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SINTA 2

Comparison Of Technology Usage On Rice Productivity In Banyuwangi

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ABSTRACT

Advances in Information and Communication Technology (ICT) present both opportunities and challenges in agriculture. This study examines how technology use affects rice production in Purwoharjo District, Banyumas Regency, Indonesia. The study looks at differences in farmer preferences related to village, gender, age, and education level. We used a descriptive quantitative approach, using primary data from interviews and questionnaires with 96 farmers out of 2,175 farmers. Stratified random sampling ensured demographic representation. The Likert scale and chi-square analysis determined statistical differences in technology use and its impact on productivity. The results showed that agricultural technology significantly increased rice productivity among male farmers, those aged 41–50 years and above 50 years, and those with primary and junior high school education. Internet use benefited male farmers, while social media had a positive impact on farmers aged over 50. Variations in technology adoption were observed across villages, particularly in Grajagan, Sumberasri, and Glagahagung. The study's conclusions confirm that technology adoption plays a significant role in increasing rice productivity, particularly among certain demographic groups. However, disparities in access and utilisation highlight the need for targeted interventions to bridge the digital divide. Policymakers and stakeholders should focus on improving digital literacy, providing technological support, and ensuring infrastructure accessibility to maximise the benefits of ICT in agriculture. These findings support targeted policies to improve digital literacy and infrastructure, ensure equitable access to technology, and optimise productivity and economic conditions for farmers.

Keywords: technology, internet, productivity, chi-square, Purwoharjo

INTRODUCTION

The development of Information and Communication Technology (ICT) today is to rapid. In 2013 the number of internet users reached 71.19 million users (Adiarsi et al., 2015). In 2021 it shows that the number of internet users in Indonesia is around 202 million(Aswin & Mediyastuti Sofyan., 2022). Despite the high number of internet and social media users, their utilization remains low. Low levels of education and various challenges affect the use of the internet and social media. Almost all workers use the internet and social media, informal jobs, especially in agriculture, are still lacking in the use of the internet and social media(Saputra, 2019). The low level of education causes the low ability of farmers in terms of the use of technology which can hamper economic growth in farmers, especially in the productivity of rice crop production(Catur Yuantari et al., 2016). New applications in agriculture, such as agricultural e-commerce platforms (e.g., TaniHub, Agromaret), IoT-based smart irrigation

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systems, and the use of social media for crop marketing, can blur the lines between conventional and digital methods and add complexity to decision-making. For example, farmers' use of WhatsApp and Facebook Marketplace to sell their crops directly to consumers can increase profits, but also require higher digital skills and different marketing strategies than traditional methods (Komang & Karyati., 2020).

Utilization of Information and Communication Technology (ICT) is contained in a government program known as ICT4D (Information and Communication Technology for Development). One of the programs is to provide access to technology, especially the internet, for the public and institutions in various regions(Wijanarko & Sarwititi., 2016). In its implementation, ICT encounters many challenges and obstacles. One is the uneven distribution of infrastructure that supports the application of ICT in agriculture is an initial problem that must be immediately resolved by the authorities, because without supporting infrastructure, the application of ICT in agriculture will only be a dream(Sawitri et al., 2019). The continuous development of technology is essential to support economic growth, especially in agricultural productivity(Riniati et al., 2022).

Technological progress is marked by changes in the production process, the introduction of new products, or an increase in the amount of output using the same input(Sugiyono, 2014). Xiu et al., (2019) highlight that technological advancements in various sectors, including agriculture, can either maintain existing input-output ratios (neutral) or favor certain inputs, such as labor-saving innovations (non-neutral). This distinction is crucial in understanding how modern agricultural technologies, such as automated machinery and precision farming, impact productivity dynamics. According to Hicks, technological progress is neutral if it does not change capital and labor (Ren, 2021).

This has been criticized by Harrod who argues that neutral technological progress occurs when at a constant rate of profit (or interest rate), the ratio of capital and output also remains constant. Kendrick, Kaldor, and Solow, among others, technological progress has a variety of properties. Technological progress can be either neutral or biased" for better clarity. In terms of production possibilities, technological progress is neutral when a 2-fold increase in output occurs because of a 2-fold increase in each input. Technological advances are not always neutral; they can either save labor or capital. This will improve the flow and clarity. Technological advances that save labor or capital are said to be non-neutral. Computers, tractors and machine tools can be classified as technological advances that save labor. While technological advances that save capital are rare. The Solow theory is also supported by the Cobb-Douglas production theory which explains that the productivity of a product is not only affected by capital and labor but also by agricultural technology. Don Tapscott revealed that the digital economy is an economic system that has the characteristics of one room with information and access to information capacity(Musnaini et al., 2020). The digital economy is identified as 3 main components First, electronic business infrastructure (e-business), how electronic business (e-business) is done, electronic business (e-business)(Mesenbourg, 2018).

The role of the food crops sub-sector can contribute to East Java's rice production, because Banyuwangi Regency is a rice barn area. Banyuwangi Regency is a Regency in East Java Province which has the largest area, so that with the wide availability of the area, the opportunity to be used as agricultural land will have great opportunities. The development of Information and Communication Technology (ICT) has significantly influenced various sectors, including agriculture, by enhancing access

to information, market linkages, and productivity-enhancing tools. However, its adoption and effectiveness vary depending on factors such as education levels, infrastructure, and regional economic conditions. Given the importance of ICT in driving agricultural productivity, Banyuwangi, with its vast rice farming areas and diverse farming demographics, offers a promising case for examining how technological advancements influence rice production and farmer decision-making (Herdinawati, 2017). The purpose of this study was to determine the effect of the use of technology on rice productivity before and after technological advances and to determine differences in farmers' preferences for the use of technology that affects the productivity of rice plants in Purwoharjo District, Banyuwangi Regency based on village area of origin, gender, age and level of education.

METHODS

The type of research conducted in this research is descriptive quantitative research. Descriptive research is a method used to analyze and explain the relationship between the use of information technology and rice productivity, providing insights into how technological adoption influences agricultural outcomes (Ahyar et al., 2020). Descriptive research is research that is able to describe this study aims to describe the relationship between the use of information technology and rice productivity. Quantitative research method is a researcher's attempt to find knowledge by providing data in the form of numbers. The numbers obtained are used to carry out information analysis, in simple terms quantitative research is scientific research that is arranged systematically on parts and to find causal relationships (Sayuti & Hidayati., 2020). The time of the research was from August to October 2022 and was carried out in Purwoharjo District, Banyuwangi Regency because that area has the highest productivity at 70% and above and is in the top 3 with the highest rice productivity in Banyuwangi Regency for the last 10 years, However, the productivity, production, and area of rice plants have decreased. However, rice productivity has been decreasing each year as farmers tend to switch to other crops that are more productive.

This study uses primary and secondary data. Primary data were obtained through direct interviews using questionnaires using a family approach to improve the accuracy of farmers' answers. Secondary data were collected from various agencies, including the Village Head Office, Sub-district Office, BPS Banyumas Regency, Agriculture Service, and related journals and books. The research sample was 96 farmers who would be interviewed, selected from a total population of 2,175 farmers in eight villages in Purwoharjo District, Banyuwangi Regency.

This study contributes to understanding the influence of information technology on rice productivity in Banyuwangi. By analyzing the level of technology adoption and the obstacles faced by farmers, this study provides insight into the effectiveness of agricultural technology implementation. These findings are relevant to digital transformation efforts in the agricultural sector and can be a basis for policy makers in designing strategies to increase productivity through technology optimization. By examining farmer preferences and the effectiveness of technology adoption, this study contributes to a better understanding of the role of ICT in sustaining and improving rice productivity. The findings provide valuable insights into whether technological advancements can mitigate productivity declines and offer solutions for optimizing agricultural practices in Banyuwangi Regency.

This study uses a Likert scale because this scale is effective in measuring respondents' attitudes, preferences, and level of agreement with a statement. The Likert scale was chosen because it allows for a more structured measurement of farmers' perceptions

regarding the use of technology in agriculture.

Respondents were given five answer choices with the following ranges:

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

The values obtained from the Likert scale were then grouped for analysis using statistical methods, such as Chi-Square, to identify preference patterns and the relationship between technology use and rice productivity. In the analysis, the average value or percentage of each category was used to understand the tendency of respondents' attitudes. With this approach, the study can obtain more accurate data that can be compared quantitatively, thus helping to draw conclusions regarding the influence of technology on agricultural productivity in Banyuwangi. In this study, the data analysis method was chi-square analysis. Chi-square analysis was used to determine whether there were differences in respondents' perceptions of factors affecting rice productivity. The chi-square test is a non-parametric statistical method used to test whether there is a significant relationship between two or more categorical variables. The Chi-Square test is used to determine whether there is a relationship or difference between two categorical variables. In this study, the Chi-Square test was used to test whether there were differences in farmer preferences for the use of technology that affects rice productivity. The following are the decision-making steps in the Chi-Square test:

1. Formulating Hypotheses

Null Hypothesis (H_0): There is no difference or relationship between the variables tested. In the context of this study there are no differences in preferences that affect the productivity of rice plants.

Alternative Hypothesis (H_1): There is a significant difference or relationship between the variables tested. There are differences in the preferences of factors that affect the productivity of rice plants.

2. Determining the Degree of Freedom (df)

The degree of freedom (df) is calculated using the formula:

$$df = (r-1) \times (c-1)$$

where:

r = number of rows in the contingency table

c = number of columns in the contingency table

3. Calculating the Chi-Square Value (χ^2)

The Chi-Square value is calculated using the formula:

$$X^2 = \sum \frac{(O-E)^2}{E}$$

where:

O = observation frequency (value obtained from the data)

E = expected frequency (expected value if H_0 is true)

The expected frequency (E) is calculated using the formula:

$$E = \frac{(Number\ of\ Rows\ x\ Number\ of\ Columns)}{Total}$$

If based on Probability (Signification). with a significance level of 5% to look for farmers' preferences. If probability > 0.05 then Ho is accepted, if probability < 0.05 then Ho is rejected. Basis for decision making, based on comparison of calculated Chissquare with Chi-Square table. If Chi-Square Count < Chi-Square Table then Ho is accepted If Chi-Square Count > Chi-Square Table then Ho is rejected (Alavi et al., 2020).

The Chi-Square test was chosen because this study focuses on the relationship between categorical variables, such as the level of technology adoption and rice productivity, based on demographic factors (age, education, gender, and village location). Chi-Square is suitable for:

1. Identifying relationships between variables – whether education level affects farmers' tendency to use technology.
2. Testing differences in preferences – Are there significant differences

in farmers' preferences for technology based on age group or gender.

3. Confirming the research hypothesis – If the test results show a significant relationship, then the alternative hypothesis is accepted, namely that farmers' preferences do affect technology adoption and rice productivity.

By using this test, the study can present stronger statistical evidence in understanding how farmers' preferences relate to the success of technology implementation in the agricultural sector in Banyuwangi Regency.

Farmers' preferences in using agricultural technology play a significant role in determining rice productivity. Farmers' decisions to adopt or avoid certain technologies—such as automated irrigation systems, technology-based fertilizers, or internet-based applications—can have a direct impact on production efficiency and yields. Understanding farmers' preferences allows for the identification of factors that drive or inhibit technology adoption. Thus, this study not only measures the impact of technology on productivity but also reveals how farmers' mindsets and habits influence the success of technology implementation in agricultural systems.

RESULTS AND DISCUSSION

The Role of Actors and Institutions

Respondents to this study were 96 rice farmers in Purwoharjo District, Banyuwangi Regency. A total of 87 male farmers (90.625%) and 9 female farmers (9.375%). Respondents aged 30 to 40 years consisted of 18 farmers (18.75%). Age 41 to 50 years consisted of 47 farmers (48.95%) and aged more than 50 years amounted to 31 farmers (31.30%). The number of farmers with tertiary education level was 8 farmers (8.33%), high school education level was 24 farmers (25%), junior high school education level was 26 farmers (27.08%), and elementary school education level was 38 farmers. (39.59%).

The imbalance in the number of respondents based on gender may affect the results of the study, especially in looking at differences in technology preferences between male and female farmers. Previous studies have shown that men and women may have different access to and adoption rates of technology due to differences in social and economic roles in farming households. Therefore, although the majority of data comes from male farmers, it is still important to consider how gender factors may affect research findings related to the use of technology to improve rice productivity.

Table 1
Results of Chi-Square Analysis Before & After Technology

Variable	Before Technology				After Technology			
	Probability	Count X^2	df	Table X^2	Probability	Count X^2	Df	Table X^2
(X1) (Y)	0,171	30,455	39	54,572	0,000	246,231	117	143,246
(X2) (Y)	0,000	83,676	51	68,669	0,304	161,440	153	182,864
(X3) (Y)	0,064	67,132	51	68,669	0,326	160,357	153	182,864

Source: Primary Data Processed, 2022

Based on Table 1, it shows the relationship between the use of agricultural technology (X1), internet (X2), and social media (X3) on rice productivity (Y) before and after the application of technology in Purwoharjo District, Banyuwangi Regency analyzed using Chi-Square. Before the technology was applied, the calculated Chi-Square value was smaller than the Chi-Square table, with a p-value> 0.05, so Ho was accepted. This shows that before the application of

technology, there was no significant relationship between the variables of the use of agricultural technology (X1), internet (X2), and social media (X3) on rice productivity (Y). However, after the technology was applied, the calculated Chi-Square value increased significantly and was greater than the Chi-Square table, with a p-value <0.05, so Ho was rejected and Ha was accepted. This shows that after the application of technology, there was a strong relationship between the use of agricultural technology (X1), internet (X2), and social media (X3) on rice productivity (Y).

The increase in the calculated Chi-Square value shows that the use of agricultural technology (X1), internet (X2), and social media (X3) has a significant impact on increasing crop yields (Y). These results emphasize the importance of agricultural digitalization. Further training is needed so that farmers can optimally utilize technology to increase their productivity

Table 2
Results of Chi-Square Analysis Based on Village

Variable	Grajagan Probability	Sumberasri Probability	Glagahagung Probability	Karetan Probability	Bulurejo Probability	Purwoharjo Probability	Sidorejo Probability	Kradenan Probability
(X1) (Y)	0,027	0,036	0,031	Constant	Constant	0,079	0,082	0,136
(X2) (Y)	0,371	0,400	0,073	Constant	0,233	0,252	0,504	0,696
(X3) (Y)	0,355	0,087	0,326	Constant	0,329	0,035	0,1555	0,548

Source: Primary Data Processed, 2022

Based on Table 2, it shows that the relationship between the use of agricultural technology (X1), internet (X2), and social media (X3) on rice productivity (Y) is not evenly distributed in each village in Purwoharjo District, Banyuwangi Regency. In Grajagan, Sumberasri, and Glagahagung villages, the calculated Chi-Square value is greater than the Chi-Square table with a p-value <0.05, so Ho is rejected. This shows that technology has a significant effect on rice productivity in these villages, while for Karetan Village and Bulurejo Village the results of the chi-square analysis are constant. On the other hand, in Purwoharjo, Sidorejo, and Kradenan villages, the calculated Chi-Square value is smaller than the Chi-Square table, with a p-value> 0.05, so Ho is accepted. This means that the use of technology, internet, and social media has not had a significant impact on rice productivity in these villages. This inequality can be caused by uneven access to technological infrastructure or differences in the level of technology adoption in each village. There needs to be a location-based policy to ensure that all villages have equal access and training in the application of agricultural technology

Table 3
Results of Chi-Square Analysis Male & Female Respondents

Variable	Man Probability	Man CountX^2	Man df	Man tableX^2	Female Probability	Female CountX^2	Female df	Female TableX^2
(X1) (Y)	0,000	62,396	6	12,591	0,463	3,600	4	9,487
(X2) (Y)	0,001	28,265	9	16,919	0,174	9,000	6	12,591
(X3) (Y)	0,014	20,657	9	16,919	0,299	5,625	4	9,487

Source: Primary Data Processed, 2022

Based Table 3, the relationship between the use of technology (X1), internet (X2), and social media (X3) on rice productivity (Y) based on gender in Purwoharjo District, Banyuwangi Regency was tested using Chi-Square. The results of the analysis show that for male farmers, the calculated Chi-Square value is greater than the Chi-Square table, with a p-value <0.05, so Ho is rejected. This means that there is a significant relationship between the use of technology, internet, and social media on male rice productivity. However, for female farmers, the calculated Chi-Square value is smaller than the Chi-Square table, with a p-value> 0.05, so Ho is accepted. This shows that for female farmers, the use of technology has not had a significant impact on rice productivity. Men are more involved in field work using agricultural technology, while women are more involved in managerial and marketing aspects. There needs to be a more inclusive training program to increase women's involvement in the use of agricultural technology so that its impact on productivity is more evenly distributed.

Table 4
Results of Chi-Square Analysis Based on Age Level

Variable	Age 30 to 40		Age 41 to 50		More than 50	
	Probability	CountX^2	Probability	CountX^2	Probability	CountX^2
(X1) (Y)	0,054	5,850	0,000	31,740	0,000	26,228
(X2) (Y)	0,453	5,738	0,009	21,966	0,444	8,929
(X3) (Y)	0,549	4,962	0,103	14,585	0,018	20,047

Source: Primary Data Processed, 2022

Based on Table 4 comparing the relationship between the use of agricultural technology (X1), internet (X2), and social media (X3) on rice productivity (Y) based on age in Purwoharjo District, Banyuwangi Regency. The results of the analysis show that for farmers aged 41-50 years and over 50 years, the calculated Chi-Square value is greater than the Chi-Square table, with a p-value <0.05, so Ho is rejected. This means that the use of technology, internet, and social media has a significant impact on rice productivity in this age group. Conversely, for farmers aged 30-40 years, the calculated Chi-Square value is smaller than the Chi-Square table, with a p-value> 0.05, so Ho is accepted. This shows that the group of young farmers has not experienced a significant impact from the use of technology. Older farmers are more likely to adopt technologies that are proven to increase productivity, while young farmers may focus more on diversifying agricultural businesses. A special approach is needed in introducing technology to young farmers so that they are more interested and motivated to use it to increase crop yields..

Table 5
Results of Chi-Square Analysis Based On Education Level

Variable	SD		SMP		SMA		S1	
	Probability	Count X^2	Probability	Count X^2	Probability	Count X^2	Probability	Count X^2
(X1) (Y)	0,001	22,563	0,002	20,993	0,064	8,995	0,102	2,667
(X2) (Y)	0,065	16,106	0,709	6,303	0,618	4,436	0,392	3,000
(X3) (Y)	0,151	13,263	0,064	16,122	0,713	2,121	0,721	1,333

Source: Primary Data Processed, 2022

This table evaluates the relationship between farmer education level (X1) and rice productivity (Y) in Purwoharjo District, Banyuwangi District. The results of the analysis show that for farmers with elementary and junior high school education, the calculated Chi-Square value is greater than the Chi-Square table, with a p-value <0.05, so Ho is rejected. This means that in this group, the use of technology has a significant effect on rice productivity. Conversely, for farmers with high school and bachelor's education, the calculated Chi-Square value is smaller than the Chi-Square table, with a p-value> 0.05, so Ho is accepted. This shows that in this group, the use of technology does not have a significant impact on rice productivity. Farmers with low education may be new to technology, so the impact is felt more. Conversely, farmers with higher education may be familiar with technology and have other ways to increase productivity. Technology-based education programs should be more focused on farmers with low education so that they can adapt more quickly to technological developments.

Agricultural Technology (X1)

The use of agricultural technology can be said as an effort by farmers to carry out work in agriculture with modern tools such as agricultural machinery, agricultural fertilizers, and agricultural medicines. Agricultural technology acts as the independent variable and agricultural productivity as the dependent variable as explained by the Cobb-Douglas production function. The results of the chi-square analysis show that as a whole the indicators of the use of agricultural technology affect the productivity indicators

The results of this study generally support the economic growth theory of Solow, Kendrick, and Kaldor, which highlights the importance of technological progress in increasing output and productivity. However, in the context of agricultural technology adoption in Banyuwangi, there are several aspects that indicate that the application of this theory does not always run evenly. Socio-economic factors, such as access to technology, education, and farmer demographics, are important variables that determine the extent to which the impact of technology on agricultural productivity can be felt. In Solow's theory, technological progress (At) is the main factor determining output growth (Y) in the long term. In this study, variable X1 (use of agricultural technology) shows a significant relationship with variable Y (rice productivity), as seen in Table 1. This supports Solow's view that the application of technology can increase production efficiency and yields. However, the impact of technology is not felt evenly by all farmer groups. Tables 2 to 5 show that the level of technology adoption and its impact on productivity vary greatly by village, gender, age, and education level. These findings indicate that although technology can increase productivity in theory, in practice there are still obstacles such as limited access, lack of understanding of technology, and farmers' readiness to implement agricultural innovations.

In line with Kendrick and Kaldor's theory, which states that technological progress is not always neutral, this study found that the adoption of technology was felt to be more beneficial by certain groups than others. In Table 5, farmers with low education (elementary and junior high school) showed a significant impact of technology use on productivity, while farmers with higher education (high school and bachelor's degree) did not experience significant changes. This shows that technological progress has a greater impact on groups that previously had limited access to agricultural information and innovation. This finding supports Kendrick's theory which highlights that technological progress can be labor-biased, where groups with lower skills or knowledge tend to experience greater productivity increases when technology is introduced

In addition, Table 3 shows that agricultural technology has a significant effect on the productivity of male farmers, but not for female farmers. This suggests that there is a gender bias in the adoption of agricultural technology. In many cases, male farmers are more involved in the use of mechanization tools and land management, while women are more involved in managerial and marketing aspects. This finding is in line with Kaldor's theory which states that technological progress has varying effects depending on the social group that adopts it.

The implication of this finding is that although classical economic growth theory highlights the importance of technology in increasing output, socio-economic factors should not be ignored in the implementation of agricultural technology. Education programs and technology access should be tailored to groups that are less exposed to innovation, such as female farmers and young farmers who are still low in technology adoption rates (Table 4). In addition, the government and policy makers must ensure that infrastructure and technical support are evenly available in various villages (Table 2), so that all farmer groups can feel the same benefits from the application of agricultural technology.

Overall, the findings of this study support Solow's theory that technology increases productivity, but also show that its effects are not neutral as explained by Kendrick and Kaldor. In the context of agriculture in Banyuwangi, technology adoption is not only determined by how advanced the innovation introduced is, but also by the factors of who uses it, where the technology is applied, and how ready farmers are to adopt it. Therefore, the success of implementing agricultural technology cannot only depend on the innovation itself, but also on strategies that ensure that the innovation can be accessed and used optimally by all farmer groups. Technological progress is neutral (unbiased) if changes do not save capital or save labor(Diartho, 2018).

Makruf et al. (2011) examined the factors affecting rice production and found that the use of SP-36 and Urea fertilizers had a significant effect on rice productivity, while other variables such as land area and number of workers did not have a significant impact. The results of this study are in line with the findings of Makruf et al. (2011), because they show that the use of agricultural technology, including fertilizers and mechanization tools (X1), contributes significantly to increasing rice productivity (Y) after the technology is implemented (Table 1). However, this study also found that internet access (X2) and social media (X3) do not always have a direct impact on rice productivity, especially in certain farmer groups who have not optimally utilized digital technology (Tables 2-5). This shows that technology based on direct agricultural inputs (fertilizers and mechanization tools) is adopted more quickly than information technology in agriculture.

Sugiantara & Utama (2019) examined the effect of labor, technology, farming experience, and training on the productivity of asparagus farmers in Bali. They found that technology and farming experience have a positive effect on productivity, while training does not always have a significant impact.

The results of this study are also in line with the findings of Sugiantara & Utama (2019), because they show that farmers with higher experience (aged over 40 years) adopt technology faster and experience increased productivity compared to young farmers (Table 4). In addition, the finding that training does not necessarily have a direct impact on productivity is also supported by the results of this study, where several groups of farmers (such as those with higher education) did not experience significant changes even though technology was available (Table 5).

Internet (X2)

The results of this study are also the same as the Harrod-Domar model of growth which is also based on the

assumption that the production coefficient is fixed. Harrod-Domar revealed that technological progress, in this case the internet, is neutral and does not affect agricultural productivity with the assumption that the production coefficient is fixed. Likewise, the Neoclassical Model still considers technological advances, in this case the use of the internet, to be exogenous. It is exogenous, meaning that the use of the internet has no effect on indicators of agricultural productivity, namely production, income and profit.

The results of this study support previous research by (Catur Yuantari et al., 2016) regarding the Utilization of Information Technology to Improve Marketing of Agricultural Products in Curut Village, Penawangan District, Grobogan Regency, Central Java. This research method uses quantitative research using a questionnaire, which is conducted by interview technique. Sampling in this study used inclusion criteria including: farmers aged 25-65 years, living and working on agricultural land in the village of Curut. From 226 data obtained 54 farmers. The research results obtained are the level of knowledge of farmers about the sales system using the internet 100% never know and do not use it, in fact only 9.26% can use the internet. There are 5.6% of farmers who use the internet for sales.

The research results that support this research are research by (Janc et al., 2019) entitled In The Starting Blocks For Smart Agriculture: The Internet As A Source Of Knowledge In Transitional Agriculture. This study used a questionnaire method provided by nearly 2500 farmers in Poland. The results of this study reveal that the Internet is not the most important source of information for Polish farmers. Although there is a close relationship between the use of the Internet and their basic social characteristics, it is also related to the structural features of Polish agriculture.

The development of technology and knowledge in all fields is increasing from year to year, but not everyone can enjoy it(Diartho, 2019). The internet has grown rapidly and is used by almost everyone to make their work easier. One of them is the use of the internet by rice farmers in Purwoharjo District, Banyuwangi Regency. The use of the internet by rice farmers is minimal in fields related to agriculture. This is because farmers more often use old habits than new habits. Farmers more frequently and happily use the advice of family or confidants than the internet.

This study reveals the educational background of rice farmers in Purwoharjo District, Banyuwangi Regency, the majority of whom have elementary and junior high school education. Even though it has been sorted and filtered, the minimum education in this study is elementary school. However, farmers in general still have a low level of education and there are still many farmers in Indonesia who are illiterate, so that the use of technological developments cannot be felt by them. The education level of farmers is a benchmark in adjusting to technology, especially the use of the internet. However, some of the technological developments applied to farmers include that in increasing farmer knowledge it can be done with multi-media.

Based on the results of the study it was found that the majority of farmers in this study in Purwoharjo District, Banyuwangi Regency were aged 45 to 56 years. This age is the middle age between young and old, some farmers who have been researched suggest that young people currently prefer other sectors besides agriculture to be their profession. Selection of other sectors because the agricultural sector is considered not very promising and requires a long time in the harvesting process. At this age, farmers grew up with television and radio, they revealed that they felt clueless to keep up with the times, especially the development of the internet.

Social Media(X3)

This result breaks Solow's theory which says that technological advances affect productivity. However, the results of this study are also consistent with Hicks' theory that technological progress can be neutral. According to Hicks, a technological advance in this study, the use of social media is said to be neutral if the ratio of the marginal product of capital to the marginal product of labor remains unchanged for any fixed ratio of capital and labor. The results of this study are also the same as the Neoclassical Model which still considers technological advances, in this case the use of social media to be exogenous. Exogenous means that the use of social media does not affect agricultural productivity indicators, namely production, income and profit.

The results of this study are in line with research conducted by(Samsinar, 2018). Utilization of social media in agricultural extension consisting of whatsapp media and mobile phones with a value of 2.48 and cellphones obtaining a value of 2.68 including the good category, television obtaining a value of 1.76, Facebook obtaining a value of 1.80 and BBM obtaining a value of 1, 84 is included in the poor category and those included in the not good category are radio media with a value of 1.60, laptops with a score of 1.60 and Instagram with a score of 1.72.

Research that is in line with these results is research by (Ahmad Nurhadi, Rob Sosiatri, 2022) which explains that based on field survey results, the condition of rice farming in the village of Cihambulu, Pabuaran, Subang, West Java continues to decline both in terms of quality and quantity. caused by various factors, including a lot of agricultural land that has converted into factories, most farmers have started to switch professions to become farm labourers, factory workers and other jobs, agricultural products are not properly distributed because knowledge about digital marketing and marketing management is still low. In addition, research conducted by (Kusumadinata, 2016) revealed that social media is only used as entertainment and not as part of reliable information media.The average farmer in Purwoharjo District, Banyuwangi Regency has not used social media much. This is due to inadequate technological knowledge regarding social media. They haven't made much use of social media in marketing agricultural products to increase the productivity of rice plants in Purwoharjo District, Banyuwangi Regency. Social media is only used for entertainment purposes only and not as part of a reliable information medium. After work, most of them use social media to find entertainment content, not education about agriculture.

Farmers prefer to carry out direct communication activities. Direct communication is more reliable and not easily changed and the validity of the information can be maintained compared to communication using social media. The need for a behavior-based information strategy that refers to the value of the need for farmer information through social media. It aims to be able to build a communication model system that is designed to build information based on cyber agribusiness.

The ability of farmers in Purwoharjo District, Banyuwangi Regency in terms of increasing agricultural productivity such as production, income and profits from agricultural products is still minimal. Farmers only depend on natural conditions and the government. Without assistance from the government it is very difficult to develop social media on agricultural productivity, especially the productivity of rice plants. Some things that are needed by rice farmers to increase the productivity of rice farming in Purwoharjo District, Banyuwangi Regency are in the form of counseling, tutorials and providing motivation and assistance in marketing that utilize social media and good management knowledge to increase the productivity of rice agricultural products in Purwoharjo District, Regency Banyuwangi

Practical Implications and Policy Recommendations The results of this study indicate that the adoption of agricultural technology (X1), internet access (X2), and social media (X3) contribute to increasing rice productivity (Y), but the impact is uneven across farmer groups. Therefore, more targeted and evidence-based policies and interventions are needed so that the benefits of technology can be felt widely. Implications for Agricultural Policy The government needs to accelerate the provision of agricultural technology infrastructure, especially in villages that have not been significantly affected (Table 2). Subsidies for modern agricultural tools and technology-based credit schemes must be adjusted to farmers' needs to increase technology adoption. Improvement of Extension Services needs to be adjusted to farmer characteristics. Older farmers need more field demonstrations, while younger farmers are more responsive to digital approaches such as video tutorials and webinars (Table 4). Digital literacy also needs to be improved to help farmers utilize the internet and social media in marketing and accessing information (Table 5). Interventions to Increase Productivity The government can establish agricultural technology centers in each village and distribute IoT-based agricultural tools to increase production efficiency. Digital marketing training for farmers is also needed so that they can sell their crops directly to the market without intermediaries (Table 3). In addition, partnerships with agricultural startups can help accelerate digital transformation in the agricultural sector.

Technology-based agricultural policies must be adapted to local conditions. Digital extension, wider access to technology, and modern marketing strategies are key to increasing rice productivity. The results of this study can be a reference for the government and agricultural stakeholders in designing more effective data-based policies.

CONCLUSION

This study aims to analyze the relationship between the use of agricultural technology (X1), internet use (X2), and social media use (X3) on rice productivity (Y). The results of the Chi-Square analysis show that the use of agricultural technology (X1) has a significant effect on increasing rice productivity, while the use of the internet (X2) and social media (X3) have a more limited impact. Demographically, the effect of the use of agricultural technology on rice productivity is more pronounced among male farmers, the age group 41 years and above, and farmers with elementary or junior high school education. In contrast, for female farmers, the age group 30-40 years, and those with high school or bachelor's education, the impact of technology on rice productivity is not significant. In addition, there is variation in the impact of technology based on village location. In some villages, technology contributes significantly to increasing rice productivity, while in other villages the impact is still limited, possibly due to different access to infrastructure and levels of technology adoption. The results also revealed that although the internet and social media have begun to be used in agriculture, their impact on rice productivity is still not significant for most farmers. This shows that the use of digital technology in the agricultural sector still requires further support in the form of increasing digital literacy, digital marketing training, and supporting infrastructure. Overall, this study confirms that agricultural technology plays an important role in increasing rice productivity, but its success depends on factors such as demographics, access to technology, and farmers' readiness to adopt it. Therefore, policies and programs that support agricultural digitalization must be tailored to the specific needs of farmers based on gender, age, education level, and village location so that the benefits can be felt more widely and evenly.

DECLARATION OF INTEREST

The authors declare no conflict of interest in this study

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