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INFLUENCE OF SOCIAL ECONOMIC FACTORS AND AGRICULTURAL TECHNOLOGY IMPLEMENTATION TOWARD ORANGE CROP PRODUCTIVITY

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Abstract: The purpose of this study was to find out and analyze the socio-economic influence of farmers on the level of technological application in orange plantation. The research method used descriptive analysis, while to determine the relationship between variables was done by using a simple non-linear regression test and multiple linear regression test. A survey method was conducted on socio-economic factual description of farmers, the application of agricultural technology, especially orange plantation and its productivity. The unit of analysis is a farmer who was cultivation in 2009 until 2020. The sampling technique was done by two-stage random sampling and obtained a sample of 90 farmers as respondents. The collected data were analyzed analytically descriptive according to the results of hypothesis testing. The result of the research showed that: The application of agricultural technology influenced by socio-economic factors, namely the area of arable land and social media exposure.

Keywords: Agricultural Technology Application, Orange Productivity, Socio Economic Factors.

INTRODUCTION

Agricultural development is basically a deliberate conscious effort planned to make the desired changes by all practitioners and institutions using certain technologies that are appropriate to the potential of the local agro-ecosystem, in order to increase crop productivity and farmers' incomes. Associated with agricultural development in the current era, the development must adapt to the needs of the consumer community, as well as local potential and diversity. This requires attention to farmers as adopters of technology as well as farmer participation in efforts to sustain agriculture by increasing their competence, empowerment and quality of life. (Haryanto, 2011).

Agricultural development in the face of changes in agro-ecosystems is more focused on superior commodities that can compete in domestic and international markets. Seeing the potential of the domestic market and the international market of agribusiness development in

Indonesia has a very bright prospect, because international trade is increasingly open and transparent (Daniel, 2002).

Agricultural development that is more agribusiness oriented must become the foundation of national development, so that it requires a change of approach and paradigm, namely the development of a modern agribusiness system that relies on unskilled human resources must shift to agribusiness systems that rely on capital and skilled human resources, technology adapted by each local resource. This agribusiness development must be centralized based on a handful of groups must shift to a decentralized agribusiness system and the culture of the local community (Saragih, 2003).

Agribusiness development aims to encourage the development of agricultural businesses with business insights that are able to produce agricultural products and primary agricultural industries that are competitive in generating added value for increasing income, agricultural labor, regional economic development, increasing the income and welfare of farmers, producers and supporting income growth national (Prakoso, 2002).

One of the horticultural agribusiness commodities that is expected to meet the target in accordance with the regional potential outlined in agricultural development from the micro, macro and global dimensions is the orange commodity. From the micro aspect, oranges are expected to be able to create income for farmers, from the macro aspect is one of the commodities that will meet the needs of the community for sources of nutrition, including vitamins, while in the global dimension oranges have their own unique potentials and advantages that are not possessed in any other country. the commodity is owned in Indonesia more specifically in Garut Regency. Seeing this potential, oranges have the opportunity and comparative advantage as a commodity producing for the country's foreign exchange.

Opportunities for orange exports to foreign countries are very open considering the demand for oranges from export destinations continues, not to mention domestic demand that has not been fulfilled every year. Along with the increase in population and health awareness, as well as people's lifestyles. Export destinations including Saudi Arabia (15.5 tons), Hong Kong (17.2 tons), Singapore (10.6 tons), and Vietnam (17.5 tons). The development of orange plantation into a mainstay of export commodities is very open.

Garut is one of the regencies in West Java Province that is considered to have a high potential for horticultural agribusiness. Various fruits are produced annually from this region to meet the needs of the local market, also meet the needs of demand outside the district. The potential is obtained in table 1 below:

Table 1. Fruits Production of Garut Regency in 2018

No	Fruits Name	Productions (Tons)	Productivity (Tons/Ha)
1	Oranges	37.176	6,30
2	Bananas	18.182	3,08
3	Papayas	1.425	2,41
4	Avocados	1.120	1,90
5	Guavas	1.018	1,72

Souce : Garut Regency Agriculture Office, 2018

Based on the table above, illustrating that the potential for oranges production is an indication of the potential for agribusiness in Garut Regency, for 2018 with a record that oranges production has reached 37,176 tons or productivity of 6.30 tons / ha.

Garut Regency is an agrarian area geographically located in West Java Province, including a C type climate with a rainfall of 1,589 mm / year having an area of around

3,065.19 km² and consisting of 42 districts, 21 villages, and 403 villages with natural resources which range from mountains, forests, seas and beaches. Based on the strata of agricultural development areas, it is very potential for the development of food crops, horticulture, and plantations.

Agriculture development in Garut regency based on exposure to the agriculture service (2010), has made a major contribution to national development, both in the form of direct contributions such as GDP formation, employment, foreign exchange earning through exports and inflation suppression, as well as indirect contributions through the creation of conducive conditions for the implementation of economic development in Garut Regency by contributing to the GDP of 31.14% which ultimately contributed to the economic growth (LPE) of 4.27% which has been achieved by farmers or the community both on their own plots or gardens, so among the commodities of fruits that have the potential to develop very well are oranges. Oranges (*Orange sp*) is a plant native to Asia as one of the fruits favored by various walks of life who love it, because it has a good taste, sweet and sour, and a fragrant aroma.

Oranges are source of vitamin C which is very vital for the survival of the body's metabolism and maintaining one's health (Trubus, 2009). The availability of fruits in Indonesia is 43.31 kg / capita / year, so Indonesia is still significantly adrift, so it is worthy of world recognition if the two countries got the title as a fruit exporting country in the International.

High oranges production in Garut Regency has not been followed by productivity levels. This fact shows that productivity achievements are still low at only 6,309 tons / ha. Oranges productivity figures in Garut Regency still have the potential to be increased, at least targeted to reach 8.5 tons / ha or 0.85 quintals / trees. The above fact is an interesting optimism and needs to get serious attention from all agribusiness and local government regulations, and it is not something that is impossible if there is a touch of efforts to apply agricultural technology.

Subsequently released on its development, the potential of horticulture, especially oranges in Garut Regency, shows a promising impression over the past five years by showing an increasing trend of development every year. These developments can be seen in the following table 2:

Table 2. Total of Planted Area, Harvest Area, Production, and Oranges Productivity In Garut Regency, 2018

Year	Planted Area (Ha)	Harvest Area (Ha)	Production (Tons)	Productivity (Ton/Ha)
2014	6.540	5.740	35.065	6,11
2015	6.557	5.619	35.124	6,25
2016	6.777	5.577	35.195	6,31
2017	6.800	5.688	36.695	6,45
2018	6.824	5.650	37.210	6,58

Sumber : Garut Regency Agriculture Office, 2018

Oranges cultivation techniques can be cultivated in the yard or other open land, to be pursued in the fulfillment of nutrition, also has aesthetic and ecological value. The existence of this plant, especially in the Garut Regency, is often found on community land, although the amount is still limited, but has high potential.

Oranges commodity has a bright prospect to meet domestic demand, this commodity is usually sold at the consumer level during the harvest season between Rp. 8,000 / kg and outside the season reaches Rp. 12,000 / kg. Such high opportunity is still not achieved from its production position.

Oranges production activities that are still experiencing problems in agricultural technology include: techniques to counteract CVPD attacks, so that the impact can thwart the harvest, as well as productivity that has not been optimal because farm management carried out by farmers is still traditional, so fruit quality is still low both in fruit size, level fruit maturity is not uniform, fruit / tree productivity achievements are low, and it is deformed due to pests and inadvertent harvesting.

Farmers who work on oranges are found in several districts in Garut Regency. One of the sub-districts which become oranges production in Garut Regency is Bayongbong, a producer farmer in the sub-district that has joined in a joint forum of farmer groups with their socio-economic diversity (Farmers) and the varying degrees of technology application.

According to Abidin (2000) , the ability of farmers to respond to the level of application of agricultural technology in farming was closely related to socio-economic factors and there was a positive relationship and some were negative. Based on the description above, then in this study will explore how much influence the level of application of agricultural technology and how much influence its application on increasing crop productivity.

LITERATURE REVIEW

Socio-economic diversity needs to get joint attention (Berkhout et al, 2002) because this condition is a major factor in the agricultural sector and as the majority of producers are farmers generally have limitations in the control of land (Walters & Groninger, 2014). They are also limited capital in farming which has an impact on low production and their income.

Limited farm land at the farm level is a daily phenomenon that occurs naturally (Power, 2010) . The desire to have a broad business is a hope among them but with limited ability must also adjust to their capital. For farmers who have enough capital, they dare to invest in bigger businesses and vice versa. Proving that there is courageous behavior for farmers in taking risks related to the business they run.

Behavior of farmers in taking risks depends on how they can predict their farming business (Darnhofer, Schneeberger & Freyer, 2005).. Oranges farming is seen as a profitable business prospect. Business behavior is usually seen in terms of managing its business in having production techniques or methods as well as the use of production inputs. For farmers who have a wider business, they will face more risks in the form of business losses that tend to be careful in dealing with risks more carefully and try as efficiently as possible.

Soekartawi (1986), revealed that there are prominent characteristics of small farmers, namely ownership of land, control over resources and low income received, in general these smallholders only control a small plot of land and are sometimes accompanied by certainty in their processing, other than the condition of the land is usually infertile and scattered. On the one hand their numbers are increasing as revealed by Soewardi (2005), the results of the 2016 agriculture census that the percentage of smallholders continues to grow ie from 11.8 million (52.7%) in 2006 to 14.7 million (56.5%) in 2016.

Conditions like this also occur due to a decrease in the amount of agricultural land due to land conversion (Azadi, Ho & Hasfiati, 2011) which was previously used as an agricultural area to become settlements, buildings, and industrial factories (Nguyen et.al,

2016), although quantitatively the existence of farmers in Indonesia is still dominant, but due to narrow land tenure and inefficient management, Farming carried out by farmers becomes economically unattractive, as a result it does not provide a decent income guarantee.

The concept of farmers in sociology is peasants and farmers. Peasants are farmers who have narrow land and utilize a large part of the agriculture obtained for their own interests. While farmers are farmers who live in the agricultural world, by utilizing modern technology including banking services. Sociologists say that the two concepts, all people who live from agriculture are called farmers (Soetrisno, 2002). Farmers in the sub-district of Bayongbong in Garut Regency turned out to have the characteristics of farmers and peasants.

Farmers as agribusiness entrepreneurs generally have the characteristics of income level, education, managerial ability, access to capital and low information. This is the background of various potential problems as obstacles to the achievement of the objectives of the cooperation program. For example, low income levels allow farmers not to use working capital loans for their farming businesses but are used to meet other unproductive needs such as consumption (Krisnamukti, 2004).

Farmers' income is the product of production produced at a price, minus all production costs incurred (Mubiyanto, 1975). There are 3 factors causing the low income of farmers, namely low production (Y), low price (HY) on high production costs (TC). While the low production is very likely to occur due to the still low or not yet the maximum socio-economic factors and the level of application of agricultural technology by farmers in the field.

The still low symptoms on crop production (Cakmak & Yazici, 2010), especially the oranges commodity, need the attention of various parties, because most farmers in Indonesia have joined the farmer groups organization, which means it is considered quite good in responding to every agricultural technology program (Mufidah et.al, 2016).

Symptoms of the decline and the maximum potential for oranges production are caused by socio-economic factors that have seen from the socialized farmers. Factors included in the socio-economic are among others due to a decrease in the application of the use of agricultural technology, because the implementation is still in a state of forced or may be caused by a decrease in the intensity of agricultural strengthening activities, so that the agricultural technology package does not get a good response (Carrillo et.al, 2018).

The amount of farmer's income can be seen from the amount of product yields (Reidsma et.al, 2010). Adaptation to climate change and climate variability in European agriculture: the importance of farm level responses. *European journal of agronomy*, 32(1), 91-102. in his farming business, so that with many production results it can be predicted that the results of the farming activities are profitable. So for the volume of re-production is something owned by the farmer that supports the success in managing his farming business.

Achieving productivity is the resultation and performance of a business and is related to how to use production inputs (Buslig, 2018) such as amount of oranges seedlings quality, provision of fertilizers according to recommended dosages, how to use pesticides according to needs and labor and water management. Management of the optimal use of inputs as a production process for oranges cultivation requires experience and expertise. The principle is how to use these optimal production inputs to achieve maximum productivity.

According to the theory of social person action in Hamilton (1992), that social reality is a picture of the tendency of farmers to choose and even replace it with technology other than those recommended. This is possible due to socioeconomic factors in its ability to respond to the level of application of agricultural technology.

RESEARCH METHODS

This study uses a survey method, which is meant by the survey is an attempt to gather information from respondents who are sampled using a list of questions that have been structured. According to Singarimbun (1984), the notion of such a survey is limited to the definition of sample by gathering information from a portion of the population in the hope that representative data will be obtained.

Sugiyono (1999), argues that data collection can use primary and secondary sources. Primary sources are data sources that directly provide data to data collectors, while secondary sources are those that do not directly provide data. In this study there were collected consisting of primary and secondary data, while the data needed to test the hypothesis entirely in the form of primary data obtained from respondents.

Data collection procedures are done by indirect communication techniques using research instruments in the form of questionnaires and documentation studies. Data collection procedures with a questionnaire carried out through a list of questions / written questions compiled to get information or information from several people. While the data procedure with documentation study is by studying written materials related to the object under study.

Primary data that are expected to be collected from the instrument are those concerning the level of adoption of innovations in the oranges farming technology package for farmers who have different socioeconomic levels. Secondary data were obtained from Dinas and literature study.

The target population in this study were farmers who worked on oranges in Bayongbong District. The sampling technique is done by two stage random sampling. This research was conducted through a survey with the following sampling techniques:

1) The withdrawal of the first stage of the sample is to determine the sub-district intentionally (purposive), which is the sub-district which is the location of oranges farming and the selected sub-district is Bayongbong.

2) Choosing the suitable village, which is the village according to the registration at the district level which is the location of production, that is, the village which, according to the registration at the subdistrict level, is the location of the production of oranges in three villages. The selected villages are Mekarjaya Village, Banjarsari Village, and Mulyasari Village.

3) Establish Secondary Sampling (SSU) which is the stage of determining secondary sample units, in this case is to determine the sample size of farmers as an analysis unit. Based on preliminary information in three villages selected as many as 445 oranges farmers.

Dynamic data consists of qualitative and quantitative data. Quantitative data analysis uses an approach by means of descriptive data presented in the form of tabulations. Quantitative analysis is used by means of analytic descriptive adjusted to the results of hypothesis testing. Testing the hypothesis used is multiple regression analysis and simple linear regression analysis.

FINDINGS AND DISCUSSION

1. Effect of Farmers Socio-Economic Factors on the Level of Application of Agricultural Technology

The level of application of agricultural technology in oranges plants as described in the first hypothesis, is influenced by farmers' socio-economic factors. To find out the extent

of the influence of socioeconomic factors on the level of application of orange technology, analyzed with the statistical test "Multiple Linear Regression".

In table 35, the determination value (R²) of 0.446 shows that 44.6%, variable variations in socioeconomic factors can explain the level of technology application. The remaining 55.4% is explained by other variables outside the model. Judging from the analysis of variance values obtained F count of -9.256 and a significant value of 0.000 < 0.05, then H_a is accepted, because lower and upper are negative, then H_a is accepted, so it can be concluded that there are differences in average productivity.

Analysis of the effect of each independent variable on the dependent variable using the t test. Based on the test results, it turns out that corruption, commercialization of business and exposure to mass media significantly affect the level of confidence of 95% on the level of application of agricultural technology (X₂). As for the area of arable land, education, farming experience, farmers' participation in counseling and democratic practices do not have a significant (non-significant) effect. In summary the results of the analysis can be written as follows:

$$\begin{aligned} X_2 &= 0.56 + 1,000 (X_{11}) + 0.397 (X_{12}) + 0.327 (X_{13}) + 0.327 (X_{14}) + 0.327 (X_{15}) \\ &+ 0.213 (X_{16}) + 1,000 (X_{17}) \\ &= (3.85) (7.70) (2.72) (2.24) (2.24) (2.24) (1.46) (7.70). \end{aligned}$$

No effect on the area of arable land, education, farming experience, and farmer participation in counseling, may be caused by the variable data which lacks variation (the variation is relatively homogeneous) to the level of application of agricultural technology in oranges plants. This is seen as less supportive of the absorption of agricultural technology, most of the relatively small amount of land area is less supportive of the level of application of oranges farming technology.

2. The Effect of Application of Agricultural Technology on Productivity

The level of productivity as described in the second hypothesis is influenced by the level of application of agricultural technology. To find out the extent of the effect of the level of application of agricultural technology on productivity is analyzed by the statistical test "Simple Linear Regression".

In table 36, the determination value (R²) of 0.716 shows that 71.6% of the variation in variable technology diversity can explain productivity. The remaining 28.4% is explained by other variables outside the model. Judging from the analysis of variance, the calculated F value is 31,887 when compared to the F table of 0.385 and a significant value of 0.000 < 0.05, then H_a is accepted, because the lower and upper values are positive, H_a is accepted, so that simultaneously the level of technology application significantly influences (significantly) to productivity.

Analysis of the effect of each independent variable on the dependent variable using the t test. Based on the test, the real results are obtained, namely that the level of application of agricultural technology significantly affects the level of confidence of 95% on productivity. In summary the results of the analysis can be written as follows:

$$\begin{aligned} Y &= 0.215 + 0.884 X_2 \\ &= (3,853) (-2,831) \end{aligned}$$

3. The Socio-Economic Effect of Farmers and the Application of Agricultural Technology on Productivity

The level of productivity as described in the third hypothesis, is influenced by the socio-economic level of farmers and the application of agricultural technology. To find out the extent of the influence of the socio-economic level of farmers and the application of

agricultural technology to productivity was analyzed with the statistical test "Multiple Linear Regression".

In table 37, it can be seen that the determination value (R²) of 0.099 means that 9.9% of the variation in the free variable diversity of farmers' socioeconomic level and the application of agricultural technology can explain productivity. The remaining 90.1% is explained by other variables outside the model. Judging from the analysis of variance, the calculated F value is 4.755 with a significant value = 0.011. ANOVA test criteria is if the value is significant α, then the resulting correlation coefficient is significant. Because the value of Sig. = 0.011 <math><0.05</math>, then the resulting correlation coefficient is significant, which means that simultaneously the socio-economic level of farmers and the application of technology have a significant (significant) effect on productivity.

Analysis of the effect of each independent variable on the dependent variable using the t test. Based on the test, it turns out that the results show that the socio-economic level of farmers and the application of agricultural technology significantly influence the level of confidence of 95% on productivity. In summary the results of the analysis can be written as follows:

$$Y = 0.215 + 0.021 (X_1) + (-0.015) X_2 \\ = (3,853) (3,075) (-2,831)$$

Based on the data above, socio-economic factors and the application of agricultural technology affect the productivity of oranges plants. With the ability to contribute each variable above will be different from each other. The analysis also identified that the higher socio-economic level and the application of agricultural technology could encourage and increase the productivity of oranges plants.

4. Research Implication

Based on the findings obtained from this study, three of the seven socio-economic factors of farmers that have a significant influence on the level of technology application are education, business commercialization, and exposure to mass media, while for the area of arable land, farming experience, farmers' participation in extension and cosmopolitan no influence on the level of application of agricultural technology. High or low application of oranges technology is reflected by the good socio-economic conditions that will ultimately determine the level of productivity of oranges plants.

Along with the policy of agricultural development, where the general strategy is to place an agrarian economy focused on the agribusiness and agro-industrial systems as activities that provide direction for the development of cultural transformation, especially in the countryside. Policies in the context of increasing crop productivity cultivated by farmers are pursued through the creation of a conducive agribusiness system and the development of innovations and technologies that are suitable for agroecosystems, especially in the current era directed towards becoming agro-economic areas of agriculture and agro-tourism.

Increased productivity as well as farmers' income may not be realized without an effort to increase the application of agricultural technology in carrying out farming activities. Technology improvement will not be separated from the support of farmers' socio-economic factors. These socioeconomic factors include: education, business commercialization, exposure to mass media, arable land area, farming experience, farmers' participation in counseling and cosmopolitanism.

Whether or not a farmer is successful in his farming business is greatly influenced by the socio-economic factors of the farmer. The seven socioeconomic factors influence each

other so that the improvement of one component of the socio-economic factors of farmers alone will not produce satisfactory results without being accompanied by improvements in the other linkages. From these links, there are those that within certain limits can be controlled by farmers and cannot be controlled by farmers at all, namely the level of prices or price tendencies in general that apply throughout the territory of the State, as well as the situation of unforeseen natural situations such as: natural disasters, climatic conditions such as the present prolonged dry season which is usually psychologically disturbing to plants that affects the rate of growth is also not optimal results.

While socio-economic factors that can affect the costs and income of farmer farmers to a certain extent can be controlled by farmers including the large volume of farming as a company, high yields from livestock as a side business, efficiency in the use of agricultural equipment and machinery, division of business branches, efficiency in the use of labor, education, especially training, age of farmers, and adjustment of farming business with capital as well as the courage of farmers to use banking credit such as KUR funds and the like. While crop productivity will be fulfilled very much depends on the treatment of these farmers and demonstrate agricultural technology properly in accordance with the growth and development of plants including oranges.

Farming is a complex field, various problems arise from the elements contained in it as a system to the external factors that influence it. Farming activities lead to a complex activity in the sense of involving a number of factors, both directly and indirectly related to the production process.

Based on these conditions, the policies that must be adopted for the development of oranges farming in order to increase productivity including income of oranges farmers must pay attention to socio-economic factors. Socio-economic factors need to be supported and adjusted to the culture of the community, the availability of institutional facilities, economic tools, and the physical environment. Positive individual characteristics support increased production, so that ultimately it will impact on productivity as well as farmers' incomes. These factors, which need to be considered in an effort to increase the level of application of agricultural technology in the context of increasing the production of oranges farming in the form of adoption, innovation, mastery, and application of the technology.

To increase the production of oranges plants that have an impact on the success of productivity and income of farmers, it is necessary to have a transparent economic policy, development of a better economic infrastructure, so that agribusiness-oriented agri-business based agriculture activities are rural based. In addition, it is necessary to create a mechanism of cooperation through partnership and managerial relationships that are designed, assembled and developed in accordance with the needs of farmers who have the support of various parties involved, both from the government apparatus in this case the agricultural service in the regency.

CONCLUSION AND SUGESTION

Based on testing the hypothesis and discussing the results stated above, it can be concluded as follows:

1. Farmers' socio-economic factors such as: arable land area (X_{11}), farming experience (X_{12}), education (X_{13}), farmer participation in extension (X_{14}), cosmopolitanism (X_{15}), business commercialization (X_{16}), and mass media exposure (X_{17}) simultaneously has an influence on

the level of application of orange technology. Individually and the seven socio-economic factors of oranges farmers studied that have a real influence on the level of application of oranges farming technology are the area of arable land and mass media exposure.

2. The level of application of orange technology has an effect on productivity. The better the level of technology application, the higher the productivity of oranges farming.

3. The socio-economic level of farmers and the application of agricultural technology have an influence on the productivity of oranges plants. The higher the socio-economic factors of farmers and the level of application of agricultural technology, the higher the productivity of oranges.

It is necessary to further study the deepening of the socio-economic factors of oranges farmers, especially the level of arable land and exposure to social media able to encourage increased productivity. It is also necessary to further study the critical points faced by farmers in the application of agricultural technology and the productivity of oranges farming, especially the use of seeds, and control of pests / viruses of CPVD.

It needs to be studied further about farmers' socio-economic factors in terms of internal and external factors of farmers. It is necessary to further study the application of agricultural technology packages in providing an increase in the productivity of oranges farming.

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