.	Using	56	100
2.	Not Using	-	-
	Total	56	100

Source: Processed primary data 2024

Table 2 shows that farmers in Asaki Village already use or apply tractors as a tool for cultivating land, namely 100% of farmers from farmer groups who use tractors.

Paddy Rice Production

Production is one of the factors that determine the high and low income obtained by wet-rice farmers in organizing farming every farmer strives for maximum farming results so that they can meet their needs.

Table 3 Rice paddy production in Asaki Village, Lambuya Sub-district 2024

No.	Land classification (ha)	Production (Kg)
1	0 ,3 - 1	3.734
2	1 - 3	11.912
3	3 - 6	56.160

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	Total	68.075,73
	Average	1.215,63

Source: Processed primary data 2024

Based on the table, there are three classifications of paddy fields: 0.3-1 ha with an average production of 3,743 kg, 1-3 ha with an average production of 11,912 kg, and 3-6 ha with an average production of 56,160 kg. Total paddy rice production per harvest reached 68,075.73 kg, with an overall average production of 1,215.63 kg. The use of tools such as tractors in the processing of paddy fields plays an important role in improving land quality and planting intensity. According to an interview with Mr. Masupi, before the use of tractors, harvesting was only done twice a year. After the adoption of tractors, the harvest frequency increased to three times a year, indicating that this technology is able to increase the harvest intensity and productivity of paddy fields (Hamidah & Soedarto, 2006).

Adoption Process of Tractor Technology Use on Rice Paddy Farming Production

According to Arief (2022), the adoption of tractor technology brings many benefits, including in increasing productivity and efficiency in paddy rice cultivation. Farmers' adoption of tractor technology in paddy rice farming is expressed based on the following scores of knowing, paying attention, assessing, trying, applying, increasing rice production, changing rice prices, and rice yield loss.

Table 4 Distribution of respondents' answer scores

No. Item	Frequency and Percentage of Respondents' Answers										Cumulative Value ative	Average Score
	SS (5)		S (4)		R (3)		TS (2)		STS (1)			
	F	%	F	%	F	%	F	%	F	%		
1	25	44,64	30	53,57	1	1,81	0	0	0	0	248	4,42
2	28	50	25	44,64	3	5,35	0	0	0	0	249	4,44
3	27	48,21	29	57,78	0	0	0	0	0	0	251	4,48
4	39	69,64	15	26,78	2	3,57	0	0	0	0	261	4,66
Average Score Knowing											1.009	4,5
1	28	50	22	39,28	6	8,92	0	0	0	0	246	4,39
2	34	60,71	18	32,14	2	3,57	0	0	0	0	248	4,59
3	31	55,35	22	39,28	3	5,35	0	0	0	0	252	4,5
4	20	35,71	20	35,71	10	17,85	0	0	0	0	210	4,2

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Average Score Paying Attention											956	4,42
1	31	55,35	20	35,71	5	8,92	0	0	0	0	250	4,46
2	24	42,85	23	41,07	7	12,5	0	0	0	0	233	4,31
3	29	57,78	20	35,71	6	10,71	0	0	0	0	243	4,41
4	33	58,92	18	32,14	4	7,14	0	0	0	0	249	4,52
Average Score Assessing											975	4,42
1	31	91,07	20	35,71	5	8,92	0	0	0	0	250	4,46
2	25	44,64	23	41,07	7	12,5	0	0	0	0	238	4,32
3	29	51,78	20	35,71	6	10,71	0	0	0	0	243	4,41
4	33	58,92	17	30,35	5	8,92	0	0	0	0	248	4,50
Average Score Trying											979	4,42
1	31	55,35	22	39,28	3	5,35	0	0	0	0	252	4,5
2	28	50	22	39,28	6	10,71	0	0	0	0	246	4,39
3	37	66,07	13	23,21	6	10,71	0	0	0	0	255	4,55
4	23	41,07	22	39,28	11	19,64	0	0	0	0	236	4,21
Average Score Applying											989	4,41
1	28	50	24	42,85	4	7,14	0	0	0	0	248	4,42
2	26	46,42	23	41,07	6	10,71	0	0	0	0	240	4,36
3	23	41,07	28	50	3	5,35	0	0	0	0	236	4,37
4	25	44,64	24	42,85	6	10,71	0	0	0	0	239	4,34
Average Score Increased rice production											963	4,37
1	31	55,35	25	44,64	0	0	0	0	0	0	255	4,62
2	31	55,35	19	28,57	5	8,92	0	0	0	0	246	4,47
3	31	55,35	22	39,28	3	3,35	0	0	0	0	252	4,5
4	25	44,64	24	42,85	7	12,5	0	0	0	0	242	4,32
Average Score of Rice Price											995	4,47
1	23	41,07	22	39,28	11	19,64	0	0	0	0	276	4,92
2	28	50	25	44,64	3	5,35	0	0	0	0	249	4,44
3	25	44,64	30	53,57	1	1,78	0	0	0	0	248	4,42
4	28	50	24	42,85	3	5,35	0	0	0	0	245	4,45
Average Score of Rice Hail											1.018	4,55

Based on table 4 above, it can be explained that;

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1. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements is 4.5, which is on a value scale that shows the answer choice strongly agrees.
2. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements, amounting to 4.42, is on a value scale that shows the answer choice strongly agrees.
3. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements, amounting to 4.42, is on a value scale that shows the answer choice strongly agrees.
4. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements, amounting to 4.42, is on a value scale that shows the answer choice strongly agrees.
5. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements is 4.41, which is on a value scale that shows the answer choice strongly agrees.
6. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements is 4.37, which is on a value scale that shows the answer choice strongly agrees.
7. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements is 4.47, which is on a value scale that shows the answer choice strongly agrees.
8. According to the statement items used, most respondents gave a strongly agree assessment and the fewest respondents gave a doubtful assessment. The total average value of the 4 statements is 4.55, which is on a value scale that shows the answer choice strongly agrees.

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Relationship between Technology Adoption and Rice Paddy Production

Based on the results of research conducted on the relationship between the use of tractor technology with increased rice production in this study using the *Sperman rank* correlation test with the help of SPSS sortware. To test the research Ha accepted or rejected can use the Rho Spearman table or by comparing the value of Sig. (2-tailed) with α (0.05). If the probability value is ≤ α (0.05), then Ha is accepted and if the probability is ≥ α (0.05), then Ho is rejected for more details can be seen in table 4.19.

Table 5 Relationship between Technology Adoption and Rice Paddy Production in Asaki Village, Lambuya District, Konawe Regency

Variable	Correlation Value	Significant Value	Relationship
Tractor Usage	0.542	0,000	Significant
Increased Production			

Source: Primary data processed 2024

Table 5 shows that the use of tractors has a significant relationship with increased rice production in Asaki Village. It can be seen that the test results using SPSS software get a spearman rank correlation coefficient value of 0.542 with a significant level of 0.000. This is a significant value smaller than 0.05, meaning that there is a positive correlation between tractor use and increased rice production so that Ho is rejected and Ha is accepted. This research is in line with the opinion of Sugiono (2015), regarding the guidelines for the interpretation of the correlation coefficient, namely 0.00-0.199 not closely, 0.20-0.399 quite closely, 0.60-0.799 closely, 0.80-1000 very closely. This means that the relationship between the adoption of tractor technology and increased rice production is included in the category quite closely, namely 0.40-0.599, so that the better the use of tractors in land processing, the higher the increase in rice production.

The result of this study is that the better the use of tractors in cultivating land, the higher the increase in rice production obtained by farmers and vice versa the higher the increase in production, the better it will be in using tractor technology in cultivating land. Therefore, the use of good tractor technology is very necessary in increasing rice production so that the results obtained will affect the results of the farm. This is in line with the opinion of Rania, *et al*, (2020) which states that the use of a good tractor will result in satisfaction for the landowner. If farmers are satisfied with the use of tractors in cultivating land, they will also be eager to increase their production. High production can increase the income of farmers. In addition, the opinion of

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(Listiana, 2017) states that the use of tractor technology has a fairly close relationship with increasing production where increasing farmer production is an ability internalized in farmers aimed at knowledge, attitudes, and skills to carry out farming activities so that farmers can succeed in carrying out their farms.

CONCLUSION

Based on the results of the discussion in research on the relationship of tractor technology adoption to rice paddy farming in Asaki Village, Lambuya District, Konawe Regency, it can be concluded that the use of tractors has a significant relationship with increased rice production in Asaki Village, it can be seen from the Sperrman rank correlation coefficient value of 0.542 with a significant level of 0.000. This is a significant value smaller than 0.05, meaning that there is a positive correlation between the use of tractors and increased rice production so that Ho is rejected and Ha is accepted. The relationship between the adoption of tractor technology and increased rice production is included in the category quite closely, namely 0.40-0.599, so that the better the use of tractors in land processing, the higher the increase in rice production.

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